


Readiness of micro, small, and medium enterprises (MSMEs) in the food and beverage sector for halal certification implementation: A case study in Magelang, Indonesia

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ABSTRAK

Introduction

Halal certification is increasingly critical for Micro, Small, and Medium Enterprises (MSMEs) in Indonesia, especially in the food and beverage sector. Despite its mandatory status under Halal Product Assurance Law, many MSMEs face challenges in achieving compliance due to limited knowledge, inadequate service support, and operational constraints.

Objectives

This study investigates the readiness of MSMEs in Magelang to implement halal certification. It analyzes the influence of knowledge, service quality, halal awareness, production processes, and human resource capabilities on MSME readiness while identifying the most significant factors affecting compliance.

Method

The research employs a quantitative cross-sectional approach, surveying 110 MSME operators in Magelang. Data were collected using structured questionnaires and analyzed using descriptive statistics, classical assumption tests, and multiple linear regression analysis.

Results

The findings reveal that knowledge, service quality, and halal awareness significantly influence MSME readiness for halal certification, with knowledge being the most dominant factor. Human resource capabilities also positively impact readiness, while production processes were found to be insignificant. The model explains 74% of the variance in readiness, emphasizing the importance of integrating these factors.

Implications

The study highlights the need for targeted educational initiatives, streamlined certification processes, and enhanced institutional

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support to improve MSME compliance. It provides actionable insights for policymakers, certification bodies, and MSME operators to foster a robust halal certification ecosystem.

Originality/Novelty

This research contributes to the understanding of halal certification readiness by offering a multidimensional analysis of critical factors, addressing gaps in existing literature, and proposing practical interventions to enhance MSME participation in the halal market.

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INTRODUCTION

The micro, small, and medium enterprises (MSMEs) sector has consistently served as a backbone of the Indonesian economy, contributing approximately 61.07% of the nation's gross domestic product (GDP), equating to IDR 8,573.89 trillion, and accounting for 99.99% of employment opportunities (Kementerian Koordinator Bidang Perekonomian Republik Indonesia, 2021). This unparalleled impact underscores the sector's pivotal role in fostering economic stability and promoting socio-economic development across Indonesia. Given the country's demographic composition as the world's largest Muslim-majority nation, the demand for halal-certified products aligns seamlessly with consumer expectations and global Islamic economic trends. Indonesia ranks second globally in the halal food category, as per the Global Islamic Economy Indicator (LPPOM MUI, 2023). This positioning highlights not only the domestic importance of halal certification but also its potential to catapult Indonesia as a global hub for halal food production, thereby strengthening its competitive edge in international markets.

Halal certification has transitioned from being a voluntary measure to a mandatory compliance requirement under the Halal Product Assurance Law (Law No. 33 of 2014). This regulation mandates that all consumable goods distributed in Indonesia, including those produced by MSMEs, meet halal certification standards. The mandatory certification, implemented since October 2019, is a crucial step in ensuring consumer confidence, particularly within the Muslim community, by guaranteeing the halal integrity of products (Giyanti et al., 2020). However, despite its critical importance, many MSMEs in Indonesia, especially in cities like Magelang, struggle to align with these regulatory demands due to internal and external barriers. These include insufficient knowledge about certification requirements, limited awareness of the benefits of halal certification, and systemic inefficiencies in the certification process.

The research problem centers on the readiness of MSMEs in the food and beverage industry to comply with mandatory halal certification. While halal certification can provide competitive advantages by increasing consumer trust and

expanding market reach, the adoption rate among MSMEs remains alarmingly low. For instance, preliminary surveys conducted with 15 food and beverage MSMEs in Magelang revealed that only two enterprises had successfully obtained halal certification. The reluctance or inability to comply is often attributed to various challenges, such as a lack of knowledge about certification procedures, inadequate access to necessary resources, and a perceived complexity of the regulatory framework (Rudianto et al., 2024). Addressing these issues requires a nuanced understanding of the factors influencing MSME readiness, coupled with targeted interventions to foster compliance.

General solutions to the identified challenges have often involved providing informational support and capacity-building initiatives. Government-led programs like SEHATI (Sertifikat Halal Gratis) aim to reduce the financial burden associated with certification while raising awareness about its importance. Such initiatives, though impactful, need to be complemented by evidence-based strategies tailored to the unique needs of MSMEs. Studies have shown that knowledge dissemination, skill enhancement, and streamlined processes can collectively improve compliance rates. For example, A'yun (2023) emphasized that increasing awareness about halal practices and simplifying application procedures can significantly enhance MSME participation in halal certification programs.

Specific solutions proposed in existing literature focus on the integration of multiple factors that influence MSME readiness. Research by Harbit & Syafrida (2022) identified key factors, including knowledge, service quality, and halal awareness, as critical determinants of MSME compliance. These factors not only enhance the technical preparedness of enterprises but also address psychological and attitudinal barriers to certification. Other studies, such as those by Rahmawati (2022), have highlighted the importance of robust human resource management systems and effective organizational structures in facilitating compliance. Furthermore, Rahmawati's (2022) findings underscore the value of using advanced statistical tools, such as multiple linear regression, to quantify the impact of these factors on MSME readiness.

