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Advancing sustainability in culinary: Examining the role of halal supply chain management and operational efficiency

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ABSTRACT

This study aims to examine the role of halal supply chain management (HSCM) in improving sustainability in micro, small, and medium enterprises (MSMEs), by exploring the mediating role of operational efficiency. This study used a quantitative approach with a cross-sectional design. Data were collected from 336 respondents, through a structured questionnaire. Hypothesis testing and mediation models were conducted using structural equation modeling. The research results show that HSCM has a positive impact on sustainability. Furthermore, operational efficiency was shown to significantly mediate the relationship between HSCM and sustainability. These findings indicate that the implementation of halal principles promotes efficiency in business processes, which in turn improves business sustainability. This research provides important insights for culinary businesses to utilize a halal system as a strategy to improve efficiency and sustainability. Practices such as selecting halal-certified suppliers and tracking raw materials can reduce costs and create a sustainable competitive advantage. This study extends existing research by empirically testing the mediating role of operational efficiency in HSCM within MSMEs, a context that has been rarely explored.

Keywords: halal practices, halal supply chain management, operational efficiency, small culinary business, sustainability

INTRODUCTION

Consumer demand for halal products is increasing globally, not only in Muslim-majority countries, but also in non-Muslim countries (Ab Talib & Zulfakar, 2024; Putri et al., 2021). This trend encourages micro, small, and medium enterprises (MSMEs), particularly in the culinary sector, to adopt a halal supply chain management (HSCM) system to meet the growing needs of the halal market (Latifah, 2022; Nur Azizah et al., 2025; Susiang et al., 2024). The implementation of HSCM not only reflects compliance with sharia law but also plays a crucial role in improving operational efficiency and business sustainability for MSMEs.

The Halal Industry Development Corporation's 2020 report estimated the global market value of halal products at USD 2.3 trillion, with annual growth of around 8%, illustrating the significant market potential for MSMEs that effectively implement HSCM. Rajendran et al. (2024) and Tieman et al. (2012) indicate that a robust halal management system can reduce the risk of product non-conformities and improve supply chain efficiency, ultimately positively impacting MSME profitability. Furthermore, a halal supplier management system can also support sustainability efforts by integrating environmentally friendly practices into production and distribution processes (Ernayani & Firman, 2024).

Despite this promising potential, studies examining the relationship between HSCM, operational efficiency, and MSME sustainability, particularly in the food sector, are relatively limited. Previous research has tended to focus on large-scale industries, resulting in little empirical exploration of the specific dynamics faced by MSMEs (Giyanti et al., 2021). Nonetheless, the culinary sector remains one of the most significantly impacted industries by the implementation of halal regulations, particularly in urban areas like Bekasi City, which is a hub for food MSME growth.

Research on HSCM has grown rapidly in recent years, particularly in the context of MSMEs in the food sector. Recent studies have highlighted various important aspects that contribute to improving MSME performance and sustainability (Dwiputri et al., 2023). Firdaus and Safitri (2023) found that HSCM success factors and knowledge of halal practices positively influenced HSCM implementation, which in turn improved the performance of food MSMEs. However, this study did not explore the role of supply chain efficiency as a mediating variable in this relationship.

On the other hand, Ab Talib and Zulfakar (2024) discussed the challenges faced by small halal markets, such as Brunei

Darussalam, in managing sustainable halal food supply chains. They proposed four key initiatives namely responsible sourcing, green purchasing, sustainable packaging, and green transportation, that could help halal certified food companies achieve sustainable development goals. However, this study is more normative in nature and has not empirically tested the impact of these initiatives on the efficiency and sustainability of MSMEs.

Khan et al. (2022) identified eleven critical factors for effective HSCM and evaluated their impact on sustainability performance. This study concluded that effective HSCM is positively related to a company's economic, environmental, and social performance. Furthermore, Julistia et al. (2021) showed that the halal value chain ecosystem in MSMEs still faces obstacles in obtaining halal certification, despite many MSMEs implementing halal ecosystems, which impacts consumer trust and business sustainability.

