

Risk Analysis of Halal Compliance in the Halal Industry Supply Chain Using a Simple Risk Mapping Approach

Raihan Akmal Taufiq^{1*}, Ghoniurozaq², M. Zimam Asshidqi³, Fatkhur Rokhman⁴

^{1,2,3,4}UIN K.H Abdurrahman Wahid

raihanakmaltaufiq2007@gmail.com^{1*}, ghoniurozaq@gmail.com², aashidqizimam@gmail.com³,
fatkhur.rokhman@uingusdur.ac.id⁴

Abstract

The growth of the halal industry requires every business operator to ensure the halal status of their products at every stage of the supply chain. This study aims to analyze halal risks in the supply chain of fried chicken MSMEs using a simple risk mapping approach. The study employs a mixed-methods approach based on library research, combining qualitative analysis to identify potential halal risks with simple quantitative analysis through the assessment of likelihood, impact, and risk scores. The study focuses on three main stages of the supply chain: raw material procurement, the production process, and product distribution. The results indicate that the highest-level risks stem from the use of chicken not slaughtered in accordance with Islamic law, the use of food additives with unclear halal status, suppliers lacking halal certification, and the occurrence of cross-contamination during the production process. Based on the risk mapping results, these risks fall into the high category and therefore require control as a top priority. In contrast, risks in the distribution stage tend to fall into the moderate to low categories. The application of risk mapping provides an overview of critical halal control points while helping to systematically determine risk control priorities. The findings of this study are expected to serve as a reference for MSMEs in improving halal risk management and supporting the implementation of a more effective and sustainable halal supply chain.

Keywords: *halal supply chain; risk mapping; halal risk; MSMEs; risk management.*

1. Introduction

In recent years, the halal industry has experienced rapid growth, both nationally and internationally. This development is driven by the growing awareness of the Muslim community to adopt a lifestyle in accordance with Islamic law. One manifestation of this awareness is seen in consumer patterns, which are increasingly paying attention to the halal aspects of products, particularly food and beverages. As the country with the largest Muslim population in the world, Indonesia has enormous potential for developing the halal industry. In this sector, Micro, Small, and Medium Enterprises (MSMEs) play a crucial role, particularly in the food sector, which is a primary need for the community (Halal Product Guarantee Agency, 2023).

However, the halal concept focuses not only on the products consumed by the public but also encompasses the entire process involved in creating those products. The halal supply chain concept emphasizes that every stage of the supply chain, from raw material procurement through production to distribution to consumers, must meet established halal standards. In practice, many MSMEs still do not understand the importance of comprehensive halal risk management. As a result, the potential for contamination with non-halal materials remains significant and can impact a product's halal status.

Halal risks can arise at various stages of the supply chain. At the raw material procurement stage, risks can stem from the use of materials that do not have halal certification or are obtained from suppliers whose credibility is uncertain. At the production stage, common risks include cross-contamination with non-halal materials, the use of equipment that is not segregated according to regulations, and suboptimal implementation of hygiene standards that support halal assurance. Meanwhile, at the distribution stage, risks can arise from a lack of product separation during storage and shipping, allowing for mixing with products that are not guaranteed halal (Rahman et al., 2021). These conditions indicate a gap between the ideal conditions and the reality on the ground.

To address these issues, a method is needed that can systematically identify and map halal risks while remaining easily implemented by MSMEs. One method that can be used is risk mapping, a risk mapping technique based on the likelihood of a risk occurring and the magnitude of its impact. This method is widely used in risk management because it helps organizations prioritize risk management in a more effective and structured manner (Hopkin, 2020).

In the halal industry, the application of risk mapping plays a crucial role in identifying critical points in the supply chain that could potentially lead to violations of halal principles. Through risk mapping, business actors can determine the priority level of each risk and thus determine more appropriate mitigation strategies. This approach is highly suitable for MSMEs because it is relatively simple and does not require a complex risk management system or the use of sophisticated technology.

