

Internal Initiative vs External Pressure: Evidence from Halal Standard Adoption in Indonesian Food Small and Medium Industries (SMIs)

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Abstract: This research's focal points are identifying key factors of halal food standards (HFS) in small-medium industries (SMIs) in Padang and exploring the roles of traceability systems in compliance with the halal assurance system (HAS). The sample size included 105 food SMIs in Padang through a survey using questionnaires. The study employed Structural Equation Modeling-Partial Least Square (SEM-PLS) as a data analysis technique. Results demonstrated that external pressure from government regulations and organizational commitment as part of internal initiatives significantly affected HFS adoption, whereas the latter had a stronger effect. Meanwhile, consumer pressure, industrial competition, marketing function, operational improvement, and suppliers had no significant impact. Results also exhibited that HFS adoption and traceability systems had a significant implication for compliance with HAS. The limitation lies in variables related to halal food standard adoption factors. Accordingly, future researchers have to explore the analyzed phenomenon in various research contexts. In sum, the results afford valuable information that is favorable for industries, allowing them to provide better and safer halal food products for consumers. They also indicate that the halal traceability system enables food SMIs to elevate their business and offers a vast potency for further developing halal industries in Indonesia.

Keywords: compliance with HAS, external pressure, halal assurance system (HAS), halal food standard adoption, internal initiative

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1. Introduction

In recent years, halal certification has grabbed significant global attention from food industries in diverse business sectors as it allows them to maintain competitive advantages and face growing strict competition. Therefore, a multitude of companies vie to adopt the halal certification strategy to enhance their business performance (Salindal, 2019). Similarly, in Indonesia, like other Muslim countries, the government has taken practical steps to ensure halal standard compliance. The Indonesian Standards Control and Quality Authority is then mandated to adjust halal standards by taking into account Islamic figures' suggestions and relevant market conditions to address increasingly strict competition (Prabowo et al., 2015; Khan et al., 2019). This effort aims to attract Muslim and non-Muslim consumers while helping Indonesian companies ensure product safety and hygiene (Amin et al., 2009). Besides, it protects retailers' reputations, which are considered at risk when non-halal products are found on their shelves (Shaikh & Ahmed, 2022).

The novelty this research offers is related to the limitation of previous studies, which mainly investigate the influence of external factors apart from supplier pressure. Najmi et al. (2023) and Ab Talib and Chin (2018) reported that suppliers are not external factors influencing halal standard adoption. Their studies solely focus on other external pressures, such as government regulations, industry competition, and consumer pressure. Najmi et al. (2023) explore critical factors affecting halal food standard (HFS) adoption among food manufacturers in Pakistan and how traceability systems ensure their compliance with the halal assurance system (HAS). Their findings pinpoint that several factors, e.g., consumer pressure, industry competition, marketing functions, operational improvements, and organizational commitment, significantly impact HFS adoption, while government regulations have an insignificant one. Furthermore, Ab Talib and Chin (2018) examine the motivations behind the implementation of the Halal Food Standard (HFS) among food manufacturers in Malaysia. Whether these firms adopt a proactive or reactive stance regarding HFS implementation in the Malaysian food manufacturing sector is also the centerpiece of their research. Their empirical assessments reveal that internal factors contributing to HFS adoption include organizational commitment, operational improvements, and marketing functions, whereas the external ones are governmental intervention and consumer pressure. Finally, (Giyanti et al., 2021) test external pressure factors based on consumers and competitive intensity.

This research thus differs from previous ones by incorporating supplier factors into halal standard application among food SMIs, as we believe that suppliers are instrumental in implementing halal assurance and maintaining halal product integrity (Khan et al., 2019). Our initial survey brings to light that several small and medium industries (SMIs) adopt halal assurance practices due to their collaboration with suppliers. Suppliers with halal interests, compared with those devoid of the same interest, present distinct characteristics (Fujiwara, 2017). For instance, some SMIs producing chips obtain semi-finished or raw chip materials from suppliers adhering to halal standards, therefore requiring the SMIs to have halal certification. The adoption's urgency is escalating because chip distributors, covering supermarkets, accept only halal-certified products.

Suppliers of halal raw materials are crucial in implementing halal standards. They are responsible for providing raw materials that meet halal requirements and hence are needed to ensure that the materials contain no haram (forbidden) substances and are processed according to Islamic dietary laws. They must abide by stringent guidelines to prevent contamination with non-halal substances. It is essential for maintaining consumer trust and the reputation of halal certification. The measures are of great importance since halal products hinge their integrity on the purity and quality of raw materials (Abderahman et al., 2021). Besides, by procuring raw materials from reputable halal suppliers, manufacturers reinforce their product authenticity and quality, thereby fostering consumer trust and loyalty. Meanwhile, unreliable suppliers will compromise the entire supply chain, leading to non-compliance with halal standards (Omar et al., 2020).

The halal assurance system requires producers to ensure the availability of halal ingredients from their suppliers, emphasizing the importance of respecting consumer rights and meeting the specific needs of Muslim customers (Spiegel et al., 2012). To satisfy the requirement, halal-certified companies must maintain open communication with halal-certified suppliers to promptly relay any pertinent information or developments that may impact their halal-related determination (Mustun, 2022). The attentive approach is warranted, considering the delicate nature of the halal food industry. Additionally, it is crucial to ensure that consumer complaints are swiftly communicated to suppliers and distributors (Tieman & Che Ghazali, 2013). Likewise, proprietors of halal fast food establishments strive to cultivate enduring partnerships with their halal-certified suppliers, upholding a robust mutual commitment to

establishing and meeting shared long-term goals and objectives. This proactive strategy is important as the first party depends significantly on the latter, which guarantees it high-quality supplies and ingredients (Zulfakar et al., 2014), therefore rendering it challenging to transition to alternative ones.