Although research has highlighted various aspects of HSCM, there remains a gap in the literature regarding the integration of HSCM systems with sustainability and operational efficiency goals, particularly in the context of MSMEs in the food sector. Previous research tends to focus on large industries, thus further studies targeting MSMEs are needed to understand the specific dynamics and challenges they face in implementing halal supply chains. Therefore, the purpose of this study is to examine the role of HSCM in improving the sustainability of MSMEs in the culinary sector, by exploring the mediating role of operational efficiency. The subjects of this study are food business owners in Bekasi City, who face real challenges in integrating halal principles and efficiency as a primary strategy for their business continuity amidst a competitive market. Building on this research objective, the next section reviews the relevant theoretical foundation and prior empirical studies to develop the study's hypotheses.

LITERATURE REVIEW

Building on the research objective outlined in the introduction, this section discusses the theoretical foundation and prior empirical studies that inform the research framework. It begins with the resource-based view (RBV) theory as the underpinning grand theory, followed by a review of literature on HSCM, operational efficiency, and sustainability of MSMEs. This structured review provides the basis for developing the study's hypotheses.

Resource-Based View Theory

Approach RBV is a strategic theoretical framework for explaining the long-term competitive advantage of a business entity. This theory emphasizes that unique, inimitable, and difficult-to-substitute internal resources are key to creating sustainable value (Dandi & Ali, 2025; Zahrotun et al., 2024). In the context of MSMEs in the halal food sector, the RBV approach is used to understand how specific capabilities such as halal certification and sharia-based management systems become strategic foundations for building a sustainable creative economy (Khouroh et al., 2019; Susanto et al., 2023).

As part of the creative economy, halal food MSMEs rely not only on product innovation but also on value-based supply chain management. Intangible assets such as customer trust, halal compliance integrity, and social connections with halal business partners play a crucial role in strengthening MSMEs' competitive position (Baiquny & Nasution, 2024; Dilasari et al., 2024). Capabilities such as halal logistics, certified documentation systems, and long-term relationships with halal suppliers are concrete forms of high-value strategic assets from the RBV perspective. Research by Astiwara (2023) shows that integrating resource strategies with halal logistics capabilities directly impacts the efficiency and business performance of halal MSMEs.

The RBV concept has four main attributes, namely valuable, rare, inimitable, and non-substitutable (VRIN). In the context of the halal supply chain, resources that meet VRIN criteria include unique knowledge of halal laws and principles, adaptability skills to global sharia regulations, and a credible halal certification system. Rofiq et al. (2023) emphasize that utilizing valuable and scarce resources encourages MSMEs to survive amidst increasingly complex market pressures. Susiang et al. (2024) also emphasize that internalizing religious values and consistent halal compliance create a reputation that is difficult for conventional competitors to imitate.

The implementation of the halal supply chain as a strategic resource significantly contributes to the sustainability of the creative economy, particularly in the food sector of MSMEs. The halal supply chain not only strengthens market legitimacy but also acts as a catalyst for increasing distribution efficiency, product innovation, and speeding up adaptation to market changes. Susiang et al. (2024) demonstrated that implementing halal principles in the supply chain system encourages customer loyalty and operational efficiency. Research by Saima dan Firdaus (2024) shows that halal food businesses that consistently adhere to halal standards experience a steady increase in sales and reputation. Karia (2025) also states that a halal resource-based strategy strengthens business resilience and sustainable innovation.

HSCM and Sustainability of MSMEs

The sustainability of MSMEs adheres to the principles of profit, people, and planet (Fandeli et al., 2025). It is defined as a business approach that not only pursues economic profit but also considers social and environmental aspects in a balanced manner (Dwiputri et al., 2023). The economic dimension refers to a business's ability to survive and grow financially in the long term. The social dimension involves contributing to the well-being of workers, local communities, and upholding ethical business practices. Meanwhile, the environmental dimension emphasizes responsible resource management and waste reduction (Ghalih & Chang, 2024). Previous research (Sutrisno et al., 2025) revealed that MSMEs that integrate these three dimensions into their business strategies tend to exhibit stronger competitiveness and customer loyalty.

Food MSMEs, as part of the creative economy, face more complex sustainability challenges. In addition to limited capital and low managerial capacity, issues such as product certification, food safety, and environmentally friendly practices are key barriers to sustainability (Widayati, 2025).