This research focuses on analyzing halal risks in the halal industry supply chain using a simple risk mapping approach in the fried chicken MSME sector. The selection of the research object was based on the high level of fried chicken consumption in the community and the

fact that many MSMEs in this sector still lack a well-documented and structured halal assurance system. The analysis was conducted at three main stages of the supply chain: raw material procurement, production, and product distribution to consumers.

Based on this background, this study aims to identify various halal risks that could potentially arise at each stage of the supply chain and to categorize these risks into low, medium, and high categories. The research findings are expected to provide practical benefits for MSMEs in improving their product halal assurance systems, while strengthening the link between scientific risk management concepts and the implementation of halal principles from a religious perspective.

2. Literature Review

Mechanisms, and the halal certification process by authorized institutions. In Indonesia, the government has established regulations regarding halal product assurance, requiring certain products to be certified. However, in practice, MSMEs still face various obstacles, such as limited knowledge of the halal system, relatively high certification costs, and low awareness of the importance of implementing halal principles comprehensively throughout the supply chain (Halal Product Assurance Agency, 2023).

2.1. Halal Risk in the supply chain

Halal risk can be defined as the potential for a product or process to mismatch with established halal requirements, thus impacting a product's halal status. This risk can arise at various stages in the supply chain, from raw material procurement to distribution to consumers. According to Rahman et al. (2021), sources of risk in the halal assurance system can stem from raw materials with unclear origins, production processes that do not meet halal standards, and distribution processes that do not separate halal and non-halal products. This demonstrates that halal risk is complex and encompasses multiple dimensions.

In the context of MSMEs, the level of halal risk is generally higher than in large-scale companies. This is due to limited resources, including financial, technological, and human resources, as well as the suboptimal implementation of internal control systems. Some examples of frequently encountered risks include the use of food additives that do not have halal labels, the use of the same equipment for halal and non-halal products, and lack of supervision during the distribution process.

This situation demonstrates that halal risks are not only related to technical aspects, but also encompass managerial aspects and the level of business actors' awareness of the importance of maintaining product halalness. Furthermore, halal risks can have significant impacts, both economically and on consumer confidence. Products whose halal status is questionable have the potential to lose market share, especially among Muslim consumers who place a high value on halal aspects in their consumption activities. Therefore, a systematic approach is needed to identify, analyze, and manage these various halal risks.

2.2. Risk Mapping in Risk Management

Risk mapping is a risk management method used to identify, analyze, and prioritize risk management based on the likelihood of occurrence and the magnitude of impact. This method is generally presented in the form of a risk matrix that categorizes risks into several categories, such as low, medium, and high, thus simplifying the decision-making process.

According to Hopkin (2020), risk mapping is an effective tool because it provides a visual representation of the position of each risk. This allows organizations to more easily prioritize risk management in a precise and targeted manner. One of the main advantages of this method is its simplicity, making it applicable to various types of organizations, including MSMEs with limited resources.

Through the use of risk mapping, business actors can identify the most critical risks and determine appropriate mitigation measures. In the context of the halal supply chain, this method is particularly useful for identifying critical points that could potentially lead to violations of halal principles.

However, based on a review of various previous studies, the application of risk mapping in halal risk analysis is still relatively limited, particularly in the MSME sector. Most research focuses on halal certification and halal assurance systems in general, without conducting specific risk mapping analyses at each stage of the supply chain. This situation indicates a research gap, which is one of the reasons for this study.

3. Research Methods

All This research employs a mixed methods approach using library research. This mixed methods approach was chosen because it combines simple qualitative and quantitative analysis in the process of identifying and mapping halal risks in the halal industry supply chain. The qualitative approach is used to understand and examine the phenomenon of halal risks based on various relevant literature, while the quantitative approach is utilized by assigning scores to the likelihood of risk occurrence and the impact at each stage of the supply chain. According to Creswell and Creswell (2018), a mixed method is a research approach that combines qualitative and quantitative methods in a single study to produce a more comprehensive analysis. In this study, a qualitative approach is used to identify various types of halal risks based on the concept of the halal supply chain and halal assurance system. Meanwhile, a simple quantitative approach is used to determine the level of risk through a scoring process using the risk mapping method.

