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NAVIGATING RISKS IN HALAL SUPPLY CHAINS: A LITERATURE REVIEW ON ENSURING COMPLIANCE AND INTEGRITY

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Abstract:

The growing demand for Halal products in global markets underscores the critical importance of Halal supply chain management (HSCM) in ensuring compliance, integrity, and consumer trust. However, maintaining Halal integrity throughout the supply chain remains a significant challenge due to various risk factors, logistical barriers, and the absence of robust governance mechanisms. This study aims to comprehensively explore the risk factors affecting Halal logistics and food integrity, analyze the barriers to effective HSCM, and evaluate potential strategies to address these challenges. To achieve these objectives, the study employed a systematic and data-driven approach, synthesizing findings from peer-reviewed journal articles, case studies, and industry reports. This method enabled the identification of key risk dimensions, including production-related risks, contamination during logistics, and inadequate traceability systems. Additionally, the study examined barriers such as resistance from logistics service providers, limited customer demand for Halal-compliant practices, and insufficient infrastructure to support Halal logistics operations. Emerging technologies, particularly blockchain, were also explored as potential enablers of transparency, traceability, and trust in the Halal supply chain. The findings reveal that production-related risks are the most critical, while sustainability risks are comparatively less significant. Practical implications include the need for supply chain managers to prioritize risk mitigation efforts, policymakers to develop standardized guidelines, and certification bodies to streamline Halal certification processes. Despite its

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contributions, the study acknowledges limitations, such as the reliance on secondary data and the lack of empirical validation across diverse regions. This study provides valuable insights for researchers and practitioners by offering a structured understanding of the complexities in HSCM and highlighting opportunities for future research and technological integration to ensure Halal integrity in global supply chains.

Keywords:

Blockchain, Halal, Integrity, Logistics, Risk Management, Supply Chain, Traceability

Introduction

The increasing global demand for halal products has necessitated the development of robust supply chain systems that ensure compliance with Islamic dietary laws and ethical considerations. The rapid expansion of the halal industry, driven by consumer awareness, regulatory frameworks, and international trade, underscores the importance of maintaining halal integrity across the entire supply chain (Majid et al., 2025). However, despite its growth, the industry faces significant challenges, including fraud, supply chain contamination, inconsistent certification processes, and a lack of standardized regulatory frameworks. These issues threaten consumer trust and the sustainability of the halal market.

Ensuring compliance within halal supply chains is crucial for sustaining consumer confidence and market growth. However, various risks related to raw materials, processing, logistics, and certification present significant challenges to maintaining halal assurance (Khan et al., 2025; Saeed, 2024). Addressing these risks requires a comprehensive understanding of the factors that influence halal compliance and the mechanisms needed to mitigate potential threats (Wahyuni et al., 2023). Studies indicate that non-compliance issues have led to product recalls and consumer concerns over authenticity, emphasizing the need for stricter monitoring mechanisms (Sunmola et al., 2025). Recent industry reports indicate that fraud in the halal food sector has increased by 15% in the last five years, further highlighting the need for enhanced risk management strategies (Halal Industry Report, 2024).

Halal supply chain risks arise from multiple factors, including contamination, fraudulent certification, improper handling, and outsourcing complications (Khan et al., 2025; Saeed, 2024). Prior studies suggest that technological advancements, particularly blockchain and artificial intelligence (AI), offer promising solutions for enhancing traceability and ensuring compliance (Sunmola et al., 2025; Wahyuni et al., 2024). However, the effective integration of these technologies into halal supply chain risk management remains challenging due to high implementation costs, regulatory inconsistencies, and the lack of standardized frameworks (Azmi et al., 2023). The growing complexity of global supply networks further exacerbates these challenges, making it imperative to examine existing risk mitigation strategies and their effectiveness (Khan et al., 2025).

A critical issue in halal supply chain management is ensuring continuous halal integrity from production to consumption (Azmi et al., 2023). Studies have shown that weaknesses in certification mechanisms and gaps in traceability contribute to non-compliance issues, which undermine consumer confidence (Khan et al., 2025). Additionally, the absence of standardized

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risk assessment frameworks further complicates mitigation efforts, as businesses struggle to prioritize and address risks effectively (Majid et al., 2025; Wahyuni et al., 2024). While existing research has explored individual risk factors, such as raw material integrity, logistics risks, and certification challenges, a more holistic approach is needed to understand the interconnectedness of these risks and their impact on halal supply chain integrity (Saeed, 2024).