One strategic approach to addressing these challenges is through the implementation of a halal supply chain. HSCM is a systematic approach to managing the flow of products, information, and finances in a halal manner, from raw materials to end consumers (Khazaini & Munir, 2024).

The halal supply chain concept not only emphasizes Sharia compliance but also upholds the principles of sustainability across the production, distribution, and consumption processes in an ethical and transparent manner. Halal supply chains contribute to strengthening logistical efficiency, increasing transparency, and ensuring product quality and legality (Ghalih & Chang, 2025). For MSMEs in the food sector, halal supply chains also create opportunities to improve raw material traceability, reduce waste, and raise quality standards. Previous research (Khan et al., 2022) confirmed that adopting halal principles in supply chain operations positively impacts business sustainability and enhances consumer perceptions.

Andespa et al. (2024) found that halal supply chain strategies, such as supplier management, distribution, and quality control, can strengthen product quality and safety for food businesses. Consistent with other studies (Ab Talib & Zulfakar, 2024), they concluded that a sustainable halal food supply chain approach provides a competitive advantage and supports business sustainability through a structured and measurable model. Based on these findings, the first hypothesis proposed in this study is as follows:

H1. HSCM has a positive impact on sustainability.

HSCM and Operational Efficiency

HSCM not only guarantees product halal integrity but also promotes more efficient and structured process management. By implementing halal principles, businesses are required to ensure traceability, compliance, and a high level of coordination among supply chain actors (Astiwara, 2023). This directly drives improvements in operational processes, reduces waste, and increases productivity. Research by Alfarizi (2023) shows that halal logistics practices in culinary MSMEs in Indonesia directly enhance operational efficiency.

Operational efficiency refers to an organization's ability to maximize output using minimal resources, without compromising service or product quality (Rahmiyati et al., 2024). In the small business sector, operational efficiency is a strategic factor that determines competitiveness and sustainability, particularly when resources are limited and operational costs are high (Shamsudin et al., 2025). Achieving efficiency requires careful process management, from raw material procurement and production to distribution.

Aziz et al. (2021) demonstrated that successful supply chain factors contribute over 50% to the implementation of operational efficiency in the food MSME sector. Furthermore, Qizwini (2025) found that quality traceability and halal certification positively affect operational efficiency. Accuracy in material selection, hygiene standards, and transparency in certification processes are all part of value-added efficiency (Munthe et al., 2023). An efficient halal supply chain model enables small businesses to reduce waste without compromising the core halal values of food products. Collaboration among halal supply chain actors, including producers, distributors, and certification, is key to maintaining consistent quality and ensuring smooth operational processes (Astiwara, 2023). Therefore, the second hypothesis proposed in this study is as follows:

H2. HSCM has a positive impact on operational efficiency.

Operational Efficiency and Sustainability of MSMEs

Operational efficiency is a business's ability to optimally manage and utilize resources to produce maximum output at minimal cost. In the context of MSMEs, particularly the labor-intensive and price-sensitive food sector, operational efficiency is a key element in improving business performance. This efficiency encompasses various aspects, from raw material management and production time to labor utilization, to distribution and customer service. With good efficiency, MSMEs can reduce costs, improve service quality, and accelerate production cycles, ultimately strengthening competitiveness and supporting long-term sustainability.

The relevance of operational efficiency to the sustainability of MSMEs is supported by several empirical findings. Suriani et al. (2024) found that cost efficiency significantly influences the competitiveness and sustainability of MSMEs, with a direct contribution to overall business continuity. In this context, efficiency serves as a key determinant of MSMEs' ability to survive and grow amid high production costs and fluctuating market demand. When MSMEs effectively manage costs and streamline their processes, they are more likely to maintain sustainable operations.

Similar research findings were presented by Samara and Anggraeni (2025), who examined the impact of digitalization on the efficiency and sustainability of MSMEs. They stated that the use of information technology can reduce operational costs, accelerate services, and improve the overall efficiency of business processes. This increased efficiency directly impacts MSMEs' ability to adapt to market dynamics and changes in the external environment, which is a crucial factor in ensuring business sustainability. Efficiency is no longer seen simply as a means of saving money, but as a core strategy for survival and growth.