Furthermore, the importance of supplying halal raw materials is growing in tandem with the increasing global demand for halal products, particularly in nations with significant Muslim populations, such as Indonesia, where halal issues are critical in the daily life of its people (Giyanti et al., 2021). Ab Talib et al. (2016) reported that companies implement halal practices to fulfill consumer standards and needs and confront ever-increasing market demand. Supplying halal raw materials enables manufacturers to meet this demand, creating new market opportunities and improving business competitiveness. Halal certification is a vital assurance for consumers, emphasizing the importance of ensuring products comply with Islamic dietary laws (Handayani et al., 2022). It is also a marketing tool industry actors apply to differentiate their products from their competitors and make the products the main options available for Muslim consumers (Ainoon, 2007). Regarding halal certification, the government issued a policy mandating small and medium industries (SMIs) to acquire halal certificates by October 2024. Despite the approaching deadline, many SMIs are yet to pursue this certification. While the issue remains unsettled, another arises, i.e., some SMIs are unprepared to invest in traceability systems that help them monitor halal procedures to ensure a halal supply chain. It is regrettable because the halal values of products and supply chains manifested through their integrity, originality, credibility, legitimacy, and safety, which are significantly different from those of non-halal ones, can only be ensured through an effective traceability system (Zainuddin et al., 2019).

Traceability can boost trust between parties by helping them share real-time information (Kamarulzaman, 2021) and providing traceable evidence, which allows auditing and enables stakeholders to build consumer trust in the products concerned. Accordingly, in product halal assurance, low trust can be addressed using traceability systems, which deliver two advantages to companies, i.e., increasing company compliance levels with halalness (Amin et al., 2009) and elevating supply chain performance (Zainuddin et al., 2019). Surprisingly, although companies are aware of the imperativeness of a traceability system, they are inclined not to deploy the system to ensure compliance with HAS at the same time (Mattevi & Jones, 2015). The incident puts a fine point on the urgency of this research, which also inspects factors influencing halal food standard adoption and how traceability systems contribute to this adoption. To our knowledge, factors encouraging halal operation readiness are unclear due to minimal research on their contribution to halal practice adoption (Ab Talib et al., 2015a; 2015b). The factors are grouped into two, namely the internal factor, that is a proactive approach/initiative taken by companies to adopt halal standards, and the external one, that is engaged with the influence of the government, competitors, and market demand. Moreover, the role of halal traceability is also investigated as a moderating variable on compliance with halal assurance systems.

2. Materials and Methods

2.1. Government Regulations and Halal Food Standard Adoption

Government regulations force companies to conduct halal practices, as Golan et al. (2004) argue that government regulations make companies adopt halal certification to produce safe and quality food. Halal certification is considered an assurance of safe and quality food (Nawi et al., 2023). The government's role is becoming increasingly important because government policies have a significant impact on company decisions in implementing halal standards. Giyanti et al. (2020) convey that if a product does not comply with halal requirements or does not meet halal standards, the government will take strict action against its producer. Companies then accept halal-related procedures because of pressure from the government (policies, rules, and regulations). In other words, increased support from government policies corresponds to a higher probability of small and medium industries (SMIs) implementing halal standards (Vanany et al., 2021), and the government pressure motivates companies to adopt practices that benefit the community.

H1: Government regulation influences halal food standard adoption.

2.2. Consumer Pressure and Halal Food Standard Adoption

Consumer pressure can prompt companies to alter their business strategies that are targeted at SMIs. Market competition, propelled by consumer preferences, encourages companies to make continuous innovations and increase their products' quality by, among other techniques, applying halal standards (Chen et al., 2015). Additionally, to win customers' hearts, they should offer better products and services than those offered by SMI competitors. However, implementing halal standards to meet customers'

needs and building a long-term relationship with them are challenging tasks (Masudin et al., 2018) as consumers nurture a high awareness of the halal concept. Consumer purchase behaviors are influenced by the halal logo and have a positive impact on their intention to purchase halal products (Aziz & Chok, 2013).

H2: Consumer pressure influences halal food standard adoption.

2.3. *Suppliers and Halal Food Standard Adoption*

Halal suppliers, at present, direct their operational and managerial tasks to a third party to promote company performance openness to the halal process and system. The action, which may be in the form of outsourcing or subcontracting, aims to achieve a higher efficiency level (Ali et al., 2014). Nevertheless, it poses many different challenges to companies, one of which is decision-making related to supplier selection. In the selection process, companies have to decide on either choosing high-quality suppliers or involving several suppliers with less specific quality standards (A. H. Ngah et al., 2022). Suppliers play an indispensable role in halal industries in light of their contributions to maintaining halal product integrity (Khan et al., 2019). Nonetheless, we have to keep in mind that maintaining halal integrity is challenging for all parties engaged in halal production, including suppliers (Zulfakar et al., 2014). The challenge primarily lies in two aspects: the different characteristics of suppliers contributing to the halal food supply chain from those accounting for another supply chain (Fujiwara, 2017) and their geographical locations. Suppliers with homes abroad, especially non-Muslim ones, have a very high risk related to halal integrity (Ali et al., 2014).

H3: Suppliers influence halal food standard adoption

2.4. *Industrial Competition and Halal Food Standard Adoption*

Compliance with halal standards contributes to companies' image and reputation. In addition, halal certification assures that the related companies have fulfilled halal requirements. According to Escanciano and Vijande (2014), Muslims are very concerned about halal practices and are very sensitive to halal adoption by industries (Rezai, 2015). The three factors contribute to competitive pressure that can differentiate companies from their competitors by fostering them to present better performance. As explained by Ngah et al. (2014), competitive pressure is attributable to companies' concern for losing competitive advantages, that then impels them to adopt a supply chain abiding by halal principles. Meanwhile, in a more strict market competition, small and medium enterprises perceive the need to attain competitive advantages through innovations (Sumarliah et al., 2021). Besides, to be constantly competitive in halal industries, consistency in promoting halal standard practices is crucial. Becoming a halal food industry demands assurance related to the halalness of its products, with honesty as the paramount factor in the assurance (Othman et al., 2009).