The research object is the halal food industry supply chain for fried chicken MSMEs. The research analysis focuses on three main stages in the supply chain: raw material procurement, production processes, and product distribution. This limitation of scope was implemented to focus the research on identifying critical points of halal compliance at each stage of the supply chain.

Research data was obtained through various relevant literature sources, such as scientific journals, books on risk management, and official documents related to halal product assurance systems. All data obtained was then systematically analyzed to identify potential halal risks that may arise in the halal supply chain process.

Data analysis techniques were conducted using two approaches: qualitative analysis and simple quantitative analysis. Qualitative analysis was used to identify and describe various halal risks at each stage of the supply chain. Next, quantitative analysis was conducted by assigning a score to each risk based on its likelihood and impact. The assessment process used a scale of 1 to 5.

Tabel 1: Skala Likelihood

Skor	Category
1	Very low
2	Low
3	Moderat
4	High
5	Very High

Tabel 2 : Skala Impact

Skor	Category
1	Very small impact
2	Small impact
3	Moderate impact
4	Major impact
5	Very large impact

The risk score is obtained by multiplying the likelihood and impact values using the following formula:

Risk Score = Likelihood $\times$ Impact

The resulting risk score is then mapped into low, medium, and high risk categories using a risk mapping matrix. According to Hopkin (2018), risk mapping is an effective risk management tool to help prioritize risk management based on its urgency. The risk level categories in this study are defined as follows:

Tabel 3: Risk Score

Score-Risk	category
1-5	Low
6-14	Curently
15-25	Tall

This study aims to analyze risk management in the halal supply chain of MSMEs. Through this approach, the research is expected to provide a more systematic overview of the level of halal risk in the fried chicken MSME supply chain, while also helping to determine priorities for halal risk control in a more measurable manner.

The limitations of this research lie in the use of data based on literature studies without direct field observations. Furthermore, the risk score assessment was conducted conceptually based on a literature review, so the results are descriptive and cannot be broadly generalized. Nevertheless, this research remains relevant as a basis for understanding the implementation of halal risk management.

4. Research Results

4.1. Fried Chicken MSME Supply Chain Flow

Based on the results of a literature review and a simplified supply chain model for the MSME sector, the supply chain flow for fried chicken businesses in this study is divided into three main stages: raw material procurement, production, and product distribution.

In the raw material procurement stage, MSMEs obtain broiler chicken from local suppliers and traditional markets as the primary source of production materials. In addition, supporting materials such as flour, cooking oil, and various spices are also used in the product processing. From a halal supply chain perspective, the raw material procurement stage plays a crucial role because inaccurate material selection can impact the halal status of the resulting product.

The production stage encompasses a series of activities, from washing the chicken, slaughtering, mixing spices, coating the chicken with flour, frying, and finally, temporary storage before the product is marketed to consumers. This stage is quite complex because it involves various factors, such as labor, production equipment, and work environment conditions, which can affect product quality and halal status. Next, the distribution stage includes packaging, storage of the finished product, and distribution to consumers. Distribution can be done directly through dine-in, takeout, and delivery services. At this stage, halal compliance must be maintained to ensure product integrity is maintained until it reaches consumers.

In general, the supply chain flow of the fried chicken MSME used in this study can be described as follows:

Raw material supplier $\rightarrow$ Production process $\rightarrow$ Packaging $\rightarrow$ Distribution $\rightarrow$ Consumer

4.2. Halal Risk Identification

a. Raw Material Stage

The main risk in the raw material procurement stage relates to the possibility of non-compliance with Islamic law requirements in the chicken slaughtering process. If the slaughtering process is not carried out in accordance with applicable halal standards, the resulting product cannot be categorized as halal. Furthermore, the use of additives such as instant seasoned flour and flavorings also poses a potential risk if they contain animal ingredients whose halal status cannot be confirmed.