Building on these foundations, the current study identifies gaps in existing interventions, particularly in addressing the interplay between internal and external barriers. For instance, while knowledge and service quality are widely acknowledged as critical factors, limited attention has been given to the role of production processes and resource allocation in influencing halal compliance. Similarly, while studies have highlighted the significance of government support, there is a lack of empirical evidence on how these initiatives translate into tangible outcomes for MSMEs.

This study contributes to the existing body of knowledge by addressing these research gaps. It adopts a multidimensional approach, examining factors such as knowledge, service quality, halal awareness, production processes, and human resource capabilities to determine their collective and individual impact on MSME readiness for halal certification. By leveraging advanced analytical tools, such as

SPSS-based multiple regression analysis, the research provides a data-driven understanding of the key determinants of halal certification readiness.

The objectives of this study are twofold: first, to analyze the factors influencing the readiness of MSMEs in Magelang to comply with halal certification mandates; and second, to identify the most dominant factor among these variables. By focusing on the food and beverage sector, this research offers actionable insights that are both sector-specific and policy-relevant. The novelty of this study lies in its holistic approach to examining readiness, which combines traditional factors like knowledge and awareness with operational considerations such as production processes. This comprehensive framework not only deepens academic understanding of MSME compliance but also provides a robust basis for designing targeted interventions.

This study underscores the importance of integrating knowledge dissemination, service improvement, and resource allocation in fostering MSME compliance with halal certification mandates. It highlights the need for a collaborative approach involving both government initiatives and MSME engagement to address systemic barriers effectively. By bridging existing gaps in the literature, this study aims to contribute to the broader discourse on halal certification and its role in enhancing the competitiveness of Indonesia's MSME sector in both domestic and international markets.

LITERATURE REVIEW

Influence of Knowledge on Halal Certification Readiness

The influence of knowledge on halal certification readiness is significant in determining the awareness and intentions of businesses to pursue halal certification. Studies indicate that a greater understanding of halal principles among small and medium enterprises (SMEs) directly correlates with increased readiness to obtain such certifications (Oemar et al., 2023). Knowledge not only facilitates awareness but also mitigates challenges faced during the certification process, such as high costs and administrative complexities (Al-Mahmood & Fraser, 2023; Prawiro & Fathudin, 2023). Furthermore, research reveals that organizations equipped with a better understanding of regulatory requirements are more inclined to engage in certification processes, ultimately leading to enhanced market opportunities and consumer trust (Hasan & Latif, 2024; Talib et al., 2017).

Moreover, the educational status of business actors influences their perception and compliance with halal standards, highlighting the need for improved outreach and training initiatives (Rofiah et al., 2024; Syufa'at et al., 2024). Overall, the evidence underscores that enhancing knowledge about halal certification is critical for fostering a conducive environment for SMEs to become compliant and competitive within the halal market (Othman et al., 2017; Prawiro & Fathudin, 2023).

Influence of Service Quality on Halal Certification Readiness

The influence of service on halal certification readiness is multifaceted, emphasizing the significance of effective service delivery in enhancing businesses' willingness to

pursue halal certification. Studies have shown that service quality, including the ability to address client needs and ensure compliance with halal standards, significantly impacts the certification process in restaurants and food services (Katuk et al., 2021; Marzuki et al., 2012). Furthermore, the interaction between service providers and consumers fosters trust in halal-certified products, motivating businesses to achieve certification as part of a competitive strategy (Haleem et al., 2019; Ibeabuchi et al., 2024).

Moreover, inadequate support services often hinder small and medium enterprises (SMEs) from understanding the complexities of halal certification, leading to decreased readiness (Syufa'at et al., 2024). Professional education and tailored services are crucial in bridging the knowledge gap, thus promoting a more favorable environment for certification (Handani & Kim, 2023; Prabowo et al., 2015). In essence, enhancing service capabilities within the halal ecosystem not only aids in compliance but also aligns with broader market demands, thereby contributing to increased halal certification readiness among businesses (Salindal, 2019; Talib et al., 2017).

Influence of Halal Awareness on Halal Certification Readiness

Halal awareness significantly influences businesses' readiness for halal certification by shaping their understanding and commitment to comply with halal standards. Increased awareness leads to better perceptions of the marketing advantages associated with halal certification, particularly in non-Muslim markets, where halal concepts are increasingly integrated into consumer lifestyles (Ibeabuchi et al., 2024; Syahlani et al., 2024). Research shows that businesses with heightened halal awareness are more likely to recognize the importance of certification in ensuring product quality as well as consumer trust, essential factors that can influence their operational strategies (Oemar et al., 2023).

Moreover, organizations that actively promote halal awareness tend to see an uptick in demand for halal-certified products, which pressures them to pursue certification to meet market expectations (Ahmadova & Aliyev, 2021). Studies have identified that heightened halal awareness among consumers translates into greater purchase intentions, thereby encouraging businesses to increase their readiness for certification to capitalize on this consumer behavior (Adel et al., 2021; Gojali & Asih, 2020). Consequently, fostering awareness through targeted education and marketing initiatives is vital in motivating businesses towards securing halal certification and enhancing their competitiveness in the global halal market (Izudin et al., 2024; Jubaedah et al., 2023).