H4: Industrial competition influences halal food standard adoption

2.5. *Operational Improvements and Halal Food Standard Adoption*

The perceived benefits of compliance with halal standards are associated with the extent to which advanced technological innovations are implemented, providing greater advantages compared to conventional or older technologies (Liao & Barnes, 2015). New technology adoption has a significant effect on operational management by bringing about productivity elevation (Azmi et al., 2017). In this research, the benefit of applying halal standards is perceived when a company's management recognizes the relative advantage of the application of the standard in its operational activities. Organizations or companies in the halal industry can attain competitive advantages by designing a unique business strategy. They also have to consider a particular decision that can impact their long-run operational performance because the halal assurance system (HAS) requires the application of halal principles among food producers. In this case, halal assurance can serve as a reference for planning a new strategy, and halal food companies can employ it to find a new and valuable business orientation (Zailani et al., 2015). Moreover, at an organizational level, companies' capacity to adopt halal standards in their production process hangs on the working individuals' capacity, skill training, and development for experienced staff (Najmi et al., 2023).

H5: Operational improvements influence halal food standard adoption

2.6. *Marketing Functions and Halal Food Standard Adoption*

Halal implementation positively affects a company's market performance. When halal practices are instituted in the company's product production and marketing, customers sensitive to halal aspects will be more attracted to its products quickly (Najmi et al., 2023). High demand for halal products can boost

companies' sales and market shares. In a growing competitive environment, holding halal certification can be a means to differentiate companies from their competitors. The prominent consumer preference for halal-certified products (Giyanti et al., 2020) serves as a significant motivation for companies to align their operations with halal compliance standards systematically. Consequently, the rising market demand for halal products prompts companies to develop and implement specialized systems and procedures to ensure the halal integrity of their offerings (Ab Talib & Chin, 2018).

H6: Marketing functions influence halal food standard adoption.

2.7. *Organizational Commitment and Halal Food Standard Adoption*

Commitment to halal standards is of great importance for organizations that are anxious to comply with Sharia laws. Their top management plays a pivotal role in providing the training staff need and promoting halal concepts to acquire competitive advantages (Ab Talib et al., 2015a). By adopting a proactive approach to halal principles, companies can build a positive image and perform best for the sake of their business sustainability (Ab Talib & Chin, 2018). Therefore, as Othman et al. (2009) find out, uncertified companies will perceive the push to pursue halal certification when noticing that their competitors show better performance with the certification. The dread of losing market shares can induce companies to get halal certification to be consistently competitive.

Rubio (2011) explains that top-level management needs to motivate its organization to take bolder and more creative steps by promoting innovative ideas consistently. It foregrounds that in halal standard practice adoption, the top management's engagement is essential to create support from internal and external parts of the organization. The effect of top-level management involvement on company performance and portfolios has been a subject of broad research, as the management can give benefits, cover organizational changes, and stimulate modification by using new technology in business operations (Ngah et al., 2013). In this context, the management gives support that contributes to the company's determination to apply halal standard principles by exerting its power and authority, which are influential in the decision-making process (Musa et al., 2016).

H7: Organizational commitment influences halal food standard adoption

2.8. *Traceability Systems and Compliance with the Halal Assurance System*

Traceability systems in halal implementation by small and medium industries (SMIs) ensure that the products they produce abide by halal principles and correspond with Islamic laws. The systems aim to monitor and trace the entire supply chain and production of halal products, from accessing raw materials and generating the end products to investing consumer trust in the product's halalness (Najmi et al., 2023). Traceability systems suggest food safety and quality and compliance with HAS practices and principles (Aiello et al., 2015).

Based on HAS23000, each company must have a written procedure to ascertain the traceability of certified products and ensure that the products are made from materials LPPOM MUI consents to and produced in a criteria-complying facility. Nonetheless, some industries pay the least attention to the significance of traceability systems as strategic tools (Mohamed et al., 2016), regardless of the systems' ability to trace and monitor activities while acting as a communication tool to share information and cut halal-related risks (Zailani et al., 2010). As consumer demand for system transparency and product quality grows, Asioli et al. (2014) admonish companies to exploit traceability systems to help them perform better and fulfill Muslim consumer needs and wants. Even though companies apply halal standards in their operational activities, the role of traceability systems in elevating food security as desired remains of paramount importance (Tan et al., 2020; Zainuddin et al., 2019).

H8: Traceability systems moderate the relationship between halal standard adoption and compliance with the halal assurance system.

H9: Halal food standard adoption influences compliance with the halal assurance system

2.9. *Methodology*

A quantitative approach was deployed. Data were collected using random sampling, and the sampling framework included all halal SMIs in Padang. A list of 2,959 halal food SMIs was acquired from the Halal Product Assurance Organizing Body in 2023. Roscoe's guidelines (1975), in Sekaran and Boogie (2010), delivered a criterion for determining the sample size, i.e., the sample size should be larger than 30 but less than 500. In this research, 105 companies were finally chosen as samples on the grounds of their significance for the economy of Padang and halal certification dominance. Eventually, the data collection process was carried out through questionnaire distribution.

The research employed measurement items that were acquired and modified from some previous research. External pressures and internal initiative were adapted from Mensah and Julien (2011), Aziz and Chok (2013), Escanciano and Santos-Vijande (2014), Rezai (2015), Zailani et al. (2015), Chen et al. (2015), and Sucipto et al. (2021). Traceability systems were measured following Chang et al. (2017), Rahman et al. (2017), and Kamarulzaman (2021). Moreover, compliance with the halal assurance system (HAS) was adopted from Rahman et al. (2017). This research drew on Partial Least Squares Structural Equation Modeling (PLS-SEM) through the SmartPLS software as the data analysis technique. A considerable body of research has claimed that PLS-SEM is a preferred statistical technique for path modeling, specifically in dealing with complex multivariate models (Hair et al., 2014). PLS-SEM was also renowned for its flexibility, robustness, and efficacy as a statistical tool for predictive analysis and theory testing (Henseler et al., 2015). It allowed for a comprehensive examination of correlations between variables while accommodating the intricacies inherent in multivariate datasets. The diagram of the research design is depicted in Figure 1

