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Evaluation of the Performance of the Halal Supply Chain in Fish Processing SMEs: An Empirical Study Utilizing the PLS-SEM Approach

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ABSTRACT

The awareness of Muslims and non-Muslims towards halal products is increasing because of the quality and safety assurance of products. Maintaining the integrity of halal products related to consumer trust can be done through the halal supply chain management (HSCM) framework. As a vital sector for halal product export, many fishing industries are still small and medium-scale and have limited HSCM implementation. This study aims to determine factors that affect the performance of fishery product small and medium enterprises (SMEs) in implementing HSCM within single-framework. The research was conducted in Madura Island, Indonesia, and surveyed 150 respondents who had prerequisites already had halal certification and a minimum of 5 years of experience producing fishery products. The performance of HSCM in fisheries industries was analyzed using criteria that consist of government regulations on halal products, government halal incentive programs, consumer demand for halal products, halal commitments in the supply chain, and supply chain relationship management. Data analysis uses partial least squares structural equation modeling (PLS-SEM) to obtain model relationships between variables. The results show consumer demand, government programs, government regulations, halal commitments, and supply chain relationship management, and HSCM is solely responsible for the performance of SMEs. In addition, HSCM also improves SME performance, which is shown by increased purchases, expansion of market areas, and increased operational expenditure efficiently. The main finding reveals compliance with halal regulations, customer relationship management, strengthening management's commitment to the implementation of halal standards, and the use of halal certification as a promotional tool, which are the main factors that improve the performance of SMEs. These main findings could lead SMEs to improve managerial aspects to support their competitiveness in the global market.

1. INTRODUCTION

Halal product demand is rising with the global Muslim population. Global Muslims are expected to grow 26.4% by 2030 [1]. The increasing knowledge of consuming halal products by Islamic law is another factor contributing to the heightened demand for halal products [2]. The desire for halal products extends beyond Muslim consumers; non-Muslim consumers increasingly pursue halal-certified items to ensure superior quality and safety [3]. Halal products are not limited to food but also beverages, medicines, and dietary supplements. Muslim consumers allocate 51.86% of their expenditure to halal food and beverage consumption. Consumer demand for halal products also applies to fishery products. Halal certification for fishery products impacts market opportunities and consumer trust [2, 4, 5]. Consumer behavior and preferences are influenced by the readiness to pay a premium for certified products. Companies must uphold the integrity of halal products throughout the distribution process, from raw materials to end consumers, to satisfy the growing consumer demand for halal products. The integrity of halal products across the supply chain is a critical concern for customer trust.

In line with the case, industries and SMEs are required to increase productivity by producing according to halal product processes. SMEs can implement halal production processes by simplifying the product application system while maintaining production. Research regarding legal policies for halal products for SMEs in Indonesia has been widely carried out [6, 7]. Law No. 33 of 2014 regulates that all products circulating in the market, including those used or consumed by the public, must be halal-certified. This law aims to provide legal and spiritual assurance to Muslim consumers [8-10]. The Halal Product Guarantee program encompasses raw materials,

processing, storage, packaging, distribution, sales, and product presentation, all of which must adhere to Islamic law [11]. One of the crucial aspects of halal assurance for producers is labeling their products with the halal mark. The government incentivizes SMEs to obtain halal certification at no cost through the self-declaration program [8, 12]. The government's commitment and legislation seek to improve the marketability of SME products.

The success of the halal certification process for SMEs is determined by the commitment of both leadership and employees [13]. Leaders must prioritize and advocate for halal certification to ensure compliance and motivate employees [14]. Halal certification can improve market performance by increasing consumer trust and satisfaction [13, 15, 16]. The growing demand for halal products opens significant market opportunities for companies that commit to implementing government regulations on halal compliance. HSCM is necessary for businesses to maintain the integrity of halal products. A strategy that can be adopted is to implement an integrated halal assurance system among all stakeholders [15, 17]. An example of a strategy for implementing HSCM includes education and training on halal standards and practices, improving hygiene and sanitation standards to prevent cross-contamination, and a comprehensive traceability system to help maintain transparency and accountability [18, 19]. The design of a halal supply chain is necessary to implement HSCM. The supply chain comprises four activities: halal procurement, halal manufacturing, halal distribution, and halal logistics [19-21]. Implementing HSCM can be challenging for SMEs in Indonesia, mainly due to technology adoption costs [22]. The halal supply chain must operate effectively to preserve the integrity of halal products from upstream to downstream.

The implementation of HSCM significantly impacts business performance in environmental, operational, and economic dimensions. HSCM effectively minimizes environmental impact, particularly in warehousing and packaging [23, 24]. HSCM operationally impacts company performance in several ways: halal certification and labeling processes, halal traceability systems, and the identification and mitigation of risks across the entire supply chain [25]. The implementation of HSCM positively affects a company's economic performance by increasing consumer trust and expanding market reach [26, 27]. Overall, the practical application of HSCM practices positively impacts the halal supply chain's environmental, operational, and economic performance, ensuring sustainability and competitiveness in the market.