Despite numerous studies on halal supply chain risk management, research has largely remained fragmented, with a focus on isolated aspects of the supply chain (Ali et al., 2023). Although various mitigation strategies have been proposed, including blockchain-based traceability, halal assurance systems, and quality control mechanisms, there is a need for an integrated approach that addresses multiple risks simultaneously (Sunmola et al., 2025; Wahyuni et al., 2024). Additionally, the role of emerging technologies in improving halal supply chain compliance has not been sufficiently explored, particularly in terms of their practical implications for businesses and policymakers (Khan et al., 2025). The absence of an established framework for prioritizing risks and developing strategic mitigation approaches further highlights the need for a more comprehensive analysis of halal supply chain risks (Majid et al., 2025).

This study aims to bridge these research gaps by providing a systematic and data-driven review of halal supply chain integrity and risk management. The key objectives of this paper include identifying major risks affecting halal supply chains, analyzing existing risk mitigation strategies, evaluating the role of technological advancements in enhancing halal integrity, and proposing future research directions (Khan et al., 2025; Wahyuni et al., 2024). By synthesizing findings from various studies, this paper contributes to the growing body of literature on halal supply chains and offers valuable insights for academics, industry practitioners, and policymakers (Majid et al., 2025). Furthermore, this study highlights the need for integrated risk assessment frameworks and innovative halal assurance mechanisms, which are essential for ensuring compliance in an increasingly complex and globalized halal market (Azmi et al., 2023; Sunmola et al., 2025).

Methodology

This study adopts a systematic and data-driven methodology to investigate the risks and mitigation strategies in halal supply chains, utilizing Scopus AI as the primary database for sourcing relevant research. Data collected from studies spanning the years 2014 to 2025 provide insights into evolving challenges and emerging solutions within the field. The methodology is designed to achieve three core objectives: (1) identifying key risks that impact halal supply chains, (2) evaluating existing mitigation strategies, and (3) examining their interconnections with crucial themes such as halal supply chain integration, integrity assurance, barriers, and risk factors. Furthermore, this study highlights the limitations of conventional methods, which often depend on manually generated rules and domain-specific attributes, contrasting them with the adaptability and scalability of AI-driven approaches.

To conduct a thorough review, this study selected peer-reviewed journal articles, conference proceedings, and reputable industry reports that are highly relevant to halal supply chain management. To achieve the research objectives, Scopus AI was employed, integrating both natural language processing and keyword-based search techniques to enhance the identification of pertinent literature. The natural language query, “What are the risks in halal supply chains and how can compliance and integrity be ensured?” was employed to capture a broad spectrum

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of literature. This was supplemented with a keyword search using the following terms: ("halal" OR "permissible" OR "lawful" OR "Islamic") AND ("supply chain" OR "logistics" OR "distribution" OR "procurement") AND ("risk" OR "threat" OR "hazard" OR "uncertainty") AND ("compliance" OR "adherence" OR "conformity" OR "regulation") AND ("quality" OR "standards" OR "assurance" OR "control") AND ("traceability" OR "transparency" OR "accountability" OR "monitoring"). This dual approach ensured comprehensive coverage of literature addressing the research objectives.

Only studies published within the last decade were considered to capture the most recent developments in the field. Additionally, inclusion criteria required that selected studies provide empirical or theoretical insights into halal risk management. The collected literature was systematically analyzed using thematic analysis to identify recurring risk factors, mitigation measures, and technological advancements in halal compliance. Thematic coding enabled the categorization of findings into key areas, including supply chain vulnerabilities, certification and traceability, regulatory challenges, and technological solutions. Furthermore, connections among identified themes were examined to provide a holistic perspective on the interdependencies within the halal supply chain framework. By employing this structured and data-driven approach, the study synthesizes existing knowledge to offer a consolidated view of risk management in halal supply chains. The findings contribute to academic discourse by identifying research gaps and providing actionable recommendations for improving halal integrity and compliance mechanisms.