Another risk can arise from raw material suppliers who do not have halal certification. This condition results in low traceability of raw materials, making it more difficult to verify the origin and halal status of the ingredients. This situation is often found in MSMEs, where price is more important in selecting suppliers than guaranteeing the halal status of the ingredients used.

b. Production Stage

At the production stage, the most common risk is cross-contamination. This contamination can occur due to the use of inadequately separated production equipment, substandard equipment cleaning processes, or poor production environment hygiene.

Furthermore, repeated use of cooking oil can also pose a risk, especially if the oil was previously used to process products whose halal status is unclear. Human resource factors also contribute to the emergence of halal risks, particularly due to workers' limited understanding of the halal procedures and standards that must be implemented during the production process.

c. Distribution Stage

At the distribution stage, the risk level is relatively lower than in previous stages, but still requires attention. Potential risks include mixing the product with other goods during storage, using unhygienic packaging or containers, and damaged packaging that can lead to contamination. Although the impact is not as severe as the risks at the raw material and production stages, failure to maintain halal certification at the distribution stage can still undermine consumer confidence in halal products.

4.3. Halal Risk Identification

After conducting a risk identification process at each stage of the supply chain, the next step is to perform a risk assessment using a simple quantitative approach. This assessment aims to determine the priority level of halal risks based on the likelihood of the risk occurring and the impact it has on the product's halal status. This approach is used so that the risk analysis process is not merely descriptive but also has a more measurable and systematic basis for assessment.

The assessment is conducted using a 1–5 scale. The likelihood score indicates how likely a risk is to occur within the fried chicken MSME supply chain. Meanwhile, the impact score describes the severity of the consequences if the risk were to actually occur, in terms of its effect on the product's halal integrity. The higher the score assigned, the greater the risk level.

The risk score is obtained by multiplying the likelihood score by the impact score. The result of this calculation is then used to categorize the risk as low, moderate, or high. This approach is considered effective because it helps prioritize risk controls more objectively.

Table 4 : Halal Risk Assessment for Fried Chicken MSMEs

Risk	Likelihood	Impact	Risk Score	Category
Chickens are not slaughtered according to sharia	5	5	25	Tall
Supplier is not yet halal certified	4	4	16	Tall
Additional ingredients without halal labels	4	4	16	Tall
Cross-contamination of production equipment	4	5	20	Tall
Low production environment cleanliness	3	4	12	currently
Repeated use of cooking oil	3	3	9	currently
Damage to product packaging	2	2	4	Low
Product mixing during distribution	2	3	6	currently

Description:

Low risk = score 1–5

Moderate risk = score 6–14

High risk = score 15–25

Based on the analysis, the highest risk levels are found in the raw material procurement and production stages. This finding indicates that these two stages are critical points in maintaining the halal integrity of fried chicken MSME products. The highest risk was found in the use of chicken whose slaughtering process did not comply with Islamic law, with a risk score of 25. This risk has a very high likelihood and impact because the slaughtering process is one of the main requirements for determining the halal status of animal-based products. If the slaughtering process is not carried out in accordance with Islamic law, the product directly does not meet halal requirements.

Furthermore, the risk of cross-contamination in production equipment also received a high risk score of 20. This risk can arise from the repeated use of equipment without adequate cleaning procedures. Within the halal supply chain concept, cross-contamination is a factor that requires special attention because it can lead to the mixing of halal ingredients with questionable or non-halal ingredients. Therefore, control and supervision of the cleanliness of production equipment are crucial in implementing a halal assurance system.

Other risks categorized as high include the use of additives that do not have a halal label and the use of suppliers that are not halal certified. These risks demonstrate that monitoring raw material sources remains a major challenge for MSMEs in the halal food sector. Unclear origins and halal status of raw materials can increase the likelihood of using ingredients that do not meet halal standards, potentially reducing consumer trust in the product.

Meanwhile, risks categorized as moderate are identified in aspects of production environment hygiene, repeated use of cooking oil, and product mixing during distribution. While the impact is not as significant as risks categorized as high, these risks still require adequate control because they can impact product quality and the business's halal image. For example, repeated use of cooking oil can degrade product quality and increase the potential for contamination if not monitored regularly.