Influence of Production Process on Halal Certification Readiness

The production process plays a crucial role in determining the readiness of businesses for halal certification. Compliance with halal standards during production is essential, as it ensures the integrity of the final product. Studies indicate that businesses engaging in transparent production processes that adhere strictly to halal guidelines are better positioned to achieve certification (Oemar et al., 2023; Syahlani et al., 2024). The effectiveness of the production process, including the sourcing of halal-certified

inputs and proper handling, directly influences consumers' trust in halal products, which in turn motivates businesses to pursue certification (Ibeabuchi et al., 2024; Jaiyeoba et al., 2019).

Moreover, the perception of product quality in halal-certified goods is significantly impacted by the production process. Enhanced production standards are linked to improved consumer confidence and willingness to purchase halal products (Mahama et al., 2020; Zailani et al., 2019). Firms that adopt rigorous quality control measures not only meet halal requirements but can also enhance their market performance and brand image, encouraging others to follow suit (Jaiyeoba et al., 2019; Maulidia, 2022). Thus, a strong commitment to halal principles throughout the production process is essential for businesses seeking certification and for capitalizing on the growing demand for halal products in the market (Wahyuni et al., 2024; Widodo et al., 2023).

Influence of Human Resource Capabilities on Halal Certification Readiness

The influence of human resources on halal certification readiness is a critical factor for businesses aiming to achieve compliance with halal standards. A lack of qualified personnel with the necessary knowledge and skills in halal assurance is often a barrier for small and medium-sized enterprises (SMEs) seeking certification (Syufa'at et al., 2024). The ability of human resources to effectively manage and implement halal practices not only impacts the certification process but also the overall operational efficiency of the organization (Giyanti et al., 2020; Maulidia, 2022).

Research indicates that organizations with established training and development programs related to halal practices are more likely to succeed in obtaining certification (Rafiki & Wahab, 2016). Building a workforce knowledgeable about halal requirements enhances compliance and increases consumer confidence regarding product authenticity (Ahmadova & Aliyev, 2021). This emphasis on human capital development is essential, as educated staff can better navigate the complexities of halal certification processes, thereby reducing challenges related to costs and administrative burdens (Maulidia et al., 2024). Ultimately, investing in human resource development improves readiness for halal certification and contributes to enhanced market performance, highlighting its significant role in the halal ecosystem (Hanifasari et al., 2024).

Gaps in Existing Research

Despite the extensive literature on MSME readiness for halal certification, significant gaps remain. Most studies focus on individual factors such as knowledge or awareness, neglecting the interplay between these elements and operational or institutional challenges. For instance, while Rudianto et al. (2024) emphasizes internal barriers like low knowledge, there is limited discussion on how these barriers interact with external factors such as service quality or regulatory frameworks. Similarly, while Harbit & Syafrida (2022) identifies human resource capabilities as a critical determinant, the broader organizational and systemic implications are rarely explored. These gaps highlight the need for comprehensive, multidimensional

research that examines the synergistic effects of various factors on halal certification readiness.

Novel Contributions of the Current Study

This study seeks to address the aforementioned gaps by adopting a holistic approach to understanding MSME readiness for halal certification. It examines the combined impact of knowledge, service quality, halal awareness, production processes, and human resource capabilities. By leveraging advanced analytical tools such as multiple linear regression, the research aims to quantify the relative importance of these factors and identify actionable insights for policymakers and MSME operators. The findings are expected to contribute to the broader discourse on halal certification, offering a nuanced understanding of the challenges and opportunities in this domain.

METHOD

Research Design

The study adopts a cross-sectional quantitative research design, emphasizing the analysis of relationships between independent and dependent variables at a specific point in time. The independent variables include knowledge, service quality, halal awareness, production processes, and human resource capabilities, while the dependent variable is MSME readiness for halal certification. This design is appropriate for assessing the influence of multiple factors on a singular outcome and enables the use of statistical models to determine the strength and significance of these relationships. The research aims to identify both the collective and individual impacts of these variables, providing a comprehensive understanding of the key determinants of halal certification readiness among food and beverage MSMEs in Magelang.

Population and Sampling

The study's target population consists of MSMEs engaged in food and beverage production in Magelang City, Indonesia. The focus on this sector is driven by its significant role in the local economy and the mandatory halal certification requirements established by Law No. 33 of 2014 on Halal Product Assurance. The population includes MSME operators aged 18 and older who are responsible for decision-making and management processes within their enterprises.

The sampling technique employed is non-probability purposive sampling, which involves selecting respondents based on predefined criteria. These criteria include:

1. MSME operators actively engaged in food and beverage production.
2. Respondents aged 18 years or older with decision-making authority.
3. Businesses operating within the administrative boundaries of Magelang City.

A total of 110 respondents were selected to ensure sufficient data for robust statistical analysis. This sample size is consistent with the requirements for multiple linear regression analysis, which necessitates a sufficient number of observations to achieve reliable results.

Data Collection

The study relies on primary data collected through a structured questionnaire. The questionnaire is designed to capture information on the independent and dependent variables, as well as demographic details of the respondents. Each question is crafted to align with the research objectives and is evaluated for clarity and relevance through a pre-test with a small group of respondents.

The questionnaire is distributed either directly or electronically, depending on the accessibility and convenience of the respondents. A five-point Likert scale is used to assess attitudes, perceptions, and behaviors related to halal certification readiness. The scale ranges from "strongly disagree" to "strongly agree," facilitating the quantification of subjective responses into measurable data.