Based on previous empirical evidence, it can be concluded that operational efficiency plays a crucial role in supporting the sustainability of MSMEs. Efficiency, reflected in resource management, technology implementation, and business process optimization, not only reduces costs but also contributes to increased competitiveness and business resilience. Therefore, this study proposes the following third hypothesis:

H3. Operational efficiency has positive impact on the sustainability.

HSCM, Operational Efficiency, and Sustainability of MSMEs

In the literature on halal MSMEs, it has been widely stated that HSCM has a significant impact on business sustainability. However, to the best of researchers' knowledge, studies that explicitly explain the role of operational efficiency as a mediating variable in this relationship are still rare. However, the implementation of a structured halal supply chain system,

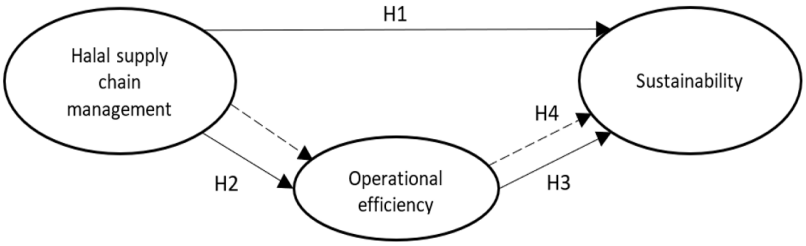

Figure 1. Research model (Source: Authors' own elaboration)

such as halal certification, traceability, and supply chain integrity procedures, naturally results in increased operational efficiency.

In a study of halal herbal food MSMEs, Rajendran et al. (2024) found that the halal supply chain mediates the relationship between supply chain integration and business performance. The part of the halal supply chain related to operational efficiency is the primary link connecting system integration and business sustainability outcomes. In other words, sound halal supply chain integration can strengthen efficiency, which in turn increases the resilience and competitiveness of MSMEs, particularly in the food sector.

Tumiwa et al. (2023) demonstrated that traceability, halal certification, and HSCM practices significantly improve the performance of food MSMEs. Furthermore, an analysis by Che Hassan and Osman (2024) emphasized that halal supplier integrity, including transparency, traceability, and systematic certification procedures, can improve the operational efficiency of the entire supply chain. The study highlighted how operational efficiency is a key mechanism for transferring the benefits of HSCM to more sustainable business conditions.

In line with the findings of Haque (2024), MSMEs that consistently implement halal principles experience increased operational efficiency and expanded market access, which in turn supports the sustainability of local businesses. Giyanti et al. (2021) found that implementing standard halal practices in food manufacturing has been shown to improve operational performance, ultimately strengthening the market and financial performance of MSMEs. This demonstrates that operational efficiency is a critical pathway to business sustainability.

Structured, compliance-based halal supply chain practices do not necessarily guarantee business sustainability if they are not accompanied by increased efficiency in resource management, production processes, and distribution. In other words, the success of HSCM in promoting MSME sustainability tends to depend to the extent to which the system can significantly improve operational efficiency. This efficiency is a crucial pathway for translating the advantages of the halal system into long-term business resilience. This study examines the indirect relationship between HSCM and sustainability, with operational efficiency serving as a crucial strategic link. Therefore, the following hypothesis is:

H4. Operational efficiency mediates the relationship between HSCM and sustainability.

Figure 1 illustrates the research model in this study, which demonstrates the direct and indirect relationships between HSCM, operational efficiency, and sustainability. This model highlights the role of operational efficiency both as an outcome of HSCM implementation and as a pathway to strengthening sustainability. Overall, this framework demonstrates how halal supply chain practices can impact sustainability through interconnected operational mechanisms.

METHOD

This study employed quantitative research with a cross-sectional approach. This approach was used to assess the current state of MSMEs related to the sustainability of their businesses when implementing halal practices. The study was conducted in Bekasi City, West Java Province, Indonesia, comprising 12 sub-districts. The population in this study was MSMEs in the food (culinary) sector. Furthermore, a non-probability sampling method was used to select samples based on the location of MSMEs in each sub-district. The sampling technique used was convenience sampling, which is a method of selecting samples based on the availability and willingness of respondents to participate in the study (Golzar et al., 2022). Only individuals who agreed to be asked questions were included in the study sample. Convenience sampling was chosen due to the accessibility of MSME owners and the limited resources available. While this approach may limit the generalizability of findings, it provides valuable insights into the specific context of culinary MSMEs in Bekasi City.