The performance level of an industry influenced by the deployment of supply chain management can be assessed using the SEM-PLS methodology [28]. SEM-PLS offers the advantage of analyzing intricate structural models with limited sample sizes, accommodating non-normal data distributions, and assessing latent relationships among variables, thereby rendering it appropriate for evaluating the overall influence of these factors on halal supply chain performance. Consumer demands, government regulations, halal incentives for SMEs, relationship management among supply chain management, and halal commitment from all involved parties influence the implementation of HSCM. Many research investigations utilizing SEM-PLS for corporate performance measurement have investigated the influence of supplier relationship management on supply chain performance within the industrial sector and halal supply chains in the food industry [29-34].

The fishery industry in Indonesia is one of the key sectors supporting the national economy, especially at the scale of SMEs). Fishery product SMEs play a vital role in providing food for the public and contribute to increasing the export of halal products. The SMEs must comply with halal standards in their production process, especially within the supply chain. Extensive research has been conducted on halal supply chains in the fishery industry [35-39]. However, there is a gap in the literature regarding integrating various variables, such as government programs related to halal regulations and incentives, consumer demands, halal commitment, halal supply chain design, and company performance in applying HSCM within a single research framework. Previous studies generally focused on only one or two variables without examining the more complex relationships between the factors influencing SME performance due to the holistic application of HSCM, especially in the fishery product SME sector.

Therefore, this study aims to determine factors that affect the performance of fishery product SMEs in implementing HSCM, which involve factors like the effect of government regulations, halal incentive programs, consumer demands, supply chain relationship management, and halal commitment on halal supply chain implementation and the performance of fishery product SMEs. The expected contribution of this research is to provide insights and valuable recommendations for SME practitioners, policymakers, and other stakeholders in improving company performance. The increase in SMEs' performance will satisfy domestic market requirements and bolster the competitiveness of Indonesian halal fishery products in the international market.

2. LITERATURE REVIEW

The halal supply chain in the fishery industry, particularly at the SMEs scale, has become a topic of increasing interest to researchers in recent years. Growing consumer awareness of halal products, especially among Muslim consumers, and government regulations supporting halal certification have prompted more in-depth studies on the factors influencing halal supply chain performance.

2.1 Government regulations on halal products

The government plays a crucial role in ensuring products comply with halal standards. In several Muslim-majority countries, halal products are regulated to provide guarantees of halal integrity [40-42]. Government regulations related to halal certification significantly shape industry practices that adhere to halal standards. In Indonesia, the implementation of Law No. 33 of 2014 on Halal Product Assurance requires that every product circulating in the market must have halal certification [43]. BPJPH Head's Decree No. 33 of 2022 concerning technical guidelines for halal product process assistance stipulates the obligation for halal certification for micro and small businesses based on the business actors' declarations. Government Regulation (PP) No. 39 of 2021 on the Administration of Halal Product Assurance mandates that small and medium enterprises must complete halal certification by October 2026 [44]. The regulation aims to protect Muslim consumers by ensuring that all products consumed are guaranteed halal [6, 45-47]. The Halal Product Assurance Law mandates halal certification for products in the

market, along with other derivative regulations governing the certification process, supervision, and enforcement. With strong government commitment and close collaboration with relevant stakeholders, Indonesia's halal regulations are expected to continue to be refined and effectively implemented to protect the interests of Muslim consumers and promote sustainable growth in the halal industry [48-50]. Hence, as observed in the literature presented in this section, it is evident that there are indications suggested in the relationship between government regulations, HSCM, and SMEs performance:

H1: Government regulations on halal products positively affect the performance of SMEs.

H2: Government regulations on halal products positively affect HSCM.

2.2 Government programs for halal incentives

Halal-related incentive regulations in Indonesia are part of the government's efforts to support the implementation a comprehensive halal assurance system. Several regulations on halal incentives have also been established to ensure the sustainability of the halal sector in Indonesia, which holds excellent growth potential. Law No. 33 of 2014 is the primary foundation for implementing the halal assurance system in Indonesia [8-10]. The government mandates halal certification for products circulating in the market through this law. The government has provided several incentives to encourage businesses to comply with these regulations, especially for SMEs. Some derivative regulations consist of Government Regulation (PP) No. 31 of 2019, which outlines the implementation of halal product assurance [45, 51]. In PP No. 31 of 2019, some provisions facilitate businesses, particularly SMEs, in obtaining incentives for halal certification [8, 41, 44, 46, 50, 52]. Alongside direct governmental regulations, supporting entities such as the Halal Product Assurance Organizing Agency (BPJPH), the Assessment Institute for Foods, Drugs, and Cosmetics of the Indonesian Ulema Council (LPPOM MUI), and other halal certification organizations also contribute significantly. BPJPH is the supervisory and regulatory body that manages the certification process, while LPPOM MUI focuses more on the technical aspects of halal audits. To accelerate the certification process, the government has also promoted the use of technology through an online halal certification system [6]. BPJPH has developed an application that simplifies the registration and monitoring process for certification. The Indonesian government has incentivized businesses, especially SMEs, to obtain halal certification through various regulations. With incentives such as cost reductions, technical assistance, and technological support, it is expected that the halal sector in Indonesia can grow more rapidly. Thus, the concept of government programs influences HSCM and SMEs performance. Therefore, the following hypotheses are proposed:

H3: Government programs on halal incentives positively affect the performance of SMEs.

H4: Government programs on halal incentives positively affect HSCM.