Figure 1 illustrates the Halal Supply Chain Risk Management Process, outlining key steps from identifying risks to providing recommendations. It includes risk identification, mitigation strategies, relationship analysis, literature search, thematic analysis, knowledge synthesis, and research gap identification. This structured approach ensures improved halal supply chain integrity and compliance through evidence-based insights and recommendations.

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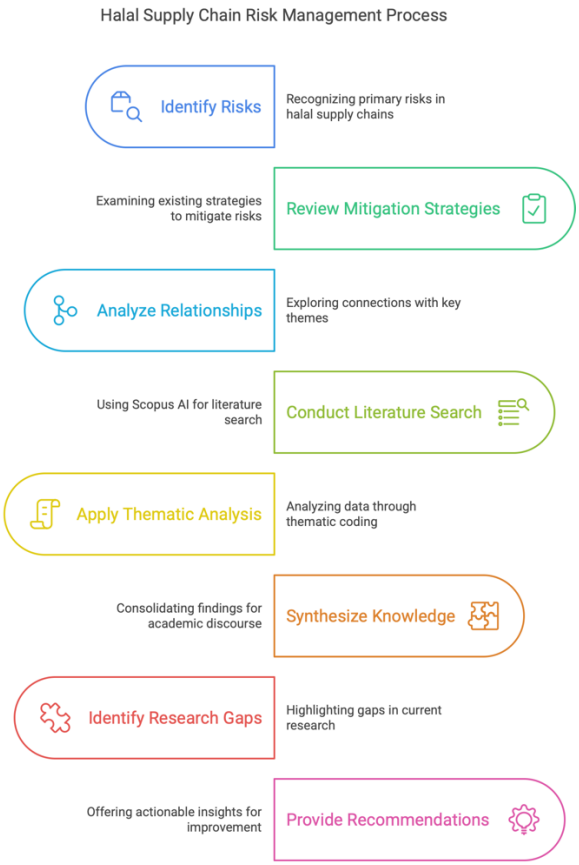

Figure 1: Process Flow of Systematic Risk Analysis in Halal Supply Chains

Result and Discussion

This study employs a systematic and data-driven approach to examine the risks and mitigation strategies associated with halal supply chains, with Scopus AI serving as the primary database for identifying relevant research. The methodology is structured to address three key objectives: (1) reviewing the primary risks affecting halal supply chains, (2) reviewing existing risk mitigation strategies, and (3) analyzing their relationship with key themes, including halal supply chain integration, integrity assurance, barriers, and risk factors. The diagram (Figure 2) illustrates the interplay between risks and mitigation strategies in halal supply chain management, aligning with the research objectives to analyze key risks and evaluate effective solutions. The strategies are categorized by their risk levels and effectiveness in addressing specific challenges.

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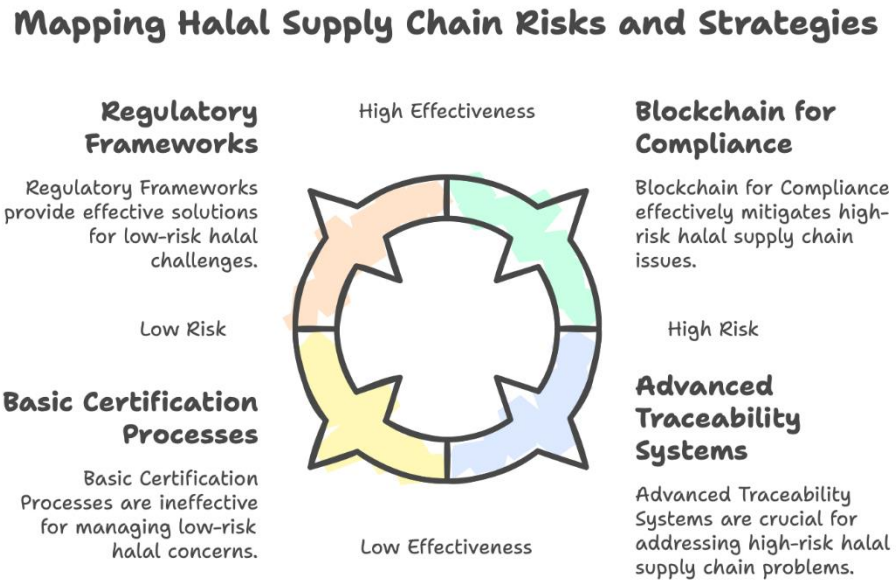