Operational Definitions of Variables

To ensure clarity and consistency, the study adopts precise operational definitions for the variables under investigation:

- Knowledge (X_1): The extent to which MSME operators are aware of halal certification requirements, procedures, and benefits.
- Service Quality (X_2): The perceived efficiency and effectiveness of services provided by halal certification bodies and related institutions.
- Halal Awareness (X_3): The level of understanding and commitment to halal principles among MSME operators.
- Production Processes (X_4): The adherence to halal standards in sourcing, manufacturing, and handling practices.
- Human Resource Capabilities (X_5): The availability of skilled personnel and organizational support for implementing halal certification.
- Halal Certification Readiness (Y): The overall preparedness of MSMEs to comply with mandatory halal certification requirements.

Data Analysis Techniques

The study employs a series of statistical tests and models to analyze the collected data. The analytical process involves the following steps:

1. Descriptive Analysis
Descriptive statistics are used to summarize the demographic characteristics of the respondents and provide an overview of the variables. Measures such as mean, standard deviation, and frequency distribution are calculated to describe the dataset.
2. Classical Assumption Tests
3. Prior to conducting regression analysis, the data is subjected to classical assumption tests to ensure the validity of the model:
 - Normality Test: The Kolmogorov-Smirnov test is applied to verify whether the data follows a normal distribution. A significance value greater than 0.05 indicates normality.

- Multicollinearity Test: Variance Inflation Factor (VIF) and tolerance values are examined to detect multicollinearity among independent variables. VIF values below 10 and tolerance values above 0.1 indicate the absence of multicollinearity.
- Heteroskedasticity Test: A scatterplot of residuals is analyzed to check for patterns suggesting heteroskedasticity. Random dispersion of points indicates that heteroskedasticity is not present.

4. Multiple Linear Regression Analysis

Multiple linear regression is conducted to evaluate the relationship between the independent variables (X_1, X_2, X_3, X_4, X_5) and the dependent variable (Y). The regression model is expressed as:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + \varepsilon$$

Where:

- Y : Readiness for halal certification.
- a : Constant.
- $b_1, b_2, b_3, b_4, & b_5$: Coefficients of the independent variables.

5. Significance Tests

- T-Test: Assesses the significance of individual independent variables in predicting the dependent variable. A p-value less than 0.05 indicates a significant effect.
- F-Test: Evaluates the collective impact of all independent variables on the dependent variable. A significant F-value suggests that the regression model is appropriate for the data.

6. Coefficient of Determination (R^2)

The adjusted R^2 value is calculated to determine the proportion of variance in the dependent variable explained by the independent variables. Higher R^2 values indicate better model fit.

Ethical Considerations

Ethical standards were adhered to throughout the study. Informed consent was obtained from all respondents, and their anonymity and confidentiality were ensured. The data was collected and analyzed solely for academic purposes, with no personal or sensitive information disclosed.

RESULTS

Descriptive Analysis

The descriptive statistics summarize the characteristics of the respondents and their responses to the key variables. A total of 110 MSME operators participated in the study, with the majority representing micro and small enterprises in the food and beverage sector. Respondents demonstrated varying degrees of knowledge about halal

certification, with mean scores suggesting moderate awareness. However, there were notable differences in service quality perceptions and halal awareness levels among the participants.

The average readiness for halal certification among the MSMEs was measured using a Likert scale, with the findings indicating a general readiness but with considerable variability. Some respondents exhibited high preparedness due to prior exposure to certification processes, while others faced significant barriers related to limited resources and operational challenges.

Classical Assumption Tests

To ensure the validity of the regression analysis, the data underwent classical assumption tests, including tests for normality, multicollinearity, and heteroskedasticity.

Normality Test

The Kolmogorov–Smirnov test was employed to assess whether the data followed a normal distribution. The significance value obtained was 0.200, which is greater than the threshold of 0.05. This indicates that the data is normally distributed, satisfying the assumption necessary for multiple linear regression analysis.

Table 1

Normality Test Results

		Unstandardized Residual
N		110
Normal Parameters	Mean	.0000000
	Std. Deviation	1.35033199
Most Extreme Differences	Absolute	.050
	Positive	.050
	Negative	-.028
Test Statistic		.050
Asymp. Sig. (2-tailed)		.200

Source: Primary data. Authors' estimation.

Multicollinearity Test

Multicollinearity among the independent variables was evaluated using Variance Inflation Factor (VIF) and tolerance values. All independent variables had VIF values below 10 and tolerance values above 0.1, indicating the absence of multicollinearity. These results confirm that the independent variables are sufficiently distinct to be included in the regression model.