The research sample consisted of culinary MSMEs in Bekasi City. Respondents were required to operate their businesses for more than one year and to have implemented HSCM for a year. Respondents were required to answer a screening question about whether they had implemented a halal system in their culinary businesses over the past year. The study was conducted by distributing 400 questionnaires to culinary MSMEs. The questionnaires used a Likert scale for each variable, sustainability, HSCM, and operational efficiency. A scale of 1 to 10 was used to indicate respondents' agreement with the statements posed, with 1 representing strongly disagree and 10 representing strongly agree.

Each variable was measured using modified items from a questionnaire compiled from previous literature. Modifications were necessary because this study specifically investigated sustainability, HSCM, and operational efficiency of MSMEs. The MSME sustainability measure was modified from a previous research instrument (Zvarikova et al., 2024), which consisted of five statement items. The HSCM measure was modified from a previous instrument (Khan et al., 2022), which consisted of six statement items. Operational efficiency

Table 1. Descriptive analysis

Demographics	Categories	n = 336	Percentage (%)
Gender	Male	156	46.43
	Female	180	53.57
Age	< 25 years	59	17.56
	25-30 years	68	20.24
	31-36 years	127	37.80
	37-42 years	72	21.43
	> 42 years	10	2.98
Education	No formal education	12	3.57
	High school and lower	223	66.37
	Graduation	95	28.27
	Postgraduation	6	1.79
Length of business	< 5 years	112	33.33
	5-9 years	135	40.18
	10-14 years	77	22.92
	> 14 years	12	3.57
Income (per month)	< Rp 5,000,000	50	14.88
	Rp 5,000,000-Rp 10,000,000	92	27.38
	Rp 11,000,000-Rp 20,000,000	141	41.96
	> Rp 20,000,000	53	15.77
Subdistrict	Bantargebang	16	4.76
	Bekasi Barat	46	13.69
	Bekasi Selatan	31	9.23
	Bekasi Timur	40	11.90
	Bekasi Utara	55	16.37
	Jatiasih	34	10.12
	Jatisampurna	10	2.98
	Medansatria	15	4.46
	Pondok Gede	28	8.33
	Pondok Melati	16	4.76
	Mustikajaya	7	2.08
	Rawa Lumbu	38	11.31

was measured using four questions, which were modified from operational efficiency questions from a previous study (Rahmiyati et al., 2024). The questionnaire was translated into Indonesian to ensure respondents understood all questions.

After the data was collected and cleaned, the instrument was tested for validity and reliability. The validity and reliability test criteria used were a significant p-value of less than 0.05 (Hair et al., 2013). Reliability testing was demonstrated by a Cronbach's alpha value above 0.07, and hypothesis testing was conducted using structural equation modeling (SEM) analysis.

Valid and reliable data were subsequently used to test the feasibility of the research model by assessing the degree of fit between the hypothesized model and the observed data. The model's feasibility was evaluated using several fit indices, such as Chi-square/degrees of freedom (χ^2/df), goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), Tucker Lewis index (TLI), and root mean square error of approximation (RMSEA). To determine whether a variable functions as a mediating variable, the Sobel test approach was employed.

ANALYSIS

Respondent Characteristics

Data collection was conducted by distributing questionnaires to culinary MSMEs in Bekasi City. A total of 400 questionnaires were distributed offline, of which 336 (84%) were returned and fully completed. The remainder were not returned or incompletely completed and were therefore excluded from the research data. The total number of data collected and analyzed in this study was 336 respondents. Respondents' demographic characteristics included gender, age, education level, length of business, monthly income, and the subdistrict where the business was operated. Details of the respondents' demographic characteristics are presented in **Table 1**.

Based on **Table 1**, the majority of respondents in this study were women (53.57%) aged between 31 and 36 years (37.80%). The data indicate that culinary MSMEs in Bekasi City are largely dominated by individuals within the productive age group. In terms of education, most respondents had a high school education or lower (66.37%), followed by bachelor's degree (S1) holders at 28.27%. Only a small proportion held postgraduate qualifications (1.79%). These findings suggest that culinary MSME actors in Bekasi City come from diverse educational backgrounds, with a predominance of secondary-level education.