A risk categorized as low is damage to product packaging. This risk has a relatively low probability and impact on the product's halal status. Nevertheless, it still requires attention to maintain product quality during storage and distribution.

4.4. Risk Mapping Matrix Section headings

After the risk assessment process is completed, the next step is to map all risks into a risk mapping matrix. This matrix is used to provide a visual representation of the position of each risk based on likelihood and impact, allowing for a clearer understanding of the urgency of each risk. With a risk matrix, the process of determining control priorities can be carried out in a more structured, systematic, and understandable manner.

In this study, the risk mapping matrix is categorized into three main categories: low risk, medium risk, and high risk. Low risk indicates a relatively low probability of occurrence and impact, allowing for control through routine monitoring. Medium risk indicates the need for regular monitoring and control because it has the potential to impact the quality and halal integrity of the product if not properly managed. Meanwhile, high risk is the top priority in control efforts because it has a high probability of occurrence and impact on the product's halal status.

The results of the halal risk assessment in the fried chicken MSME supply chain are presented in the risk assessment table.

Fig. 2 : Halal Risk Mapping Matrix

IMPACT	LIKELIHOOD				
	1	2	3	4	5
5				Cross-contamination of production equipment	Chickens are not slaughtered according to sharia
4			Low production environment cleanliness	Supplier is not yet halal certified	Additional ingredients without halal labels
3		Product mixing during distribution	Repeated use of cooking oil		
2		Damage to product packaging			
1					

Based on the results of the risk mapping, it was found that the majority of risks categorized as high occur during the raw material procurement and production process. These risks are located in the red zone on the risk mapping matrix. This indicates that the initial stages of the supply chain play a crucial role in maintaining the integrity and halal status of fried chicken MSME products.

The risk of using chickens not slaughtered in accordance with Islamic law is the most critical risk identified in this study. This risk has a very high probability and impact because it is directly related to the validity of the product's halal status. In the halal supply chain concept, raw materials are the primary element determining the quality and halal status of a product. Therefore, strict and continuous monitoring of raw material suppliers and the slaughtering process is essential.

Furthermore, the risk of cross-contamination in production equipment is also in the red zone due to its significant impact on product halal certification. This risk indicates that the production process remains a critical point in implementing a halal assurance system for MSMEs in the food sector. Lack of separation of equipment and low hygiene standards can increase the likelihood of mixing halal ingredients with ingredients of uncertain halal status.

In the medium or yellow zone, identified risks include poor production environment hygiene, repeated use of cooking oil, and product mixing during distribution. Although these risks do not directly affect the product's halal status, their presence still requires attention because they can impact product quality and consumer perceptions of the cleanliness and safety of the halal products offered. Meanwhile, the risk of packaging damage is categorized as low or green. This risk has a relatively smaller impact compared to other risks. However, controlling this risk is still necessary to ensure product quality is maintained during storage and distribution.

Through the use of a risk mapping matrix, this study demonstrates that a risk management approach can be an effective tool for MSMEs in determining halal risk control priorities. By identifying the risks with the highest criticality, business actors can focus their monitoring efforts on aspects of raw materials, production equipment cleanliness, and distribution processes to maintain the overall halal integrity of the product.

5. Discussion

The research results indicate that the most dominant halal risks in the fried chicken MSME supply chain are at the raw material procurement and production stages. Based on the risk mapping results, risks categorized as high include the use of chickens not slaughtered in accordance with Islamic law, the use of additives not yet halal-labeled, suppliers not yet halal-certified, and cross-contamination in production equipment. These findings indicate that halal control in the food industry is not solely determined by the final product but is also influenced by all activities in the halal supply chain, from raw material procurement to distribution to consumers.

Within the halal supply chain concept, product halal integrity must be consistently maintained at every stage of the process. Ali et al. (2017) explain that halal integrity is significantly influenced by the ability of business actors to maintain consistent halal control throughout all supply chain activities. This statement aligns with the results of this study, which shows that the raw material stage is the most critical point in maintaining the halal status of fried chicken MSME products.