Table 2

Multicollinearity Test Results

Variable	Tolerance	VIF
X1	0.224	4.474
X2	0.253	3.959



Variable	Tolerance	VIF
X3	0.364	2.751
X4	0.66	1.514
X5	0.431	2.322

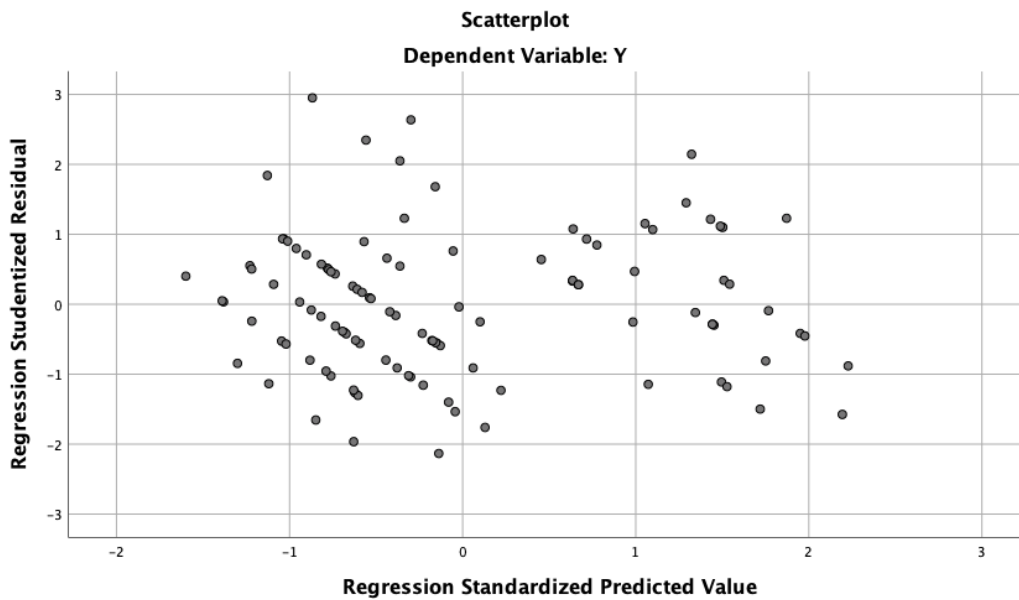
Source: Primary data. Authors' estimation.

Heteroskedasticity Test

The presence of heteroskedasticity was assessed through a scatterplot of residuals. The points in the scatterplot were randomly distributed above and below the zero line, with no discernible pattern. This suggests that the data does not exhibit heteroskedasticity, fulfilling another key assumption for regression analysis.

Figure 1

Heteroskedasticity Scatterplot Results



Source: Primary data. Authors' estimation.

Multiple Linear Regression Analysis

The primary objective of the study was to examine the influence of knowledge, service quality, halal awareness, production processes, and human resource capabilities on MSME readiness for halal certification. The results of the multiple linear regression analysis are presented in Table 3.

Table 3

Multiple Linear Regression Analysis Test Results

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
C	0.029	1.138		0.026	0.979
X1	0.315	0.098	0.339	3.206	0.002

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
X2	0.244	0.092	0.263	2.642	0.010
X3	0.181	0.089	0.170	2.044	0.043
X4	0.076	0.099	0.048	0.775	0.440
X5	0.149	0.072	0.159	2.084	0.040
R^2	.740				
Adjusted R^2	.727				
F	59.145				
Sig.	.000				

Source: Primary data. Authors' estimation.

Regression Model

The regression equation derived from the analysis is as follows:

$$Y = 0.029 + 0.315X_1 + 0.244X_2 + 0.181X_3 + 0.076X_4 + 0.149X_5 + \varepsilon$$

Where:

Y represents readiness for halal certification.

X_1 , X_2 , X_3 , X_4 , X_5 denote knowledge, service quality, halal awareness, production processes, and human resource capabilities, respectively.

The coefficients represent the impact of each independent variable on the dependent variable, with positive values indicating a direct relationship.

Significance of Variables

The significance of each independent variable was assessed using the T-test. The results are summarized as follows:

- Knowledge (X_1): The coefficient for knowledge is 0.315, with a p-value of 0.002, indicating a significant positive relationship with readiness. MSMEs with greater knowledge of halal certification requirements are better prepared to comply.
- Service Quality (X_2): The coefficient for service quality is 0.244, with a p-value of 0.010. This demonstrates a significant positive impact, suggesting that efficient and supportive institutional services enhance MSME readiness.
- Halal Awareness (X_3): The coefficient for halal awareness is 0.181, with a p-value of 0.043, indicating a significant influence. MSMEs with higher awareness of halal principles and practices are more likely to achieve certification readiness.
- Production Processes (X_4): The coefficient for production processes is 0.076, with a p-value of 0.440. This variable does not show a statistically significant relationship with readiness, suggesting that other factors may play a more critical role.

- Human Resource Capabilities (X_5): The coefficient for human resource capabilities is 0.149, with a p-value of 0.040, indicating a significant positive impact. MSMEs with skilled and well-trained personnel are better positioned to meet halal certification requirements.

Collective Impact

The F-test was used to evaluate the collective impact of all independent variables on MSME readiness. The model produced an F-value of 59.145 with a p-value of 0.000, indicating that the combined influence of knowledge, service quality, halal awareness, production processes, and human resource capabilities is statistically significant.

Coefficient of Determination (R^2)

The adjusted R^2 value for the regression model is 0.740, meaning that 74% of the variance in MSME readiness for halal certification is explained by the independent variables. The remaining 26% is attributed to factors not included in the study. This high R^2 value indicates a strong explanatory power of the model.