Figure 2: Halal Supply Chain Risk and Mitigation Strategies

Regulatory frameworks are highlighted as effective solutions for managing low-risk issues. These frameworks provide essential governance to ensure compliance, but their limited scope means they often fall short in addressing high-risk challenges, such as global inconsistencies in enforcement. Similarly, basic certification processes are shown to be insufficient for resolving even low-risk concerns. This inadequacy stems from the lack of harmonization between certification bodies, creating confusion and barriers to trade. On the other hand, blockchain technology is identified as a highly effective strategy for mitigating high-risk challenges, including traceability gaps and fraud. By offering an immutable, transparent record of halal product status, blockchain enhances consumer trust, though its adoption is limited by high costs and resistance to technological changes. Additionally, advanced traceability systems are emphasized as critical for tackling high-risk issues like contamination and certification fraud. These systems significantly improve supply chain transparency but require substantial investment and expertise. Overall, the findings underscore the need for integrating regulatory alignment and technological innovations to ensure the integrity and efficiency of halal supply chains.

RO1: To review the primary risks affecting halal supply chains, including contamination, traceability gaps, certification challenges, and regulatory inconsistencies.

The halal supply chain faces multiple risks that threaten the integrity of halal-certified products. One of the most pressing issues is contamination, which can occur at various stages of the supply chain, including production, transportation, and storage. Contamination may arise from cross-contact with non-halal substances, improper handling procedures, or the use of shared equipment (Azmi et al., 2020). Research has indicated that contamination risks are particularly prevalent in the meat and processed food industries, where the segregation of halal and non-halal products is often inadequate (Majid et al., 2023). To mitigate these risks, strict adherence to halal handling protocols, regular inspections, and improved storage facilities have been recommended (Khan et al., 2023). However, despite these measures, contamination remains a

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significant concern due to varying levels of enforcement across different regulatory environments.

Traceability gaps also pose a major challenge in halal supply chain management, as the ability to track and verify halal status is essential for maintaining consumer trust. In many supply chains, a lack of standardized traceability systems results in difficulties in confirming whether products adhere to halal requirements (Wahyuni et al., 2024). Blockchain technology has been proposed as a potential solution, offering an immutable record of product movement and halal certification verification (Sunmola et al., 2025). However, the adoption of blockchain remains limited due to high implementation costs and resistance from stakeholders unfamiliar with digital solutions (Ali et al., 2014). Additionally, inconsistent documentation practices and fraudulent halal certifications further exacerbate traceability concerns, highlighting the need for a more unified and transparent system.

Certification challenges further complicate halal supply chain operations, as inconsistencies in halal certification bodies and their standards create confusion among businesses and consumers. While some countries have centralized halal certification authorities, others rely on multiple agencies with differing requirements, leading to a lack of global harmonization (Azmi et al., 2020). The absence of mutual recognition agreements between certification bodies results in logistical barriers and increased costs for halal-certified exporters (Majid et al., 2023). Studies have emphasized the importance of streamlining certification procedures and enhancing international cooperation to improve the efficiency of halal certification (Khan et al., 2023). Additionally, the digitalization of certification processes, including real-time verification tools, has been suggested as a way to address inconsistencies and improve credibility.

Regulatory inconsistencies across different regions further exacerbate risks in the halal supply chain, as there is no universally accepted halal regulatory framework. While some nations enforce stringent halal compliance laws, others lack dedicated halal governance structures, making it difficult to ensure uniform compliance (Wahyuni et al., 2024). The divergence in regulations affects multinational businesses attempting to navigate the global halal market, as they must adhere to varying halal certification and labeling requirements (Sunmola et al., 2025). Furthermore, weak enforcement mechanisms in certain jurisdictions allow for fraudulent practices, such as mislabeling and counterfeit halal certifications (Ali et al., 2014). To overcome these regulatory inconsistencies, scholars advocate for greater international collaboration, standardized halal guidelines, and stricter enforcement mechanisms to protect halal integrity and maintain consumer confidence.