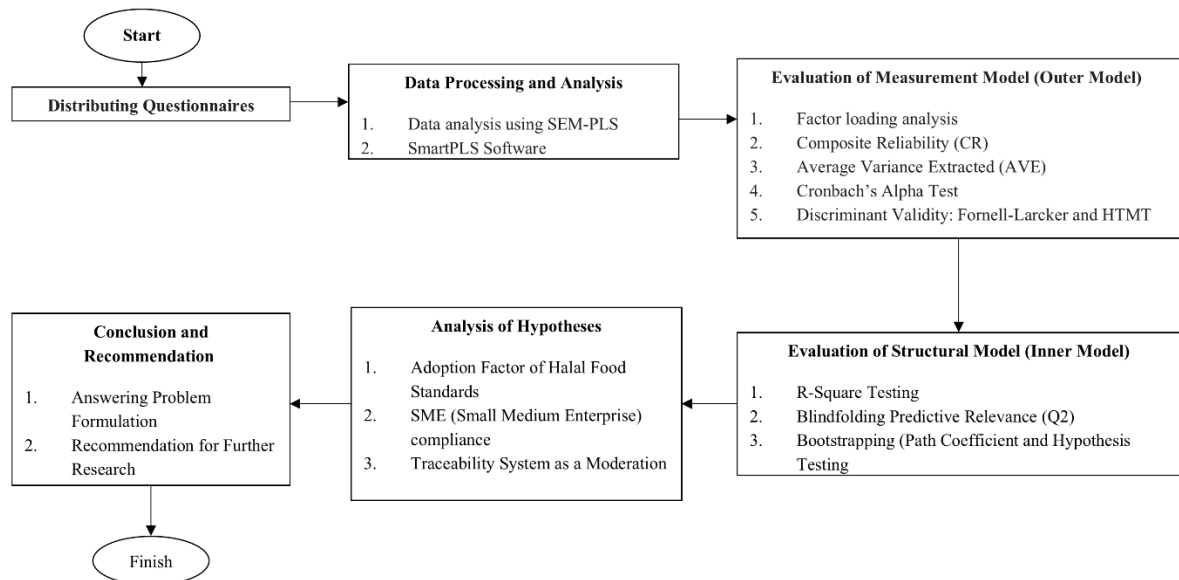


Figure 1. Research Design

2.10. Conceptual Framework

Figure 2 illustrates the interconnected factors that influence the adoption of Halal Food Standards and compliance with the Halal Assurance System (HAS). External pressures such as government regulations, consumer demands, supplier requirements, and industrial competition act as driving forces that encourage companies to adopt halal food standards. These pressures often reflect societal expectations and legal frameworks that businesses must respond to in order to remain competitive and compliant. On the other hand, internal motivations such as the desire for operational improvements, enhanced marketing functions, and organizational commitment also significantly contribute to the adoption of halal standards. These internal factors reflect a company's proactive approach to quality, branding, and long-term sustainability in halal markets.

Once the Halal Food Standards are adopted, the implementation of traceability systems becomes a crucial element. Traceability ensures that every ingredient and process can be tracked and verified, which strengthens the credibility and transparency of the halal certification. This system acts as a bridge between standard adoption and full compliance with the Halal Assurance System (HAS). Ultimately, the integration of traceability systems supports businesses in maintaining consistency with halal requirements and achieving full compliance with HAS. Therefore, the combination of external pressures, internal motivations, and systematic traceability forms a comprehensive pathway toward reliable halal food production and certification.

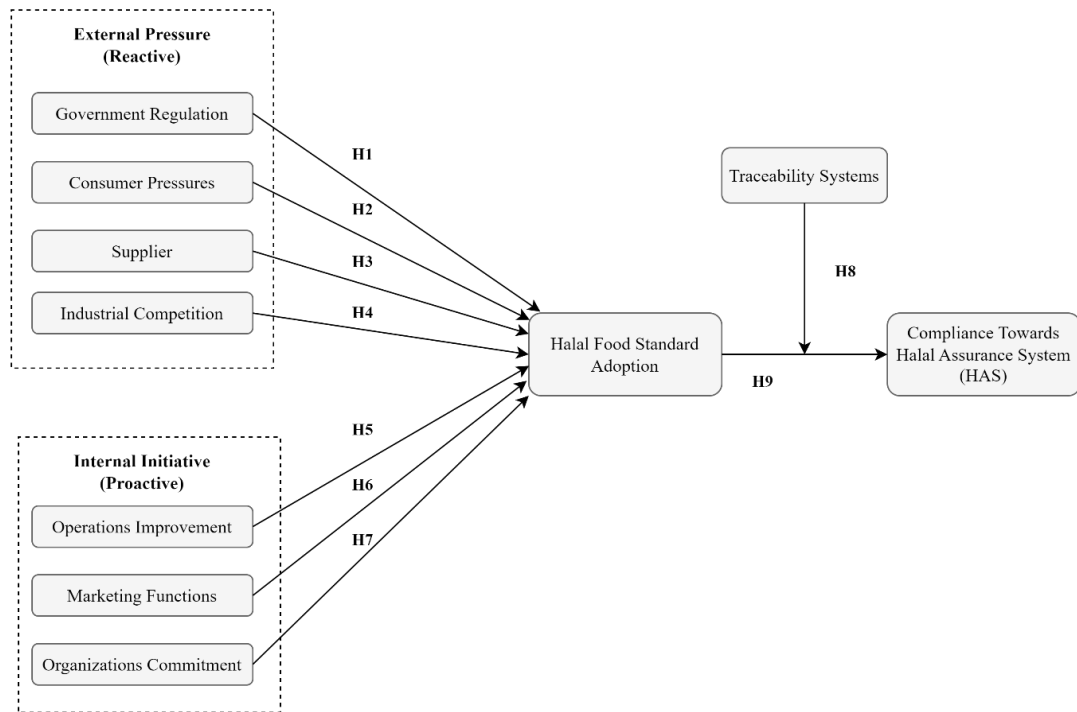


Figure 2. Conceptual Framework

3. Results and Discussion

Partial Least Squares-Structural Equation Modelling (PLS-SEM) was applied using SmartPLS 3.2.7, as recommended by Hair et al. (2017). The decision to choose PLS-SEM as a hypothesis testing technique was reliant upon its advantages, namely its ability to define more variations if compared to the criteria variable and its robustness to a variety of assumption requirements, encompassing normality and the goodness of fit index. In addition, the technique was selected because of its capability to handle limited construct measurement more efficiently by allowing construct modeling to exploit a smaller number of measurement items (Hair et al., 2017).