DISCUSSION

The Role of Knowledge in Certification Readiness

The findings of this study highlight knowledge as the most significant determinant of MSME readiness for halal certification, aligning with prior research. MSMEs with a deeper understanding of the halal certification process demonstrate greater readiness, as evidenced by a statistically significant coefficient (0.315) and a p-value of 0.002. This result supports the argument that knowledge plays a crucial role in certification preparedness, corroborating studies by Oemar et al. (2023) and Widigdo & Triyanto (2024), which emphasize the direct relationship between awareness and the intention to obtain halal certification. Additionally, Rahman et al. (2017) and Faishal et al. (2024) assert that knowledge dissemination enhances MSMEs' ability to comply with halal standards, improving quality assurance and consumer trust. These findings underscore the necessity of educational interventions and stakeholder collaboration in facilitating halal certification readiness among MSMEs.

Conversely, some studies present contrasting perspectives regarding the direct influence of knowledge on halal certification readiness. For instance, Widigdo & Triyanto (2024) contend that while knowledge alone does not directly influence certification adoption, it significantly affects compliance, which in turn fosters readiness. Similarly, Giyanti et al. (2020) highlight that many businesses struggle with unclear information regarding halal standards, posing a barrier to certification despite their awareness. Additionally, cultural and social factors may mediate the relationship between knowledge and certification adoption. Research by Kurniawati & Savitri (2019) and Sudarsono et al. (2023) suggests that consumer perceptions of halal certification are influenced by religious and cultural backgrounds, indicating that knowledge must be tailored to specific demographic segments to be fully effective. These findings imply that while knowledge is essential, additional factors such as

regulatory clarity and socio-cultural alignment play a pivotal role in halal certification adoption.

The implications of this research extend to both policy and industry practices. Strengthening halal certification readiness among MSMEs requires a multifaceted approach, integrating educational initiatives, regulatory support, and market-driven incentives. Governments and certification bodies should prioritize structured training programs to enhance MSME awareness and compliance capabilities. Furthermore, collaboration between industry stakeholders—producers, regulators, and consumers—can establish standardized practices that streamline the certification process (Faishal et al., 2024). From a market perspective, improved halal literacy among MSMEs not only enhances compliance but also fosters consumer trust, facilitating broader market penetration for halal-certified products (Giyanti et al., 2020). Ultimately, an informed and systematic approach to halal certification will contribute to greater industry participation, increased consumer confidence, and expanded market opportunities for MSMEs operating within the halal sector.

Service Quality as a Critical Enabler

The significant impact of service quality (coefficient: 0.244, p-value: 0.010) underscores its role as a critical enabler in halal certification readiness. Efficient and transparent institutional support facilitates smoother certification processes, reducing operational and bureaucratic burdens for MSMEs. The influence of service quality on halal certification readiness is an emerging area of interest, particularly as businesses seek to navigate the complexities of halal compliance in various markets. Service quality impacts not only immediate business interactions with customers but also shapes broader perceptions of halal standards, thus influencing decision-making processes regarding certification. Several dimensions merit examination: the role of service quality in consumer perception, the effect of training and education on service delivery, and the integration of technology in enhancing service quality within halal certification processes.

Some studies support the notion that service quality plays a crucial role in shaping consumer confidence in halal-certified products. Wahyuni et al. (2024) highlight that an effective service framework can elevate the perceived quality of halal-certified products, directly influencing consumer trust and purchasing intention. Similarly, Khan & Callanan (2017) emphasize the necessity for service providers to maintain high-quality interactions with customers, reassuring them about the halal integrity of their offerings. Furthermore, Marzuki et al. (2012) argue that training restaurant managers on halal food standards significantly enhances service quality, as knowledgeable staff members foster consumer trust in halal-certified services. The role of technology in service quality has also gained attention, with Karyani et al. (2024) illustrating how blockchain traceability systems can enhance transparency and trust in halal logistics, thereby reinforcing confidence in certified products.

The implications of these findings extend beyond individual businesses to the broader halal industry and regulatory landscape. Strengthening service quality in

halal certification processes necessitates a multifaceted approach, integrating regulatory support, training initiatives, and technological advancements. Certification bodies and government institutions should prioritize structured training programs to equip businesses with the necessary knowledge and skills to enhance service delivery. Additionally, the integration of technology, such as blockchain-based traceability systems, can improve transparency and operational efficiency, fostering greater trust among consumers. From a market perspective, service quality serves as a competitive differentiator, with businesses that prioritize superior service gaining a competitive advantage in the halal market (Kurniawati & Savitri, 2019). Ultimately, ensuring high service quality in halal-certified enterprises will not only enhance consumer confidence but also streamline the certification process, promoting broader adoption of halal certification among businesses.

Halal Awareness and Consumer Trust

Halal awareness has emerged as a significant determinant of MSME readiness for halal certification, with a coefficient of 0.181 and a p-value of 0.043. This finding underscores that awareness extends beyond technical knowledge to encompass ethical considerations and consumer-driven expectations. Halal awareness plays a crucial role in shaping MSMEs' readiness by influencing their understanding of certification requirements, market demand, and compliance strategies. The relationship between halal awareness and certification readiness can be examined through several lenses, including consumer awareness, business operators' knowledge, and the role of education in fostering halal literacy. Studies such as those by Jannah & Al-Banna (2021) and Kurniawati & Savitri (2019) indicate that consumer awareness significantly impacts market demand for halal-certified products, thereby encouraging businesses to pursue certification. Similarly, Oemar et al. (2023) highlight the strong correlation between MSMEs' knowledge of halal practices and their intention to seek certification, further reinforcing the need for targeted educational initiatives to enhance readiness.