2.3 Halal consumer demands for halal products

The demand for halal products has risen alongside the expanding Muslim population and increased awareness of the necessity for halal items of superior quality and safety for consumption [6, 42, 46]. The demand for halal products is not limited to the Muslim community; non-Muslim consumers also seek halal products [53]. Modern consumers increasingly demand transparency in the halal supply chain, from raw materials to final distribution. Consumers prefer products with halal certification. SMEs must ensure traceability to maintain the quality of their halal products [38, 54-57]. These consumer demands significantly affect companies' decisions to design and manage their halal supply chains more efficiently. Based on these arguments, there are hypothesized that:

H5: Consumer demand for halal products positively affects the performance of SMEs.

H6: Consumer demand for halal products positively affects HSCM.

2.4 Halal commitment in the supply chain

Halal commitment is a critical issue in Indonesia's food and consumer goods industry, especially considering its status as the country with the largest Muslim population in the world. Commitment to halal products goes beyond merely complying with regulations; it also involves religious values, business ethics, and consumer trust [13, 14, 58]. Research on halal commitment has covered aspects such as the roles of the government, industry players, and consumers in ensuring that the products consumed and used are guaranteed halal [13, 15, 16]. The government's commitment is reflected in various derivative regulations, such as Government Regulation No. 31 of 2019, which supports the implementation of halal certification by providing facilities and incentives for businesses, particularly Small and Medium Enterprises (SMEs). Producers in the food sector or other industries play a vital role in maintaining halal commitment. Halal certification is a form of commitment from industry players to ensure that the products they produce comply with halal standards set by certification bodies such as BPJPH (Halal Product Assurance Agency) and the Indonesian Ulema Council (MUI). Thus, the hypothesis taken is:

H7: The halal commitment of business operators positively affects the performance of SMEs.

H8: The halal commitment of business operators positively affects HSCM.

2.5 The implementation of HSCM and SMEs performance

HSCM must ensure that halal product production, manufacturing, and delivery adhere to halal criteria. Consumer trust must be maintained to strengthen the integrity of halal certification and encourage the growth of the halal food industry [59, 60]. The imported meat industry faces unique challenges in ensuring halal traceability. Document and halal logo fraud are common issues that complicate the halal traceability process, leading many Muslim consumers to lose trust in imported meat products [61]. Technology and product traceability significantly affect the effectiveness of halal logistics systems [62-64].

Logistics management in the food industry, from wholesale to retail levels, requires adjustments to comply with halal principles, ensuring that the halal status of products is unquestionable [65]. Halal logistics management, especially in air cargo supply chains, is essential for facilitating operations in non-Muslim countries, ensuring compliance with halal logistics and principles [66]. The warehousing process can

affect the halal status of products, as cross-contamination poses a significant risk [20, 67].

Halal Supply Chain Relationship Management ensures adherence to Sharia principles across various sectors, particularly in the food and non-food industries. Maintaining compliance throughout the entire supply chain, from raw materials to final distribution, is essential to upholding halal integrity. Key performance indicators for HSCM include halal integrity, traceability systems, certification, labeling, and other factors that can lead to cross-contamination with non-halal products [67-70]. The implementation of HSCM has become a critical issue for ensuring the halal integrity of products available in the market [71]. Practices such as traceability, halal certification, and supply chain collaboration can positively impact halal supply chain performance [66, 71, 72]. However, not all HSCM practices are directly and positively related to operational performance and product quality [73, 74]. The causal factors are no standardization, unclear regulations, poor coordination, and integration among halal supply chain participants. The implementation of HSCM will improve the performance of SMEs, affecting customer satisfaction, increasing product sales and customer trust, and ensuring timely delivery of customer orders in the right quantities. Based on these arguments, there are hypothesized that:

H9: The management of relationships among elements of the halal supply chain positively affects the performance of SMEs.

H10: Supply chain relationship management positively affects HSCM.

H11: The implementation of HSCM positively affects the performance of SMEs.

2.6 SEM-PLS approach in halal supply chain research

The supply chain has become crucial in achieving competitive advantage for many organizations in today's dynamic and competitive business environment. The ability to react quickly and flexibly to changes in customer demand and market dynamics is crucial in maintaining and improving supply chain performance. SEM-PLS is a methodology used to investigate the complex relationships among various constructs that affect supply chain performance [29-34]. This method examines performance and supply chain management in the context of information sharing [75]. Higher SCM practices can enhance competitive advantage and improve organizational performance through the SEM PLS approach [76].

Additionally, this approach can be used to assess the sustainability of supply chain performance [68, 77]. The effect of clean production strategies can improve sustainable supply chain performance [78]. Furthermore, supplier trust can enhance supply chain performance [79].

3. METHODOLOGY

The approach used in this research is a quantitative method. This study examines small and medium-sized enterprises in the fish processing industry in Indonesia's Madura region The respondents are limited to business owners who have been producing fishery products for at least five years and have obtained halal certification. A total of 150 people participated in the research, and it is a minimum requisite for applied PLS-SEM that has been favored by many researchers today [80]. The respondents are business owners who have been producing fishery products for at least five years and have obtained halal certification. One hundred fifty people participated in the research.