In terms of length of business, 33.33% of respondents have been running their businesses for less than 5 years, while 40.18% have between 5 and 9 years of business experience. This reflects that most culinary MSMEs are in the growth and development stage. In addition, most respondents earn a monthly income between Rp 11,000,000 and Rp 20,000,000 (41.96%), while 15.77% of respondents earn more than Rp

Table 2. Reliability and validity analysis

Variable	Items	SL	CR	AVE
Sustainability	I understand the importance of sustainable business growth.	0.958	0.979	0.904
	Sustainable growth focuses not only on company profits but also on the positive impact on society and the environment.	0.942		
	Understanding the social impact of entrepreneurship is also crucial.	0.963		
	It's important to be aware of the environmental impact of entrepreneurship.	0.947		
	I believe my company can be considered sustainable.	0.945		
HSCM	The origin of the products I sell is easily traceable to ensure their halal status.	0.942	0.982	0.899
Data	I only choose raw materials that have the official halal logo from a trusted institution.	0.933		
	Selling halal products helps me retain loyal customers.	0.961		
	The halal products I sell attract new customers.	0.946		
	Managing my business according to halal principles encourages me to maintain product quality and cleanliness.	0.934		
	I strive to follow the applicable halal rules and regulations in my business.	0.972		
Operational efficiency	I utilize raw materials and business equipment wisely to avoid waste.	0.918	0.970	0.889
	I regularly evaluate my work methods to make my business more efficient and faster.	0.968		
	I strive to utilize all my resources (time, energy, materials) optimally.	0.908		
	I have ways to reduce operational costs without compromising product quality.	0.976		

Note. SL: Standardized loading

Table 3. Goodness of fit measures of the full model

Parameter	Cut-off Value	Result	Interpretation
Probabbility	⩽ 0.05	0.002	Good fit
χ^2/df	< 3.00	1.557	Good fit
GFI	⩾ 0.90	0.959	Good fit
AGFI	⩾ 0.90	0.931	Good fit
NFI	⩾ 0.90	0.987	Good fit
TLI	⩾ 0.90	0.993	Good fit
RMSEA	⩽ 0.05	0.041	Good fit

Table 4. Hypotheses testing

Hypotheses	Path	PC	p	Result
H1	HSCM → SS	0.352	0.003	Supported
H2	HSCM → OE	0.771	***	Supported
H3	OE → SS	0.376	0.005	Supported
H4	HSCM → OE → SS	0.290	0.005	Supported

Note. ***Significance at the level 0.001 ($p < 0.001$); $p < 0.05$; PC: Path coefficient; SS: Sustainability; & OE: Operational efficiency

20,000,000. This indicates that culinary MSMEs in Bekasi City have quite promising economic potential, with the majority of business actors being in the upper middle class.

Meanwhile, in terms of sub-district distribution, respondents were spread across various sub-districts in Bekasi City, with the largest concentrations in North Bekasi (16.37%), West Bekasi (13.69%), and East Bekasi (11.90%). This indicates that culinary MSMEs are spread across various regions, but there are concentrations of culinary centers in several sub-districts.

Validity and Reliability Test

Based on the reliability and validity analysis results in **Table 2**, all constructs in this study were shown to have good reliability. Composite reliability (CR) values exceeded 0.7 for all constructs, indicating that the indicators consistently measure the intended constructs.

In terms of validity, all indicators showed standardized loading values above 0.7, indicating adequate convergent validity. The average variance extracted (AVE) values for all constructs were above the threshold of 0.5 (Hair et al., 2013). Thus, this research instrument can be declared valid and reliable, making it suitable for further analysis.

Model Fit Test

Next, this study conducted a model fit test to determine whether the proposed model fit the data. Furthermore, a goodness of fit test was conducted using several measurement parameters, such as x^2/df, TLI, and RMSEA. Based on the model analysis results, it can be concluded that this research model meets the goodness of fit criteria. More complete results of the model goodness of fit measurements are presented in **Table 3**.

Hypothesis Testing

The structural model in this study was tested using SEM with the maximum likelihood estimation technique. Based on the GFIs presented in **Table 3**, the model demonstrates a satisfactory level of fitness. Subsequently, the research hypotheses were tested using SEM with 5,000 bootstrapped samples and a 95% confidence interval (CI) (Hayes, 2018). The results of the hypothesis testing are presented in **Table 4**.