The highest risk in this study was found in the use of chickens not slaughtered according to Islamic law, with a risk score of 25. This risk received the highest likelihood and impact because the slaughter process is a primary requirement for determining the halal status of animal products. In Islamic teachings, animal slaughter must comply with sharia requirements, such as being carried out by a Muslim, using sharp tools, and mentioning the name of Allah during the slaughtering process. If these requirements are not met, the product may lose its halal status, even if subsequent processing is carried out hygienically. Therefore, monitoring chicken suppliers is crucial in maintaining the halal integrity of food products.

Furthermore, the risk of cross-contamination in production equipment is also categorized as high, with a risk score of 20. Cross-contamination can occur when equipment is used interchangeably without undergoing a cleaning process that meets halal standards. This

risk is crucial because, in the halal assurance system, the cleanliness of production equipment is one of the efforts to maintain the purity of halal products. This finding aligns with research by Rahman et al. (2017) stated that the traceability and monitoring system during the production process has a significant influence on the successful implementation of the halal assurance system in the food industry.

The research also shows that using suppliers without halal certification is a major source of risk in the halal supply chain. This situation indicates that some MSMEs still face limitations in selecting suppliers based on halal aspects. In practice, MSMEs often prioritize price and ease of obtaining raw materials over a supplier's halal certification status. However, using halal-certified suppliers can provide greater assurance regarding the safety and clarity of the origin of raw materials used in the production process.

In the medium risk category, several risks were identified, such as the repeated use of cooking oil, suboptimal production environment hygiene, and product mixing during distribution. While these risks do not directly change the halal status of a product, they still have the potential to impact product quality, food safety, and consumer trust in halal products. In the halal food industry, hygiene and sanitation aspects are closely related to the concept of *thayyib*, which means food that is not only halal but also good, healthy, and safe for consumption.

Meanwhile, the risk of damage to product packaging is categorized as low. This risk has a relatively small impact on the product's halal status, but it still requires attention because it is related to product quality and consumer satisfaction. Damaged packaging can reduce consumer perceptions of product cleanliness and hygiene, so monitoring during the distribution stage is still necessary.

The application of the risk mapping method in this study has proven to facilitate the identification and prioritization of risk control in a more systematic manner. Through this approach, each risk can be mapped based on the likelihood of occurrence and the magnitude of impact on the product's halal integrity. According to Hopkin (2018), risk mapping is an effective risk management tool because it can help organizations prioritize risk management based on their level of urgency. In this study, risks in the red zone were the primary focus of control because they have the greatest potential to impact the halal status of fried chicken MSME products.

In addition to risk management aspects, this study also demonstrates the link between science and religious values in the implementation of the halal supply chain. A scientific approach through the risk mapping method is used as a means to support the implementation of halal principles in Islam in a more measured and systematic manner. Thus, the concept of halal is not only understood as a religious obligation but can also be implemented through modern scientific and managerial approaches. This demonstrates that harmonization between science and religion can be achieved through the application of risk analysis methods to maintain the quality and integrity of halal products.

Overall, the research results indicate that the implementation of risk management in the halal supply chain plays a crucial role for MSMEs in the food sector. Through the process of risk identification, risk assessment, and mapping using risk mapping, business actors can identify critical halal points that need to be prioritized for control. With the implementation of appropriate controls, the halal integrity of products can be better maintained, thereby increasing consumer trust in the resulting halal products.

6. Conclusion

Based on the research findings, it can be concluded that the supply chain of fried chicken MSMEs is subject to various halal risks that can potentially arise at every stage, from raw material procurement through the production process, to product distribution. These findings indicate that efforts to maintain product halalness should not only focus on the final product consumed by the public, but must also be applied comprehensively to all activities in the halal supply chain.