3.1. Respondent Characteristics

The 105 selected companies represent a wide range of food and beverage businesses in Padang, with most operating in the snacks category, followed by bread and cake producers. A significant number of these businesses have been running for about four to eight years and are generally categorized as small-scale industries. In terms of halal certification, the majority have chosen the self-declare method, especially in the more recent years, with a noticeable increase in 2022 and 2023. These patterns suggest the strong presence of small enterprises in Padang's halal sector and reflect a growing reliance on self-declared halal certification. A more detailed overview of respondent characteristics is provided in Table 1.

Table 1. Respondent Characteristics

Characteristics	Description	Subtotal	Percentage
	Sample Size	105	100%
Business Fields	1. Fruit and Vegetables with Processing and Addition of Food Additives	1	1%
	2. Meat and Processed Meat Products	4	4%
	3. Salt, Spices, Soup, Sauce, Salad, and Protein Products	6	6%
	4. Sugar and Sweeteners, Including Honey	1	1%
	5. Fish and Fish Products, Including Mollusks, Crustaceans, and Echinodermata with Processing and Addition of Food Additives	3	3%
	6. Confectionary/Sweets and Chocolate	1	1%
	7. Snacks	43	41%
	8. Beverages with Processing	2	2%
	9. Fast-Food	1	1%
	10. Providers of Food and Beverages with Processing	4	4%

Table 1. Respondent Characteristics (continued)

Characteristics	Description Sample Size	Subtotal 105	Percentage 100%
	11. Bread and Cakes	27	26%
	12. Jam and Jelly	3	3%
	13. Cereals and Cereal Products that Constitute Derivative Products of Cereal Seeds, Roots, Tubers, Pulses, and Piths with Processing and Addition of Food Additives	3	3%
	14. Milk and Processed Milk Products	3	3%
	15. Processed Eggs and Processing-Generated Egg Products	2	2%
	16. Flour, Starch, and Their Derivative Products	1	1%
Length of Business	< 4 Years	35	33%
	4-8 Years	44	42%
	8-12 Years	16	15%
	> 12 Years	10	10%
Types of Industries	Small Industry/Employees \leq 19 Persons/Turnover \leq IDR1,000,000,000.00	100	95%
	Medium Industry/Employees \leq 19 Persons/Turnover > IDR1,000,000,000.00	5	5%
Types of Certifications	Regular	24	23%
	Self-Declare	81	77%
Year of Certification	2020	19	18%
	2021	6	6%
	2022	36	34%
	2023	44	42%
	Total	105	100%

3.2. Outer Model

Validity and reliability testing was conducted through measurement model analysis. Before hypothesis testing to predict the correlation between invisible variables in a structural model, the preliminary phase involved a measurement model evaluation to examine indicators and hidden variables to be investigated (Hair et al., 2021).

3.2.1 Convergent Validity

Purwanto and Sudargini (2021) determined that in the early research phase, the range of outer loadings for the measurement scale was considered adequate if existing between 0.5 and 0.6. The convergent validity test was undertaken through outer loadings using the Average Variance Extracted (AVE). The AVE had to be 0.5 at a minimum to suggest adequate convergent validity, pointing out that one latent variable could explain more than half of the variation of its indicators on average (Purwanto & Sudargini, 2021). The outer model test is demonstrated in Table 2.

3.2.2 Discriminant Validity

In the discriminant validity test, we were guided by three criteria proposed by Fornell & Larcker (1981), i.e., Fornell-Larcker, Heterotrait-Monotrait Ratio of Correlations (HTMT), and cross-loadings (Hair et al., 2014). Corresponding with Hair et al. (2021), within Fornell and Larcker's criteria, the squared root of each construct's Variance Extracted (AVE) should exceed the correlation value between the constructs. Fornell and Larcker's value and HTMT are listed in Table 3 and Table 4.

3.2.3 Reliability

The reliability test covered evaluating two main aspects, Cronbach's Alpha and composite reliability, to measure the degree to which the measuring instrument was reliable. A reliability value was deemed sufficient if the composite reliability outstripped a threshold of 0.7 (Purwanto & Sudargini, 2021). The reliability test also considered Cronbach's Alpha, the expected value of which had to be above 0.5 to demonstrate an adequate consistency level (Sekaran & Bougie, 2010).

Table 2. Outer Model Testing

Construct	Indicator Code	Loading Factor	Cross Loading	Average Variance Extracted	Cronbach's Alpha	Composite Reliability
CP	CP1	0.661	0.661	0.649	0.501	0.783
	CP3	0.928	0.928			
	GR1	0.815	0.815			
GR	GR2	0.863	0.863	0.567	0.682	0.791
	GR4	0.882	0.541			
	HAS1	0.907	0.882			
HAS	HAS2	1.114	0.907	0.801	0.752	0.889
	HFS1	0.944	0.944			
HFS	HFS2	0.946	0.946	0.893	0.880	0.943
	IC1	0.598	0.655			
IC	IC3	0.820	0.957	0.437	0.579	0.799
	M1	0.635	0.635			
M	M2	0.988	0.988	0.690	0.676	0.810
	OC1	0.832	0.832			
	OC2	0.856	0.856			
OC	OC3	0.878	0.878	0.684	0.848	0.896
	OC4	0.735	0.735			
	OI1	1.000	1.000			
OI	S1	0.915	0.915	1.000	1.000	1.000
	S2	0.938	0.938			
S	TR1	0.851	0.851	0.858	0.836	0.924
	TR2	0.816	0.816			
	TR4	0.807	0.807			
TR	TR5	0.790	0.790	0.666	0.833	0.889