Despite the positive influence of halal awareness, some studies suggest that awareness alone may not be sufficient to drive certification adoption. Syufa'at et al. (2024) point out that many SMEs face challenges in obtaining halal certification due to a lack of education on its necessity and complexities, highlighting the need for structured training programs. Additionally, Rofiah et al. (2024) argue that while awareness fosters an understanding of halal principles, the lack of clear regulatory guidance can hinder businesses from completing the certification process. This suggests that alongside awareness, supportive regulatory frameworks and streamlined certification procedures are essential for improving MSME readiness. Furthermore, Ibeabuchi et al. (2024) emphasize the role of consumer trust in halal certification, noting that awareness alone does not always translate into increased market confidence unless backed by strong regulatory enforcement and credible certification bodies.

The implications of these findings extend to various stakeholders, including policymakers, certification bodies, and businesses operating in the halal market. Strengthening halal awareness among MSMEs requires a multifaceted approach that integrates consumer education, business training, and regulatory support. Governments and certification authorities should invest in structured educational programs that enhance MSMEs' understanding of halal requirements and simplify certification procedures. Additionally, businesses that actively communicate their halal certifications can leverage awareness as a competitive advantage, as highlighted by Jaiyeoba et al. (2019). By fostering a culture of transparency and trust, stakeholders can create a more conducive environment for halal certification, ultimately expanding market opportunities and strengthening compliance within the halal industry.

Unexpected Findings: The Role of Production Processes

Contrary to expectations, the production process variable did not significantly influence MSME readiness for halal certification (coefficient: 0.076, p-value: 0.440). This result may be attributed to several factors. First, the heterogeneity of production practices among MSMEs could dilute the variable's impact, as some enterprises may already adhere to halal standards informally. Second, the scope of this study may not have captured the nuances of operational challenges specific to production processes. Prior studies, such as those by Oemar et al. (2023), emphasize the importance of sourcing halal-compliant raw materials and maintaining rigorous production controls. Additionally, Mahama et al. (2020) highlight that post-market surveillance of halal-certified foods influences public perceptions of product integrity, further underscoring the relevance of production practices to certification readiness.

Despite the broader importance of production processes in halal certification, some research suggests that other factors, such as regulatory frameworks and market-driven incentives, may play a more significant role in determining MSME readiness. Syufa'at et al. (2024) argue that many SMEs struggle with certification due to financial and educational barriers rather than production-related challenges. Similarly, Khan et al. (2019) identify economic constraints and lack of technical support as primary obstacles to halal certification adoption. Furthermore, Abdallah (2021) highlights the complexity of navigating multiple halal standards across different certification bodies, suggesting that regulatory inconsistencies rather than production limitations may hinder MSME readiness.

The implications of these findings suggest a need for a more holistic approach to improving MSME readiness for halal certification. While production process improvements remain essential, greater emphasis should be placed on policy interventions, financial support mechanisms, and educational programs that address certification barriers. Enhancing transparency in certification procedures, streamlining regulatory frameworks, and investing in halal education for business operators could facilitate a more conducive environment for MSMEs. Additionally, the adoption of traceability technologies, such as blockchain, as suggested by Munawar & Mugiono

(2024), can enhance confidence in halal compliance, thereby supporting both businesses and consumers in the halal market.

Human Resources as a Driver of Readiness

The study identified human resource capabilities as a significant factor influencing MSME readiness for halal certification, with a coefficient of 0.149 and a p-value of 0.040. MSMEs with well-trained employees are better equipped to meet the technical and operational requirements of halal certification, ensuring compliance with halal standards. Prior research supports this finding, highlighting the crucial role of workforce education, training, and human capital development in certification readiness. For instance, Syufa'at et al. (2024) emphasize that education on halal certification obligations is fundamental for maintaining compliance and empowering staff to engage effectively with the certification process. Similarly, Othman et al. (2016) argue that comprehensive training programs focusing on halal quality assurance significantly enhance employees' capabilities, leading to improved certification preparedness. Furthermore, Ali et al. (2017) note that firms leveraging existing expertise in halal-related areas demonstrate better performance in the halal food supply chain, underscoring the value of skilled personnel in facilitating halal compliance.

Despite the recognized importance of human resource capabilities, some studies suggest that other factors may play a more dominant role in determining MSME readiness for halal certification. De Boni & Forleo (2019) argue that while human capital development is essential, external market factors such as regulatory frameworks and consumer demand often exert a greater influence on halal certification adoption. Additionally, Zailani et al. (2019) indicate that firms committed to halal standards tend to experience performance improvements not solely due to workforce capabilities but also because of strategic investments in compliance infrastructure and supply chain management. Furthermore, Sudarsono et al. (2023) highlight that organizational readiness for halal certification is significantly influenced by continuous investment in education and regulatory alignment rather than solely by employee training. These findings suggest that while human resource capabilities contribute to certification readiness, they must be complemented by broader organizational and regulatory support mechanisms.