The SEM results indicate that HSCM has a positive and significant effect on sustainability ($\beta = 0.352$, $p = 0.003$), thus supporting **H1**. HSCM also has a positive and significant effect on operational efficiency ($\beta = 0.771$, $p < 0.001$), providing support for **H2**. Furthermore, operational efficiency has a positive and significant effect on sustainability ($\beta = 0.376$, $p = 0.005$), indicating support for **H3**. In addition, operational efficiency significantly mediates the relationship between HSCM and sustainability ($\beta = 0.290$, $p = 0.005$), thereby supporting **H4**.

DISCUSSION

This study aims to examine the role of HSCM and operational efficiency in enhancing the business sustainability of culinary MSMEs. Furthermore, it explores the mediating role of operational efficiency in the relationship between HSCM and sustainability. Four key research findings are worth discussing.

The first finding reveals that HSCM has a positive effect on sustainability. Consistent with previous research (Ali & Suleiman, 2016; Haleem et al., 2021; Khan et al., 2022; Manzouri et al., 2013) this result indicates that the implementation of halal supply chain practices by culinary MSMEs can enhance business sustainability. Better adherence to halal principles throughout the supply chain, from raw material procurement to production and distribution, contributes to higher levels of economic, social, and environmental sustainability. This confirms **H1** that HSCM positively influences the sustainability of MSMEs.

Culinary MSMEs that implement HSCM indirectly increase the efficiency of their product supply chains, reduce the risk of non-halal products, and increase consumer trust, ultimately supporting the economic sustainability of their businesses (Khan et al., 2022). From a social perspective, HSCM practices encourage fair, transparent, and socially responsible business practices, thereby strengthening the social legitimacy of businesses (Kuncorosidi et al., 2024).

Environmentally, combining halal values with green supply chain principles, such as waste reduction and the use of environmentally friendly materials, encourages ecological sustainability. This aligns with halalan thayyiban (permissible and wholesome) which emphasizes not only halal certification but also aspects of goodness and environmental sustainability. Therefore, implementing HSCM is a key strategy in supporting the achievement of sustainability goals, particularly in the context of culinary MSMEs (Ghalih & Chang, 2024).

The second finding shows that HSCM significantly improves operational efficiency for culinary MSMEs. Consistent with previous research (Rahmiyati et al., 2024; Yadav et al., 2023), higher levels of halal principle implementation in the supply chain lead to more efficient business operations. By emphasizing strict compliance standards, such as traceability, segregation of halal and non-halal products, and transparent documentation, HSCM directly enhances workflow, quality control, and logistics management. This system fosters greater discipline in managing operational processes, thereby reducing errors, minimizing resource waste, and accelerating decision-making (Kusnadi et al., 2024; Vanany et al., 2020). This confirms **H2** that HSCM positively influences operational efficiency.

Harsanto et al. (2024) explain that the integration of digital technologies into halal supply chain systems significantly contributes to operational efficiency, as it enables real-time tracking and monitoring, and improves data accuracy across the distribution chain. Similarly, Hassan and Osman (2024) emphasize that strong supplier integrity, supported by consistent certification and standardization systems, enhances efficiency by improving coordination, reducing delays, and minimizing supply chain disruptions. A verified supplier ecosystem and digitized logistics infrastructure allow businesses to reduce lead times, lower operational costs, and increase both reliability and flexibility in their operations.

The third finding confirms that operational efficiency has a positive and significant impact on sustainability. This indicates that the more effectively a business manages its operations, the greater its ability to achieve sustainable outcomes. Operational efficiency reflects a company's capacity to optimize resources, reduce waste, accelerate process flows, and minimize costs without compromising quality (Yulyani et al., 2025). When MSMEs operate efficiently, the use of energy, raw materials, and time can be reduced, which strengthens environmental sustainability while also supporting economic and social performance. This validates **H3** that operational efficiency positively contributes to the sustainability of MSMEs.