Note: CP = Consumer Pressure; GR = Government Regulations; HAS = Compliance with the Halal Assurance System; HFS = Halal Food Standard Adoption; IC = Industrial Competition; M = Marketing Functions; OC = Organizational Commitment; OI = Operational Improvements; S = Suppliers; TR = Traceability Systems

Table 3. Fornell-Larcker Criterion Test

Item	HAS	CP	GR	HFS	IC	M	OI	OC	S	TR
HAS	0.895									
CP	0.244	0.806								
GR	0.239	0.163	0.753							
HFS	0.597	0.209	0.285	0.945						
IC	0.215	0.251	0.005	0.183	0.820					
M	0.150	0.208	-0.128	0.177	0.268	0.831				
OI	0.266	0.249	0.134	0.289	0.239	0.078	1.000			
OC	0.285	0.311	0.057	0.444	0.472	0.249	0.367	0.827		
S	0.162	0.198	0.116	0.188	0.140	0.165	0.378	0.270	0.926	
TR	0.296	0.334	0.158	0.210	0.272	0.263	0.434	0.381	0.329	0.816

The desired value from the Fornell-Larcker criterion test was an Average Variance Extracted (AVE) of each construct that exceeded the squared correlation between one construct and the other (Hanseler, 2015). The final discriminant validity test was the heterotrait-monotrait ratio of correlation (HTMT) test. As expounded by Hair et al. (2021), the heterotrait-monotrait ratio of correlation value was considered good if under 0.90.

Table 4. Heterotrait-Monotrait Ratio of Correlation Test

Item	HAS	CP	GR	HFS	IC	M	OI	OC	S	TR
HAS										
CP	0.353									
GR	0.316	0.524								
HFS	0.732	0.291	0.285							
IC	0.262	0.585	0.145	0.223						
M	0.204	0.395	0.180	0.170	0.426					
OI	0.309	0.341	0.205	0.308	0.307	0.147				
OC	0.361	0.472	0.139	0.491	0.730	0.326	0.406			
S	0.197	0.259	0.161	0.218	0.184	0.205	0.412	0.315		
TR	0.375	0.463	0.200	0.244	0.374	0.306	0.473	0.464	0.393	

3.3. Structural Model Evaluation (Inner Model)

3.3.1 R-Square Test

Some tests carried out in a structural model involved a concept like R-Square in an endogenous construct, which referred to the proportion of variability in the construct a latent variable could elucidate (Sekaran & Bougie, 2010). R-Square test results are exhibited in Table 5.

Table 5. R-Square Test Results

Item	R-Square	R-Square Adjusted
Compliance with HAS	0.389	0.371
Halal Food Standard Adoption	0.291	0.239

The statistical size for R-Square values described the degree of the variation of the effect of an endogenous variable that could be explained by an exogenous variable or another endogenous one. As Kline (2011) demonstrated, R-Square values were composed of three categories: 0.66 (a strong impact), 0.33 (a moderate impact), and 0.19 (a weak impact). Based on the processing results in Table 5, halal food standard adoption impacted SMIs' compliance with the halal assurance system (HAS) by 38.9%, thereby being considered a moderate impact. Meanwhile, SMIs' compliance with the halal assurance system (HAS) impacted halal food standard adoption by 29.1%, thus a weak impact.

3.3.2 Q-Square Predictive Relevance

The following step measured the Q-Square value that described the degree of prediction accuracy, i.e., how well any change in exogenous/endogenous variables could predict an endogenous one. Furthermore, the degree was a form of validation in Partial Least Squares (PLS) to convey the model prediction relevance (predictive relevance). A Q-Square value > 0 indicated that the model had a predictive relevance value, whereas a Q-Square value < 0 showed the absence of the desired Q-Square. The Q-Square values are displayed in Table 6.

Table 6. Q-Square Predictive Relevance

Item	SSO	SSE	$Q^2 (= 1 - SSE/SSO)$
Compliance with HAS	210.000	149.983	0.286
Consumer Pressure	210.000	210.000	
Government Regulations	315.000	315.000	
HFS*TR	105.000	105.000	
Halal Food Standard Adoption	210.000	173.088	0.176
Industrial Competition	210.000	210.000	
Marketing Functions	210.000	210.000	
Operational Improvement	105.000	105.000	
Organizational Commitment	420.000	420.000	
Suppliers	210.000	210.000	
Traceability Systems	420.000	420.000	

Notes: SSO: Sum Square Observation, SSE: Sum Square Error

In Table 6, the Q-Square values of the exogenous and endogenous variables were above 0, enabling us to conclude that compliance with the halal assurance system (HAS) and halal food standard adoption shared a good predictive relevance.

3.3.3 Hypothesis Test Results (Bootstrapping)

The following step in the testing process was a hypothesis test. Whether or not a hypothesis could be supported, the decision could be made by analyzing the significance levels between constructs, p-values, and t-statistics. The method involved measuring the estimates and error standards based on an empirical observation to avoid statistical assumptions. In the bootstrapping context of this research, a hypothesis was accepted if the significance value > 1.96 (at a 5% significance level and a two-way test) or if the p-value < 0.05 . If it was, the alternative hypothesis (H_a) was accepted, while the null hypothesis (H_o) was rejected, but if it was not, the null hypothesis (H_o) was accepted, whereas the alternative hypothesis (H_a) was rejected. To begin with, the effect of the exogenous variables on the endogenous ones was measured, as pointed out in Table 7.