RO2: To review existing risk mitigation strategies, including halal certification mechanisms, quality control processes, and the adoption of emerging technologies such as blockchain and artificial intelligence.

Effective risk mitigation strategies are crucial for maintaining the integrity of halal supply chains. One of the primary mechanisms for ensuring compliance is the halal certification process, which serves as an official endorsement of a product's adherence to Islamic dietary laws. Certification bodies conduct rigorous audits, inspections, and documentation reviews to verify that food production, handling, and storage meet halal requirements (Azmi et al., 2020). However, inconsistencies in certification standards across different countries pose challenges

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for global trade, leading to calls for the harmonization of halal certification frameworks (Khan et al., 2023). Mutual recognition agreements between certification bodies and international regulatory cooperation are essential for addressing these disparities and ensuring a seamless halal supply chain (Majid et al., 2023).

Quality control measures are another key component in mitigating risks within halal supply chains. These processes involve stringent monitoring and verification to prevent contamination and ensure compliance with halal standards (Wahyuni et al., 2024). Hazard Analysis and Critical Control Points (HACCP) and Good Manufacturing Practices (GMP) are widely used to minimize risks in food production and processing (Khan et al., 2022). In addition to conventional quality control practices, third-party audits and halal assurance systems have been implemented to enhance transparency and accountability (Sunmola et al., 2025). Despite these efforts, challenges remain, particularly in maintaining halal integrity during transportation and distribution, where the risk of cross-contamination is high (Ali et al., 2014).

The adoption of emerging technologies such as blockchain has been increasingly explored as a solution to enhance traceability and transparency in halal supply chains. Blockchain technology provides an immutable, decentralized ledger that records every transaction within the supply chain, ensuring that halal status can be verified at every stage (Majid et al., 2023). Studies have demonstrated that blockchain improves supply chain efficiency by reducing fraud and enhancing consumer trust (Wahyuni et al., 2024). However, widespread adoption is hindered by high implementation costs, resistance from industry players unfamiliar with digital technologies, and the need for regulatory frameworks that support blockchain integration (Sunmola et al., 2025).

Artificial intelligence (AI) is also playing a growing role in risk mitigation by improving quality control, authentication, and compliance monitoring in halal supply chains. AI-powered image recognition and machine learning algorithms can detect non-halal ingredients, automate inspection processes, and enhance supply chain decision-making (Azmi et al., 2020). Additionally, AI-driven predictive analytics can identify potential risks before they occur, allowing businesses to take proactive measures (Khan et al., 2023). Despite these advantages, AI implementation faces barriers such as limited access to high-quality datasets, high initial investment costs, and the need for skilled personnel to manage AI systems (Majid et al., 2023). Addressing these challenges through industry collaboration and technological advancements will be crucial for leveraging AI in halal risk management.

RO3: To analyze the interconnections between key risk factors and major themes, including halal supply chain integration, integrity assurance, barriers, and risk factors.

The graph (Figure 3) illustrates the interconnected themes and key elements in halal supply chain management. It highlights the primary areas of focus, which are divided into four major categories: Supply Chain Integration, Integrity Assurance, Barriers, and Risk Factors. These categories further branch into specific subtopics, showcasing the critical factors influencing halal supply chain operations.