A questionnaire was employed to assess respondents' demographic profile and the effect of performance on fish processing SMEs based on designed indicators. The questionnaire was designed according to the indicators of each variable specified in the conceptual model, and the items were adapted from previous studies. Measurement of the indicators for each variable was based on a Likert scale. There are five types of questionnaire measurements, with response intensity scored from the lowest value of 1 (Strongly Disagree), 2 (Disagree), 3 (Neutral), 4 (Agree), to the highest value of 5 (Strongly Agree).

The conceptual model in this research uses variables of government regulation on halal products, government halal incentive programs, consumer demands for halal products, halal commitment in the supply chain, and supply chain relationship management that affect the implementation of HSCM variables resulting in performance variables of fishery product processing SMEs. For instance, questions to measure consumer demand are: "Consumer demand for all halal-certified product," "Consumers prefer the halal-certified product to have no halal-certified product," and "Financial institution prefer SMEs that have a halal-certified product to distribute supporting funds.

Data analysis for this research utilized PLS-SEM. PLS-SEM is a statistical method used to analyze structural models by optimizing the prediction of dependent variables. PLS-SEM is more suitable for use when the main goal is to predict relationships between variables or develop a theory, especially in conditions where the data does not meet the assumptions of covariance-based SEM, such as small sample sizes, non-normal data distributions or complex models [81]. Before constructing a model, a validity test was performed using the convergent validity test or convergent validity using the Average Variance Extracted (AVE) value. AVE functions to test how well the developed instrument measures and the reliability test to test the reliability of a measurement. The AVE value must be greater than 0.50 to be considered a legitimate variable [82]. Then, following stage is the measurement model test, structural model test, data normality test, goodness of fit model test, and hypothesis test. Examining intricate links and influences among variables employs SmartPLS 4.0.9.9 software to facilitate descriptive data analysis, including assessing the validity and reliability of the measurement sub-model (outer model). It also assesses the impact between variables and structural sub-models (inner models).

4. RESULT AND DISCUSSION

4.1 Respondent information

There were 150 respondents from SMEs processing fishery products. The specific attributes of the respondents are presented in Table 1.

The demographics respondent shows that mostly SMEs employe dense to women and senior high school graduates. It is assumed most fishery SMEs as women empowerment program.

Table 1. Profile respondent

Profile		Frequency	Percentage (%)
Gender	Male	45	30
	Female	105	70
Education	Senior High School	135	90
	Diploma	5	3
	Bachelor Degree	10	7
Work Experience	6 – 10 years	58	39
	> 10 years	92	61

4.2 Measurement model evaluation

4.2.1 Testing the outer model

The outer model testing is conducted in two stages: the measurement and structural models [81]. The measurement model can be evaluated through reliability and convergent validity analysis. Convergent validity analysis, evaluated via the construct, encompasses loading factors and AVE values. Loading factor values must be a minimum of 0.7, and the AVE should exceed 0.5. The outer model test results are shown in Figure 1.

Figure 1 shows that the validity values of all indicators exceed 0.70. Consequently, all indicators are deemed valid. A variable is deemed legitimate if the AVE value surpasses 0.50 and the Cronbach's Alpha value exceeds 0.70. The discriminant validity test in this research is presented in Table 2.

Table 2 shows that the AVE values (exceeding 0.5), composite reliability (both rho_a and rho_c exceeding 0.7), and Cronbach's alpha (0.7) indicate that all variables have good validity and reliability.