The risk identification results indicate that the most dominant halal risks occur at the raw material and production stages. The highest risk was found in the use of chickens not slaughtered in accordance with Islamic law, with a risk score of 25. This risk is a critical point because the slaughter process is a fundamental requirement for determining the halal status of animal products. Furthermore, several other risks categorized as high include the use of suppliers without halal certification, the use of additives without halal labels, and cross-contamination in production equipment. These risks have a high probability and significant impact on the halal integrity of the product and therefore require more intensive attention and control.

In the medium risk category, several risks were identified, such as repeated use of cooking oil, suboptimal production environment hygiene, and product mixing during distribution. Although these risks do not directly alter the product's halal status, their presence can still impact product quality, food safety, and consumer confidence in halal products. Meanwhile, the risk of damaged product packaging is categorized as low because it has a relatively small impact on the product's halal status, although it still requires monitoring to maintain product quality during storage and distribution.

Based on the results of the risk mapping method, it was found that most of the high risks are in the red zone and are dominated by risks that arise during the raw material and production stages. This indicates that these two stages are the main critical points in implementing the halal supply chain in fried chicken MSMEs. Therefore, supervision of suppliers, the slaughter process, the selection of additional ingredients, and the cleanliness of production equipment are crucial aspects in maintaining the product's halal integrity.

The application of the risk mapping method in this study has proven to facilitate the identification, assessment, and mapping of halal risks in a more structured and systematic manner. Through this approach, MSMEs can determine the priority level of each risk, allowing for more effective and targeted control measures. Furthermore, the use of a mixed methods approach in this study yields a more comprehensive analysis because it combines a qualitative approach in the risk identification process with a simple quantitative approach by assigning likelihood and impact scores to each identified risk.

This research also demonstrates the close relationship between science and religious values in the implementation of the halal supply chain. A scientific approach, using risk analysis and risk mapping, is utilized as a tool to support the implementation of halal principles in Islam in a more measured and systematic manner. Thus, the concept of halal is not only understood as a religious obligation but can also be implemented through a modern management approach based on risk analysis and control. This demonstrates that harmonization between science and religion can be achieved through the use of scientific methods to maintain the quality and integrity of halal products.

Overall, this study confirms that implementing risk management in the halal supply chain plays a crucial role for MSMEs in the food sector, particularly fried chicken MSMEs. Through risk identification, risk assessment, and risk mapping, business actors can identify critical halal points that require priority control. With optimal monitoring and control, the halal integrity of products can be better maintained, thereby improving product quality, consumer trust, and the competitiveness of halal MSMEs amidst the rapid development of the halal industry.

Although this research is still conceptual and conducted through a literature review without direct field observation, the results are expected to serve as an initial reference for MSMEs in understanding the importance of implementing risk management in the halal supply chain. Furthermore, this study can serve as a foundation for further research using empirical data, a broader scope of research objects, and more in-depth analytical methods, allowing for a more comprehensive study of halal risks in the halal supply chain.

References

- [1] Ali, M. H., Tan, K. H., & Ismail, M. D. (2017). A supply chain integrity framework for halal food. *British Food Journal*, 119(1), 20–38. <https://doi.org/10.1108/BFJ-07-2016-0345>
- [2] Badan Penyelenggara Jaminan Produk Halal. (2023). Data dan informasi sertifikasi halal di Indonesia. Kementerian Agama Republik Indonesia. <https://halal.go.id>
- [3] Hopkin, P. (2018). *Fundamentals of risk management: Understanding, evaluating and implementing effective risk management* (5th ed.). Kogan Page Publishers.
- [4] Rahman, A. A., Singhry, H. B., Hanafiah, M. H., & Abdul, M. (2017). Influence of perceived benefits and traceability system on the readiness for Halal Assurance System implementation among food manufacturers. *Food Control*, 73, 1318–1326. <https://doi.org/10.1016/j.foodcont.2016.10.058>
- [5] Zailani, S., Arrifin, Z., Abd Wahid, N., Othman, R., & Fernando, Y. (2010). Halal traceability and halal tracking systems in strengthening halal food supply chain for food industry in Malaysia (A review). *Journal of Food Technology*, 8(3), 74–81.