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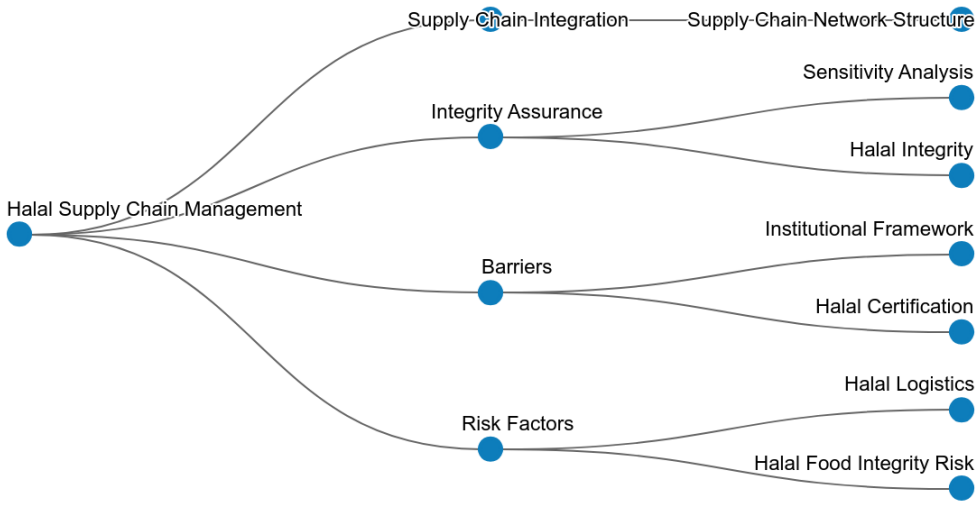

Figure 3: Concept Map

Linkage 1: Linkages Between Halal Supply Chain Management And Supply Chain Integration

Halal Supply Chain Management (HSCM) relies on robust supply chain integration **(SCI)** to ensure compliance with halal standards, maintain food integrity, and address risks such as contamination and traceability gaps. Supply chain integration involves the alignment and collaboration of internal and external stakeholders, fostering a seamless flow of information, materials, and processes. Empirical evidence highlights that stronger integration significantly improves halal food integrity by enabling end-to-end transparency and building trust among consumers (Ali et al., 2016). Effective integration allows halal supply chains to meet stringent halal certification requirements, reinforcing confidence in halal products while minimizing non-compliance risks.

The adoption of advanced technologies such as blockchain plays a transformative role in integrating halal supply chains. Blockchain ensures traceability and transparency by providing an immutable ledger of transactions across the supply chain (Surjandari et al., 2021). This technology facilitates the exchange of accurate information among suppliers, manufacturers, and certification bodies, mitigating risks related to fraud and mislabelling. Additionally, blockchain enhances halal compliance by enabling real-time monitoring of supply chain activities, ensuring that halal standards are maintained throughout the process. The incorporation of such technologies underscores the importance of supply chain integration in improving operational efficiency and fostering consumer trust.

The supply chain network structure complements integration by providing a framework for the coordination of multiple stakeholders. A well-defined network structure ensures seamless communication, efficient logistics, and optimized resource allocation across the supply chain. In the halal context, the network structure must be tailored to address unique challenges such as halal certification logistics and regulatory differences across regions. Studies in the Malaysian halal food sector demonstrate that supply chain network structures emphasizing external integration—collaboration with external partners like certification bodies and regulatory agencies—enhance halal food production and ensure compliance with global halal standards (Ali et al., 2019).

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Integrating servitization into halal supply chains adds another layer of value by fostering sustainable business growth and improving customer satisfaction. Servitization involves offering value-added services such as halal-compliant packaging, labeling, and logistics to enhance the overall consumer experience (Hassan & Fernando, 2025). The integration roadmap for servitisation highlights its potential to improve purchasing decisions and build long-term customer loyalty. By embedding servitisation into the supply chain network structure, halal supply chains can achieve greater flexibility and responsiveness, further strengthening their market competitiveness and adherence to halal principles.

In conclusion, the linkages between HSCM, SCI, and supply chain network structures highlight the critical role of collaboration, transparency, and technology in ensuring halal integrity. Strong integration practices, supported by advanced technologies like blockchain and robust network structures, enable halal supply chains to address risks and meet regulatory requirements effectively. As the halal industry continues to expand, further research on optimizing these linkages is essential to enhance compliance mechanisms and foster sustainable growth in the global halal market (Table 1).