Table 7. Hypothesis Testing

Hypothesis	Variables	Beta	T-Statistics (O/STDEV)	P-Value	Result
H1	Government Regulations -> Halal Food Standard Adoption	0.263	2.270	0.012	Supported
H2	Consumer Pressure -> Halal Food Standard Adoption	0.008	0.085	0.466	Not Supported
H3	Suppliers -> Halal Food Standard Adoption	-0.004	0.040	0.484	Not Supported
H4	Industrial Competition -> Halal Food Standard Adoption	-0.061	0.533	0.297	Not Supported
H5	Operational Improvement -> Halal Food Standard Adoption	0.117	1.052	0.147	Not Supported
H6	Marketing Functions -> Halal Food Standard Adoption	0.121	0.740	0.230	Not Supported
H7	Organizational Commitment -> Halal Food Standard Adoption	0.383	3.211	0.001	Supported
H8	HFS*TR -> Compliance with HAS	-0.040	0.537	0.296	Not Supported
H9	Halal Food Standard Adoption -> Compliance with HAS	0.551	6.487	0.000	Supported

The linkage between internal and external factors in influencing food SMIs to adopt halal food standards and the relationship between halal food standard adoption and SMI compliance with the halal assurance system (HAS) are detailed in Table 7. The significance level between latent variables was determined by comparing the t-count (t-statistics) to the t-table at a 5% significance level (0.05). If the t-count was greater than the t-table and the p-value was less than 0.05, the null hypothesis (H_0) was rejected. It showed a direct influence of exogenous on endogenous variables. Halal food standard adoption in small and medium industries (SMIs) was significantly influenced by the key factors of government regulations (H1) and organizational commitment (H7). Statistical analysis pinpointed p-values of 0.012 and 0.001 for the two factors, respectively, hence below the 0.05 threshold, signifying that they influenced SMIs' compliance with halal standards at a strong significance level.

Previous research conducted in many different countries with Muslim and non-Muslim populations suggested a positive influence of government regulations on food small and medium industries (SMIs) regarding adopting halal operational standards. It was also found that government regulations propelled companies to secure halal certification to ensure their food products met established safety and quality standards. Government regulations in this regard became pivotal because the policies implemented were proven to significantly affect companies' decisions to comply with halal standards. Specifically, empirical evidence suggested that increased government support correlated with a higher likelihood of SMIs adopting halal standards (Tan et al., 2022). In Indonesia, Law Number 33 of 2014 concerning Halal Product Assurance conveyed the state's obligation to safeguard its citizens, especially the Muslim population, by ensuring that product consumption was in accord with Sharia principles and thus spurring trust in and protection of the related food supply chain.

Organizational commitment to implementing halal food standards was critical for ensuring adherence to halal principles throughout the supply chain. Organizations that firmly committed to halal practices demonstrated increased diligence in ensuring their production and distribution processes adhered to halal principles. This commitment fostered a professional environment conducive to implementing halal standards, facilitating synergy between employees and management. Such synergy was essential for maintaining safe, high-quality production while safeguarding halal integrity and reinforcing the halal food standard (HFS) commitment. Furthermore, in nations with a Muslim majority population, the influence of religious beliefs significantly enhanced awareness of halal practices, which might correlated with a higher rate of HFS adoption (Ambali & Bakar, 2013). This observation aligned with the study by Marzuki et al. (2012), that halal compliance was regarded as a religious obligation, potentially resulting in both immediate and long-term reciprocal effects on organizational practices.

Meanwhile, several factors, including consumer pressure (H2), suppliers (H3), industrial competition (H4), operational improvements (H5), and marketing functions (H6), exhibited no significant influence on halal food standard adoption. The factors indicated p-values of 0.466, 0.484, 0.297, 0.147, and 0.230, respectively, pinpointing that their impacts came with a lack of statistical significance. Consumer pressure did not significantly impact the adoption of halal food standards. In line with this finding, Prabowo et al. (2015) argued that many individuals would purchase any products while also sticking to the principle that food and beverages with haram (forbidden) raw materials were

haram. However, they tended to overlook additional factors that could be critical in determining the halal status of a product. Nevertheless, there was a notable increase in awareness regarding food quality and safety among global consumers, including non-Muslims (Ab Talib et al., 2016).

Halal food standard adoption remained unaffected by suppliers and raw materials. In small and medium industries (SMIs), raw materials were frequently sourced from suppliers that were not necessarily established or permanent. This situation raised concerns regarding the integrity of the halal supply chain, as the absence of supplier engagement in providing raw materials that comply with halal standards could hinder the fulfillment of these essential criteria. The production of halal products adhered to a rigorous sequence of protocols, which encompassed the utilization of halal-certified materials, the implementation of adequate storage practices to mitigate the risk of contamination from *najis* (substances deemed unclean and contrary to religious law), and the assurance of optimal product quality (Sucipto et al., 2021).

Intense industrial competition negatively affected the adoption of halal food standards. This finding contrasted with research by Escanciano and Santos-Vijande (2014), which found that competition encouraged companies to adopt food standards. Two reasons explained these opposing findings: (1) Despite the high level of competition, the significant costs associated with implementing halal standards demotivated companies to pursue them (Zailani et al., 2015), and (2) Halal food standards were viewed as standard operating procedures within the industry. Meanwhile, regarding operational performance, this finding is consistent with Salindal (2019), who observed that the implementation of halal standards had a negative effect on both the financial and operational performance of companies. It resonated with the perspective that, for small and medium industries (SMIs) in the food sector, halal certification was perceived as an added burden that increased production costs (Zailani et al., 2019).

Operational improvements did not significantly influence the adoption of halal food standards by halal food SMIs in Indonesia. It implied that efforts to enhance operational efficiency and effectiveness did not directly or substantially impact the adoption of halal standards within these small and medium industries (SMIs). This was due to several factors. For example, implementing halal standards was costly, and SMIs often operated with limited financial and human resources (Bahara et al., 2024; Salindal, 2019). There was a lack of awareness and understanding among SMIs about the importance of operational improvements in achieving and maintaining halal certification. Training and education on integrating halal standards with operational practices might also be inadequate. The focus on meeting halal certification requirements might take precedence over operational improvements. Hence, halal certification was an additional burden contributing to increased production costs (Giyanti et al., 2020; Yama et al., 2019).

Marketing functions did not significantly influence the adoption of halal food standards among small and medium industries (SMIs). This lack of impact could be attributed to the tendency of SMIs to prioritize product development and production capacity enhancement (Oum et al., 2014). Such an inclination arose from their constrained resources, including limitations in capital, workforce, and access to training opportunities. Consequently, SMIs were more liable to engage in defensive strategies in response to prevailing market conditions rather than actively expanding their market networks (Giyanti et al., 2021). Their primary focus remained on maintaining stability while navigating the challenges posed by the existing market landscape (Prabowo et al., 2015; Sucipto et al., 2021).