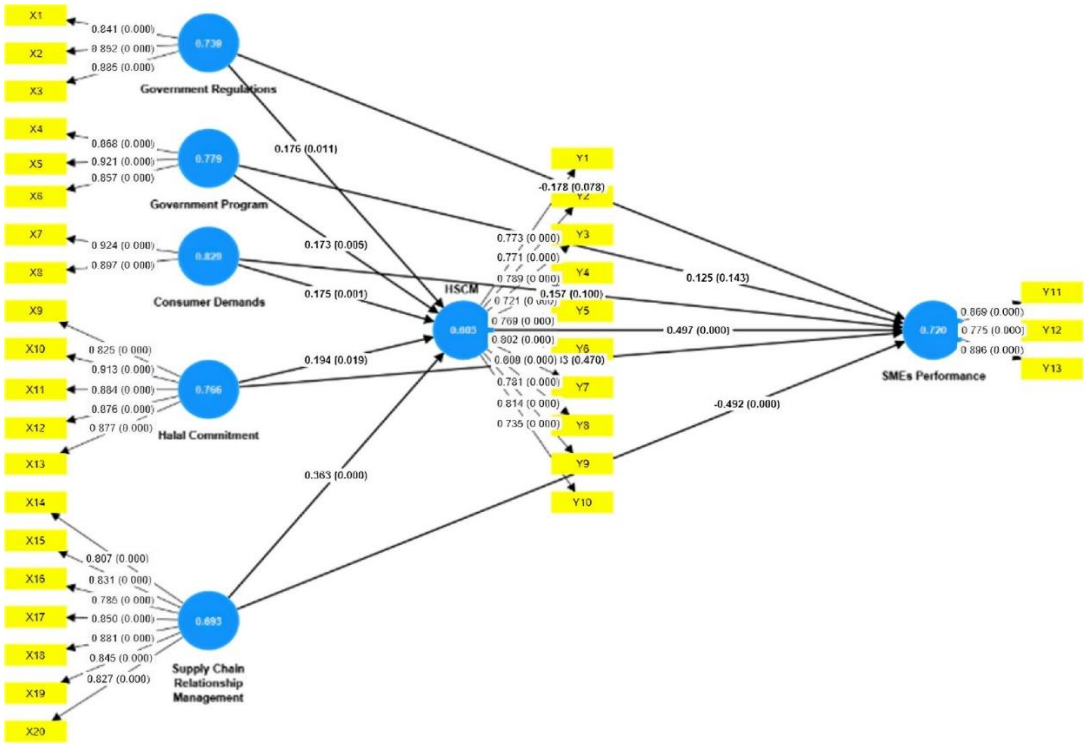

Figure 1. Convergent testing

Table 2. Contract reliability and validity

Variable	Cronbach's Alpha	Composite Reliability (rho_a)	Composite Reliability (rho_c)	AVE
Consumer Demands	0.795	0.806	0.907	0.829
Government Program	0.859	0.881	0.914	0.779
Government Regulations	0.823	0.827	0.894	0.739
HSCM	0.927	0.928	0.938	0.603
Halal Commitment	0.923	0.926	0.942	0.766
SMEs Performance	0.807	0.837	0.885	0.720
Supply Chain Relationship Management	0.926	0.928	0.940	0.693

Table 3. HTMT-matrix

Variables	1	2	3	4	5	6	7
Consumer Demands							
Government Program	0.443						
Government Regulations	0.328	0.380					
HSCM	0.586	0.474	0.736				
Halal Commitment	0.321	0.317	0.751	0.722			
SMEs Performance	0.213	0.243	0.195	0.215	0.155		
Supply Chain Relationship Management	0.529	0.222	0.759	0.785	0.778	0.274	

Table 4. R-square results

Variables	R-Square	R-Square Adjusted
HSCM	0.673	0.672
SMEs Performance	0.241	0.237

4.2.2 Discriminant validity

Discriminant validity is a measure used to ensure that a construct in a research model is truly distinct or unique from other constructs. The Heterotrait-Monotrait Ratio (HTMT) method is used to test discriminant validity. HTMT values are often considered to have higher sensitivity than cross-loading or Fornell-Larcker methods. Discriminant validity is considered obtained if the HTMT score is below 0.90. The HTMT values in this model are shown in Table 3.

Table 3 shows that the HTMT values between constructs are below the threshold of 0.90, indicating that discriminant validity has been achieved. Each construct is distinct, and this research model has no significant multicollinearity.

4.2.3 Testing the inner model (Model fit test)

The inner model test used an R-squared, with the R-square values in the research presented in the R-squared value measuring (Table 4). The R-squared value measures the extent to which the independent variables in the model can explain the variation in the dependent variable. This value is categorized into three levels: strong (≥ 0.67), moderate (≥ 0.33), and low (≥ 0.19) [81].

As shown in Table 4, the R-square value for HSCM is 0.673 with an adjusted R-square of 0.672. The R-square value indicates that the independent variables in the model can explain 67.3% of the variation in HSCM, which is categorized as a substantial contribution according to Chin's criteria. On the other hand, the R-square value for SME performance is 0.241, with an adjusted R-square of 0.237. The model construct only explains 24.1% of the variation in SME performance and is in the low category. Other factors outside the model influence SMEs performance. Low R-squared values may indicate that the model has limited ability to explain the variation in the dependent variable based on the independent variables. However, it is important to consider the practical significance of the explanatory variables, not just the statistics [83].

4.2.4 Structural model test

Besides reliability, the inner model test also includes hypothesis testing, performed in this research using path coefficients. The path coefficient represents the strength of the structural model's direct relationship between latent variables. Evaluating the path coefficient helps understand causal relationships between variables, aiding in validating the tested theoretical model. The results of the path coefficient test can be seen in Table 5.

Table 5 shows the hypothesis test results, revealing that seven hypotheses in the research were accepted (p-value < 0.05). Four hypotheses were rejected due to a p-value > 0.05 (0.339); these are the hypotheses regarding government regulations on SME performance, government programs on SMEs performance, consumer demands on SMEs performance, and halal commitment on SMEs performance.

The relationship between consumer demands and HSCM has a path coefficient of 0.175, with a T-statistic of 3.293 and a p-value of 0.001, indicating a positive and significant effect. The relationship between the Government Program and HSCM has a coefficient of 0.176 with a significant p-value of 0.011. Meanwhile, Government Regulations and SMEs performance have a negative path coefficient of -0.178, with a T-statistic of 1.762 and a p-value of 0.078, showing a negative and non-significant effect. The relationship between HSCM and SMEs performance shows the highest coefficient among all paths, at 0.497 with a p-value of 0.000, indicating that HSCM plays a substantial role in influencing SMEs' performance.