Furthermore, efficiency also creates cost advantages that can improve the economic viability of a business (Darmawan, 2025) and enable companies to invest more in social aspects such as employee welfare and community involvement. In line with previous findings (Faishal et al., 2025; Othman & Nawi, 2025), operational efficiency in the halal food industry can reduce excessive resource use and support the achievement of sustainability indicators in environmental, economic, and social aspects. Harsanto et al. (2024) stated that digital technologies that improve operational efficiency directly contribute to carbon emission reduction, energy savings, and social transparency. Operationally efficient companies not only increase profitability but also proactively maintain ecological balance and strengthen sustainable social relationships (Gustari & Sisdianto, 2024; Syaifullah, 2023).

The fourth finding demonstrates that operational efficiency mediates the relationship between HSCM and sustainability. This means that HSCM implementation enhances sustainability more effectively when supported by improved efficiency. Applying halal principles such as traceability, material segregation, halal certification assurance, and transparent documentation not only ensures Sharia compliance but also fosters more efficient business processes (Camelia et al., 2024; Hartini & Malahayatie, 2024; Wahyudi et al., 2023). Such efficiency, reflected in reduced processing time, minimized errors, cost savings, and faster distribution, ultimately drives long-term sustainability. This confirms **H4** that operational efficiency mediates the relationship between HSCM and sustainability.

Ahmad et al. (2023) found that integrating knowledge, technology, and strategy in HSCM can improve logistics efficiency and drive sustainability performance, particularly in environmental and economic aspects This finding aligns with Kuncorosidi et al. (2024), who stated that effective halal supply chain practices indirectly impact sustainability through enhanced operational efficiency and improved managerial systems that prioritize reliability and social responsibility. Operational efficiency acts as a critical link between halal values and sustainability principles, ensuring that the implementation of HSCM is not only sharia-compliant but also contributes to long-term business viability.

While these findings provide strong evidence from culinary MSMEs in Bekasi City, the context specific nature of the sample limits the extent to which the results can be generalized to other regions or industries. Nevertheless, the study offers useful insights for developing economies with similar MSME characteristics and business environments. Future research may consider cross regional or cross country comparisons, such as between Indonesia and Malaysia, to test the robustness of these relationships.

MANAGERIAL IMPLICATIONS, LIMITATION AND FUTURE RESEARCH

The findings of this study provide important implications for MSMEs in the culinary sector, particularly in integrating HSCM principles as a managerial strategy to enhance operational efficiency and business sustainability. MSMEs should prioritize transparent traceability of raw material origins and collaborate with halal-certified suppliers to strengthen consumer trust and streamline logistics. Strict adherence to halal principles fosters discipline in business process management, including waste reduction, product quality improvement, and optimal resource utilization. This approach not only reduces operational costs but also reinforces the business image as socially and environmentally sustainable.

Furthermore, the results highlight that operational efficiency serves as a crucial link between HSCM practices and sustainability. MSME owners are therefore encouraged to conduct regular evaluations of their business processes, adopt simple digital tools for raw material recording, stock tracking, and production time management, and provide employee training on halal practices and efficiency improvement. Regulators and supporting institutions can also use these insights to design training modules and certification programs that integrate halal compliance with efficiency and sustainability, thereby creating a more holistic capacity-building framework for MSMEs.

This study is not without limitations. One of the limitations that needs to be considered is the cross-sectional data collection, which cannot capture long-term dynamics or changes in managerial behavior in HSCM implementation and sustainability. Furthermore, although the test model demonstrated a good fit, other variables that may also influence sustainability, such as government support, access to halal financing, or digital competence, were not included in this research model.

In addition, because the study focuses only on culinary MSMEs in Bekasi City, the findings are context specific and may not fully capture the dynamics of MSMEs in other regions or industries. This limits the generalizability of the results. Future research should therefore expand the scope to different geographical areas or even conduct cross-country comparisons, such as between Indonesia and Malaysia, to enhance external validity and strengthen the applicability of the findings.

Based on these limitations, further research can be conducted in several directions. First, longitudinal studies are needed to examine the long-term effects of HSCM implementation and increase operational efficiency on MSME sustainability. Second, expanding the geographic context and business sectors can provide a more comprehensive understanding of the dynamics of HSCM implementation in Indonesia. Third, future research is recommended to include other moderating or mediating variables, such as halal managerial literacy, digital technology adoption, or public policy support, to explore more complex indirect influences within the MSME sustainability framework.

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