Likewise, as detailed in Table 7, the p-value for traceability systems as a moderation variable was 0.296, thus indicating an insignificant influence on SMI compliance with the halal assurance system (HAS). The specific context of the small and medium industries (SMIs) examined in this study might not adequately underscore the significance of traceability systems. Although small and medium industries (SMIs) acknowledged the critical importance of traceability systems, they were yet to fully leverage them as strategic tools for enhancing compliance with halal standards (Mattevi & Jones, 2016). It was plausible that other factors exerted a more substantial influence on SMIs compliance with the halal assurance system (HAS), thereby overshadowing the role of traceability systems. For instance, government regulations as external pressure and organizational commitment as internal initiative might be more critical determinants.

Implementing traceability systems presented considerable complexity and demanded substantial resources, especially for small and medium industries (SMIs). This complexity might diminish the perceived benefits of traceability systems in moderating the relationship between adopting halal food standards and compliance with halal standards (HAS). As noted by Ab Rashid and Bojei (2020),

adopting such traceability systems necessitated significant investments in technology and training, which could pose considerable challenges for SMIs.

SMIs often emphasize internal factors, such as motivation and commitment, over external systems like traceability. Research by Giyanti et al. (2021) indicated that these internal elements were instrumental in implementing halal standards, while traceability was perceived to have a limited impact. A significant reason for this discrepancy was that many SMIs lacked an understanding of traceability systems' advantages, leading to their underutilization and decreased effectiveness. Furthermore, Ab Rashid et al. (2018) highlighted that numerous halal food producers did not fully recognize the essential role of traceability in maintaining halal integrity. Additionally, SMIs frequently contended with restricted financial and human resources, which complicated the implementation and utilization of traceability systems and undermined their ability to meet halal food standards and comply with halal assurance system (HAS) requirements. Oum et al. (2014) discussed how these resource constraints negatively impacted innovation and compliance within SMIs. The impact of traceability systems was also context-dependent, with factors such as market demand, regulatory frameworks, and consumer preferences potentially playing a more significant role in the adoption of halal food standards and adherence to HAS, as emphasized by Abderahman et al. (2021).

Furthermore, adopting halal food standards strongly correlated with SMI compliance with the halal assurance system (HAS) at a p-value of 0.000. Compliance with the halal assurance system (HAS) necessitated that companies adhere to all pertinent regulations and Sharia principles. Implementing rigorous monitoring mechanisms throughout the entire operational process, complemented by effective traceability systems, enabled companies to confidently assert that their practices align with Sharia compliance standards (Ahmed et al., 2019). Research indicated that small and medium industries (SMIs) exhibited a growing interest in adopting traceability systems, recognizing the potential of such systems to enhance their competitive advantage. Companies should integrate these systems to improve organizational performance and address Muslim consumers' needs and preferences effectively (Asioli et al., 2014). Nevertheless, many companies have yet to fully utilize these systems as strategic instruments for enhancing compliance with halal standards despite the acknowledged significance of these standards in the marketplace (Mattevi & Jones, 2015).

4. Conclusion

Halal food standard (HFS) adoption in small and medium industries (SMIs) was primarily driven by government regulations and organizational commitment. These two factors were the most influential in encouraging SMIs to adopt halal certification and comply with the halal assurance system (HAS). As the key external factors, the government had determined clear regulations concerning the halal assurance system in Indonesia and endeavored to administer education and socialization through related offices to SMIs, allowing a more efficient halal certification process. The actions showed the government's commitment to promoting understanding and implementing halal practices. Besides, the government has provided free halal certification facilities for small and medium enterprises and industries through the *Sertifikat Halal Gratis* (SEHATI) or *Free Halal Certification* program. In addition to internal practices, organizational commitment should extend to transparent communication with external stakeholders, including consumers, certification bodies, and regulatory authorities. Organizations should foster an environment of openness about their practices concerning the maintenance of product halalness and be adequately prepared to address inquiries or concerns from relevant parties. This dual focus on internal rigor and external transparency contributed to halal food practices' integrity and credibility within the market.

In contrast, external pressures such as consumer demand, supplier requirements, industrial competition, and operational improvements, encompassing marketing functions, did not significantly impact HFS adoption. While traceability systems were essential for maintaining halal integrity, they did not significantly moderate the relationship between HFS adoption and HAS compliance in SMIs. This could be due to the limited understanding and underutilization of traceability systems among SMIs, which warranted further investigation.

Future research should explore additional variables, expand the geographical scope, and investigate additional factors, including technological readiness, financial constraints, and cultural influences, to provide a more comprehensive understanding of HFS adoption. Also, quantitative studies should be complemented with qualitative methods, such as interviews or case studies, to gain deeper insights into the motivations and challenges faced by SMIs in adopting HFS.

This study contributes to the growing body of literature on halal certification by identifying the key factors influencing HFS adoption in SMIs. It highlights the importance of government regulations and organizational commitment, which can inform future theoretical frameworks. Practically, policymakers and industry leaders should focus on strengthening regulatory frameworks, fostering organizational commitment, and supporting SMIs in implementing traceability systems to ensure the integrity and sustainability of the halal food industry. While the paper effectively highlights the current limitations of traceability systems, it could further enrich the discussion by exploring potential policy interventions and technological innovations that facilitate greater adoption of traceability among small and medium industries (SMIs).

CRedit Authorship Contribution Statement

Nilda Tri Putri: Conceptualization, Writing – Original Draft, Review & Editing, Methodology, Validation. **Meuthia:** Writing – Original Draft, Conceptualization, Formal Analysis, Methodology. **Ikhsan Rapi Saputra:** Writing – Original Draft, Investigation, Formal Analysis. **Rini Rahmahdian S:** Writing – Review & Editing, Investigation, Formal Analysis. **Iwan Vanany:** Resources, Software. **Norhayati Zakuan:** Writing – Review & Editing, Methodology.

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