Table 5. Path coefficient results

Hypothesis	Path Coefficient	T Statistics	p-values	Result Hypothesis
H1: Government Regulations -> SMEs Performance	-0.178	1.762	0.078	**Not Supported**
H2: Government Regulations -> HSCM	0.176	2.553	0.011	Supported
H3: Government Program -> SMEs Performance	0.125	1.466	0.143	**Not Supported**
H4: Government Program -> HSCM	0.173	2.839	0.005	Supported
H5: Consumer Demands -> SMEs Performance	0.157	1.646	0.100	**Not Supported**
H6: Consumer Demands -> HSCM	0.175	3.293	0.001	Supported
H7: Halal Commitment -> SMEs Performance	-0.083	0.723	0.470	**Not Supported**
H8: Halal Commitment -> HSCM	0.194	2.347	0.019	Supported
H9: Supply Chain Relationship Management -> SMEs Performance	-0.492	3.560	0.000	Supported
H10: Supply Chain Relationship Management -> HSCM	0.363	3.955	0.000	Supported
H11: HSCM -> SMEs Performance	0.497	3.578	0.000	Supported

Table 6. Internal confident 95% path coefficient evaluation

Hypothesis	Path Coefficient	2.5%	97.5%
H1: Government Regulations -> SMEs Performance	-0.178	-0.379	0.013
H2: Government Regulations -> HSCM	0.176	0.042	0.319
H3: Government Program -> SMEs Performance	0.125	-0.043	0.291
H4: Government Program -> HSCM	0.173	0.053	0.291
H5: Consumer Demands -> SMEs Performance	0.157	-0.036	0.341
H6: Consumer Demands -> HSCM	0.175	0.072	0.282
H7: Halal Commitment -> SMEs Performance	-0.083	-0.309	0.145
H8: Halal Commitment -> HSCM	0.194	0.033	0.353
H9: Supply Chain Relationship Management -> SMEs Performance	-0.492	-0.773	-0.239
H10: Supply Chain Relationship Management -> HSCM	0.363	0.183	0.542
H11: HSCM -> SMEs Performance	0.497	0.231	0.781

However, in the relationship between halal commitment and SMEs performance, the result was not significant, with a p-value of 0.470, even though the coefficient was negative (-0.083). Meanwhile, the relationship between supply chain relationship management and HSCM showed a significant positive effect with a coefficient of 0.363 and a p-value of 0.000. In contrast, the relationship between supply chain relationship management and SMEs performance showed a significant adverse effect with a coefficient of -0.492 and a p-value of 0.000. From these results, it can be concluded that several variables significantly affect HSCM and SMEs' performance, either positively or negatively.

An internal evaluation with a 95% confidence level on the path coefficient is conducted to measure the strength and significance of relationships between variables in the structural model. With a 95% confidence level, there is a 5% probability that the results are due to chance. This evaluation is essential to ensure that the model's outcomes are reliable and not influenced by random fluctuations in the data. The results of the 95% confidence internal evaluation for the path coefficient are shown in Table 6.

Table 6 indicates that the relationships between consumer demands and HSCM, as well as government program and HSCM, were significant, with confidence intervals that did not include zero, ranging from 0.072 to 0.282 and 0.053 to 0.291, respectively. Increases in consumer demand and government programs significantly impact HSCM. Conversely, the government program variable on SME performance has a confidence interval of zero (-0.043 to 0.291), indicating that this relationship is not statistically significant. However, government regulations on SME performance showed a significant negative impact, with a confidence interval from -0.379 to 0.013, suggesting that government regulations may negatively affect SME performance. The HSCM variable on SME performance shows a significant positive effect, with a confidence interval from 0.231 to 0.781. It means that effective HSCM significantly enhances SMEs' performance. On the other hand, the supply chain relationship management variable on SME performance has a significant negative impact, with a confidence interval from -0.773 to -0.239, indicating that, in this context, supply chain relationship management may negatively impact SMEs performance.

Table 7. The specific indirect effect

Indirect Effect	Original Sample (O)	T Statistics	p-value
Consumer Demands -> HSCM -> SMEs Performance	0.087	2.282	0.023
Government Program -> HSCM -> SMEs Performance	0.086	2.056	0.040
Government Regulations -> HSCM -> SMEs Performance	0.087	2.027	0.043
Halal Commitment -> HSCM -> SMEs Performance	0.097	2.083	0.037
Supply Chain Relationship Management -> HSCM -> SMEs Performance	0.180	2.495	0.013

4.2.5 Mediation test

Mediation testing is an analytical process that aims to understand whether the effect of an independent variable on a dependent variable occurs directly or through an intermediary variable. The mediation test results are shown in Table 7. The results indicated that supply chain relationship management has the highest indirect effect on SMEs performance through the mediation of HSCM. The p-values for all pathways were less than 0.05, indicating that the indirect effects of these variables on SMEs performance are statistically significant. Consumer demand had a positive and significant indirect effect on SMEs performance. Increased consumer demand enhanced SMEs performance through improved human and social capital management. Government programs, regulations, halal commitment, and supply chain relationship management positively and indirectly affect SMEs performance. These pathways indicate that government policies, halal certification, and supplier relationship management can indirectly improve SMEs performance by enhancing human and social capital management. Supply chain relationship management shows the most substantial indirect effect on SMEs performance, making it the most significant variable influencing SMEs performance.

4.3 Model fit

Model fit testing is the evaluation process used to determine how well a statistical model aligns with the data used. This test is crucial to ensure the model accurately explains the relationship between variables. The evaluation uses Standardized Root Mean Square Residual (SRMR) and Q square prediction.

SRMR is an indicator for measuring model fit, particularly in structural equation modeling. SRMR provides information on the extent of the difference between observed data and the data predicted by the model. An SRMR value below 0.08 is generally considered good, and values below 0.10 are still acceptable. The model fit test results show an SRMR of 0.080 for both the saturated and estimated models, indicating that the model is considered excellent and well-matched with the empirical data. The predicted model correlation matrix resembles the empirical data correlation matrix.