The implications of these findings highlight the need for a holistic approach to enhancing MSME readiness for halal certification. Beyond investing in workforce training, businesses should integrate human resource development into their broader strategic frameworks to address regulatory challenges and market expectations. Collaborations between educational institutions and halal certification bodies, as suggested by Alim et al. (2024), can help cultivate a skilled workforce equipped to manage halal compliance effectively. Additionally, technological advancements such as blockchain, as noted by Karyani et al. (2024), can enhance transparency in the halal supply chain, but only if employees are adequately trained to leverage such innovations. Therefore, organizations must adopt a comprehensive strategy that

includes continuous education, regulatory alignment, and technological integration to optimize their readiness for halal certification and strengthen their competitive position in the halal market.

The Interplay of Variables

The collective impact of all independent variables, as indicated by the F-test (p-value: 0.000) and adjusted R^2 value of 0.740, highlights the multifaceted nature of halal certification readiness. The findings suggest that while individual factors like knowledge and service quality are critical, their interactions play a crucial role in shaping overall readiness. For instance, increased knowledge may enhance the perceived value of institutional services, while improved human resource capabilities can amplify the benefits of halal awareness campaigns. This interplay underscores the need for integrated interventions that address multiple dimensions of readiness simultaneously. Policymakers and certifying bodies should adopt a holistic approach, combining educational initiatives, capacity-building programs, and streamlined certification processes to create an enabling environment for MSMEs.

Implications for Policy and Practice

The findings of this study have several practical and theoretical implications. For policymakers, the significant impact of knowledge and service quality highlights the importance of investing in education and institutional reform. Certification bodies should prioritize transparency and accessibility, ensuring that MSMEs can navigate the certification process with ease. For MSME operators, the findings emphasize the need for proactive engagement with halal certification requirements. Enterprises should invest in training and capacity-building initiatives to enhance their readiness, while also leveraging institutional support to overcome operational challenges.

CONCLUSION

This study explored the readiness of Micro, Small, and Medium Enterprises (MSMEs) in Magelang to implement halal certification, focusing on factors such as knowledge, service quality, halal awareness, production processes, and human resources. The findings highlight knowledge as the most significant determinant, emphasizing the need for educational programs tailored to MSMEs. Service quality and halal awareness also demonstrated strong influences, underscoring the importance of transparent certification processes and widespread awareness campaigns. Human resource capabilities positively impacted readiness, highlighting the value of skilled personnel in ensuring compliance.

The unexpected insignificance of production processes suggests that other variables may have a more immediate effect, pointing to the need for further exploration. This research contributes to the existing body of knowledge by quantifying the influence of multiple factors and emphasizing their interplay in determining readiness. The implications extend to policymakers and certification bodies, advocating for integrated approaches that combine education, capacity-building,

and procedural reform. By addressing these elements, the study supports the development of an inclusive and efficient halal certification framework, enabling MSMEs to meet regulatory demands effectively.

Limitations of the Study

This research is not without its limitations. First, the cross-sectional design captures a snapshot of MSME readiness, potentially missing temporal variations or evolving trends. A longitudinal approach would better capture dynamic changes over time. Second, the study relies on self-reported data, which may introduce response bias, especially in assessing subjective factors like knowledge and awareness. Employing mixed methods, including observational and qualitative data, could mitigate this limitation.

Furthermore, the study was geographically confined to Magelang, potentially limiting the generalizability of findings to other regions or sectors. While the sample size met the requirements for statistical analysis, larger and more diverse samples would enhance the robustness of future studies. Finally, the limited significance of production processes indicates a potential need for more granular analysis, incorporating specific operational practices or external factors such as supply chain dynamics.

Recommendations for Future Research

Future research should adopt longitudinal designs to examine how MSME readiness for halal certification evolves over time, particularly as regulatory and market dynamics change. Qualitative approaches, such as interviews or case studies, would complement quantitative findings, providing deeper insights into the lived experiences of MSME operators.

Expanding the geographical scope to include diverse regions and sectors would improve the generalizability of findings and capture regional or industry-specific nuances. Further investigation into underexplored variables, such as supply chain practices, financial constraints, or technological adoption, could enrich the understanding of factors influencing readiness.

Additionally, exploring the role of consumer demand in driving MSME compliance would provide valuable insights into market-driven incentives. Policymakers and practitioners could benefit from research that evaluates the effectiveness of targeted interventions, such as training programs or subsidized certification schemes, in enhancing readiness. These directions would contribute to a more comprehensive understanding of halal certification and its implications for MSMEs and the broader economy.

Author Contributions

Conceptualization	A.D.T. & M.I.	Resources	A.D.T. & M.I.
Data curation	A.D.T. & M.I.	Software	A.D.T. & M.I.
Formal analysis	A.D.T. & M.I.	Supervision	A.D.T. & M.I.
Funding acquisition	A.D.T. & M.I.	Validation	A.D.T. & M.I.
Investigation	A.D.T. & M.I.	Visualization	A.D.T. & M.I.



Methodology	A.D.T. & M.I.	Writing – original draft	A.D.T. & M.I.
Project administration	A.D.T. & M.I.	Writing – review & editing	A.D.T. & M.I.

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Informed Consent Statement

Informed consent was obtained before the respondents filled out the questionnaire.

Data Availability Statement

The data presented in this study are available from the corresponding author upon reasonable request.

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Conflicts of Interest

The authors declare no conflicts of interest.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

During the preparation of this work, the authors used ChatGPT, DeepL, Grammarly, and PaperPal in order to translate from Bahasa Indonesia into American English, and to improve clarity of the language and readability of the article. After using these tools, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

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