Q-Square (Q^2) is a metric used in statistical analysis to measure the accuracy of a predictive model. Q^2 indicates how well the model can predict new, unseen values. If $Q^2 > 0$, the model has better predictive ability than a model that only predicts the average value; if Q^2 approaches 1, the model has excellent predictive capability; and if Q^2 is negative, the model performs poorly and is unsuitable for prediction. The Q-square prediction values are shown in Table 8.

The Q^2 value for the HSCM variable is 0.652, indicating that the model is relatively good at predicting HSCM values. The Q^2 prediction value is 65.2%, and the model can explain the variability in HSCM. Meanwhile, the Q^2 value for SMEs performance is 0.093, suggesting that the model is not as effective in predicting SMEs performance.

Table 8. Q-square predicts

Variables	Q^2 Predict
HSCM	0.652
SMEs Performance	0.093

4.4 Discussion

4.4.1 Insights into hypothesis non-support SMEs performance

The Indonesian government mandates certification for all products circulating within the country, while in Malaysia, certification remains voluntary [7, 40]. The government has simplified the certification process for SMEs through a self-declaration mechanism, intending to boost sales and increase entrepreneurs' revenue. However, the research indicated that government programs do not significantly improve SMEs performance. The Indonesian government is exploring digitalization for the halal certification process to support SMEs and implementing the Omnibus Law to streamline halal certification procedures [6, 41, 84]. This program faces challenges in practice, including normative ambiguity and the broad interpretation of products requiring certification [42]. This research showed that halal commitment does not significantly improve SMEs performance. This finding contrasts with other studies, which suggest that halal commitment by SMEs positively impacts financial and operational performance, even in turbulent environments like Palestine [81]. Halal commitment heavily depends on the human resources involved within a company. The findings suggest that halal commitment does not substantially improve organizational performance, contrasting with other studies that assert knowledge, attitude, and awareness of government rules are crucial for enhancing organizational performance in the halal food sector [85].

Market orientation based on consumer demand can enhance SMEs performance [86, 87]. However, this research found that consumer demand for halal products does not significantly impact SMEs' financial and operational performance. This issue deserves attention, as market uncertainty significantly affects consumer demand, requiring SMEs to innovate and improve their performance. Government regulations and programs aim to meet consumer demands for halal products produced by industries or SMEs. These programs support halal certification, and commitment to halal standards typically improves SMEs performance by enhancing operational and financial outcomes. However, the effectiveness of these regulations and programs can vary depending on implementation challenges and the internal motivation of the businesses involved.

4.4.2 Implementing HSCM in fishery product SMEs

Indonesia and Malaysia comprehensively regulate halal products [42,44]. Indonesia regulates halal certification for food and beverage products, with specific laws and regulations to ensure compliance. The government-initiated free halal certification program has proven effective in implementing HSCM. In line with research findings, government programs, especially halal incentives, affect the implementation of HSCM. The response of SMEs to the free halal certification program is very high due to consumer demand for halal products. There has been a significant increase in consumer awareness and demand for halal products, driven by Muslim and non-Muslim consumers who perceive halal products as superior in terms of cleanliness, safety, and quality [3, 88]. This demand causes companies to adjust their marketing strategies to maintain halal integrity. Religious commitment, the halal logo, and food quality positively influence Muslim consumers' willingness to pay for halal-certified food [89].

In line with research findings on fishery product SMEs, it is noted that SMEs strive to implement HSCM to assure consumers that the products or services consumed by Muslims meet the desired halal standards. The implementation of HSCM in SMEs involves various parties, including suppliers, distributors, and companies, in the context of production and storage processes. All these components must comply with the halal product process. However, the HSCM concept has not been fully implemented in Indonesia. Obstacles to implementing the HSCM concept include the fact that the halal certificate is currently limited to the production process and has yet to cover suppliers, retailers, and resellers.

The halal commitment of the stakeholders within an industry determines compliance with the halal product concept. In small-scale industries, halal commitment is affected mainly by the business owner's adherence to implementing it. As decision-makers, business owners must ensure halal status at various stages. According to findings on the complexity of the halal supply chain, especially in ensuring halal status across multiple stages, this presents significant challenges. Risks such as contamination and unclear raw material status must be managed to maintain halal integrity [21,25]. Effective HSCM is linked to sustainable performance, emphasizing the need for a strong halal quality control system [27].

Research on fishery product SMEs shows that relationships with all elements in the halal supply chain positively affect HSCM implementation. Other researchers have highlighted that effective supply chain management emphasizes collaborative relationships between buyers and suppliers, significantly impacting supply chain performance. This collaboration is crucial to maintaining halal integrity throughout the supply chain. Trust among halal supply chain partners is essential to reducing the risk of non-compliance with halal procedures [90]. Supply chain relationship management plays a critical role in enhancing HSCM implementation. Collaborative relationships between buyers and suppliers, customer relationships, and effective partnerships are crucial in maintaining halal integrity and compliance [91]. Additionally, halal certification, labeling processes, and traceability systems significantly improve performance by ensuring compliance with halal standards [67, 84]. Good collaboration among elements, especially in raw material procurement, distribution, and sales processes within SMEs, will guarantee compliance in implementing halal products.

Research conducted on SMEs in fishery product processing indicated that supply chain relationship management and HSCM impact SMEs' performance. This performance is reflected in increased sales, expansion of marketing areas, and operational cost efficiency. Some researchers mentioned that HSCM implementation positively affects operational performance through research and development, technology commercialization, production, and marketing capabilities [23, 67, 76, 77, 87, 91]. However, it can also negatively impact SMEs as collaboration among supply chain elements may expose SMEs to more excellent management and control risks, resulting in reduced profits.

Studies on fish processing SMEs suggest that effective buyer-supplier partnerships, influenced by strategic and operational variables, significantly impact supply chain performance [92]. Additionally, trust among supply chain partners is essential for collaborative risk management, positively affecting MSME performance [79, 87].

4.4.3 Relationship between HSCM factors to SMEs performance

According to research on fish processing SMEs, consumer demands, government programs, government regulations, halal commitment, and supply chain relationship management do not directly impact SMEs' performance. HSCM implementation must act as an intermediary to improve SMEs' performance. Several researchers note that demand for halal products is increasing, especially in Muslim-majority countries [7]. However, SMEs face challenges in meeting this demand due to the complex halal certification process and limited resources, requiring efforts to fulfill these demands. Similarly, the government has provided support through halal incentive programs, significantly affecting SMEs' intentions to adopt halal practices to improve their performance [68]. According to other researchers, internal motivation and organizational commitment to halal products are essential for successfully implementing halal standards in SMEs, enhancing operational performance [93, 94].

Supply chain relationship management does not directly impact the performance improvement of fish processing SMEs. This finding is consistent with other researchers who state that supply chain relationship management is essential for overall supply chain efficiency, but it does not directly affect SMEs performance. Instead, it affects other factors, such as circular economy capabilities and sustainable supply chain design [34]. Factors such as management commitment and supply chain integration indirectly affect SMEs innovation performance, but SCRM alone does not directly impact overall SMEs performance [34, 95].

4.4.4 Practical implication

The managerial implications of the research are as follows:

(1) enhancing compliance with government regulations;

(2) managing consumer demands for halal products;

(3) increasing management commitment to halal certification;

(4) strengthening the halal supply chain efficiently;

(5) developing halal product innovation strategies;

(6) using halal certification as a promotional tool.

For fishery product SMEs owners, complying with government regulations on halal standards is a top priority to ensure the products meet halal requirements. SME management must understand and implement procedures that comply with regulations and proactively participate in government training or socialization related to halal regulations and certification. The program can reduce the risk of non-compliance, which could damage product reputation and consumer trust.

Consumers increasingly demand transparency and assurance of halal status for the products they consume. SMEs must effectively communicate the halal production process, from raw materials to production and distribution. Besides, maintaining good relationships with consumers through halal education will build loyalty and expand the market share for halal fishery products.

Management commitment to achieving and maintaining halal certification is crucial for supporting long-term business sustainability. Management commitments are resource allocation, employee training, and regular monitoring and evaluation of halal processes. By maintaining strong commitment, SMEs can ensure that every aspect of the supply chain meets the halal standards expected by consumers.

With regulatory government, consumer demands and a commitment to halal products, SMEs can optimize their supply chain performance. Furthermore, halal-certified raw materials management, collaborating with suppliers with halal certification, and select logistics partners who understand the importance of halal certification in product delivery. Through an integrated and halal-compliant supply chain, SMEs can enhance their competitiveness and add value for consumers.

SMEs need to innovate in developing fishery products that are not only affordable but also meet strict halal standards. By keeping up with market demand trends for clearly halal products, SMEs can diversify their product range by introducing processed fishery products that prioritize halal standards and quality. This innovation can strengthen the position of SMEs in meeting the needs of consumers who prioritize halal products.

The halal certification can be used as an effective promotional tool to attract consumers who are increasingly aware of the importance of product halalness. SMEs can utilize the halal label on packaging, websites, or promotional materials to enhance consumer appeal and trust in their products, which ultimately has the potential to increase sales.

These managerial implications are expected to guide SMEs in managing and continuously improving the halal supply chain performance and supporting their competitiveness in an increasingly competitive market. This practical implication might be limited to fishery industries context in Madura Island, Indonesia. Despite these limitations, the study provides valuable insights into HSCM in fishery context and lays the groundwork for further exploration.

5. CONCLUSIONS

The research confirms that HSCM is shaped by consumer demand, government regulations on halal products, government programs on halal incentives, halal commitment, and relationships among supply chain management elements. The importance of implementing HSCM for fishery product SMEs lies in improving their performance and competitiveness. The results of the structural model testing show that HSCM significantly impacts SME performance, particularly in terms of increasing sales, expanding marketing areas, and achieving operational cost efficiency. HSCM is an effective mediator in ensuring that the relationship between variables such as consumer demand, government programs, government regulations, halal commitment, and supply chain relationship management positively impacts SMEs' performance.

The managerial implications of this research include enhancing compliance with halal regulations, managing consumer demands, strengthening management commitment to halal standards, and leveraging halal certification as a marketing tool. With these steps, SMEs are expected to maintain halal quality, build consumer trust, and adapt to the evolving market demands.

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