Authors	Title	Source title	Year	Cited by
Ali M.H.; Tan K.H.; Makhbul Z.M.; Ngah A.H.	Augmenting halal food integrity through supply chain integration	Jurnal Pengurusan	2016	21
Ali M.H.; Alam S.S.; Nor S.M.; Amin S.I.M.; Omar N.	Elucidation of supply chain integration in Halal food industry	Malaysian Applied Biology	2019	5
Haleem A.; Khan M.I.; Khan S.	Conceptualising a framework linking halal supply chain management with sustainability: an India centric study	Journal of Islamic Marketing	2021	45
Surjandari I.; Yusuf H.; Laoh E.; Maulida R.	Designing a Permissioned Blockchain Network for the Halal Industry using Hyperledger Fabric with multiple channels and the raft consensus mechanism	Journal of Big Data	2021	51
Ghalih M.; Chang C.-H.; Johennesse L.-A.C.	Sustainable Development Goals (SDGs), Halal Supply Chain Management, and the Role of ESG in Promoting Ethical and Eco-Friendly Practices	Digital Technologies for a Resource Efficient Economy	2024	1

Table 1: The Summary of Halal Supply Chain Management and Supply Chain Integration

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Linkage 2: Linkages Between Halal Supply Chain Management And Integrity Assurance

Halal supply chain management (HSCM) is deeply intertwined with integrity assurance, as ensuring that products remain halal-compliant throughout the supply chain is critical for maintaining consumer trust. One significant aspect of this linkage is the use of risk assessment and sensitivity analysis to prioritize risks. A study by Khan et al. (2023) developed a robust framework to assess and prioritize 18 key risks in the halal supply chain, categorizing them by severity scores. This approach allows for better allocation of resources and development of mitigation strategies. Sensitivity analysis, in particular, enables supply chain managers to identify the most critical risks that could compromise halal integrity, ensuring a more targeted and effective risk management strategy.

Barriers in the halal supply chain also play a pivotal role in understanding how integrity assurance can be strengthened. According to Khan et al. (2022), significant barriers include reduced consumer demand for halal products, inadequate regulatory frameworks, and unclear policies. These barriers undermine the assurance of halal integrity by creating loopholes in governance and enforcement. By using a systematic approach, such as prioritizing these barriers through tools like the Best-Worst Method (BWM), stakeholders can address the root causes of weak integrity assurance. This emphasizes the need for collaboration between policymakers, industry players, and certification bodies to overcome structural and systemic issues in the halal supply chain.

Empirical research further underscores the direct impact of halal supply chain management practices on integrity assurance. Mohamed et al. (2020) found that the operational processes and network structures within the halal supply chain significantly influence halal integrity. The study highlights the importance of integrating business processes that align with halal compliance standards to reduce the risk of contamination or non-compliance. This integration ensures that every point in the supply chain contributes to maintaining the halal status of products, providing both operational efficiency and consumer confidence.

Additionally, halal traceability systems are fundamental in bridging halal supply chain management with integrity assurance. Zainuddin et al. (2020) demonstrated that implementing a halal traceability system enhances supply chain performance and reinforces halal integrity by ensuring transparency at every stage. Traceability allows stakeholders to monitor and verify the movement of products through the supply chain, addressing critical points where integrity might be compromised. By combining traceability systems with sensitivity analysis, stakeholders can proactively address vulnerabilities and maintain a high standard of halal compliance. This linkage underscores the dynamic relationship between halal supply chain management, risk prioritization, and the assurance of integrity (Table 2).

Authors	Title	Source title	Year	Cited by
Mohamed Y.H.; Abdul Rahim A.R.; Ma'aram A.	The effect of halal supply chain management on halal integrity assurance for the food industry in Malaysia	Journal of Islamic Marketing	2020	38
Surjandari I.; Yusuf H.; Laoh E.; Maulida R.	Designing a Permissioned Blockchain Network for the Halal Industry using Hyperledger Fabric with multiple	Journal of Big Data	2021	51

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	channels and the raft consensus mechanism			
Khan M.I.; Khan S.; Haleem A.	Analysing barriers towards management of Halal supply chain: a BWM approach	Journal of Islamic Marketing	2022	44
Khan S.; Haleem A.; Khan M.I.	Risk assessment model for halal supply chain using an integrated approach of IFN and D number	Arab Gulf Journal of Scientific Research	2023	8

Table 2: The Summary of Halal Supply Chain Management and Integrity Assurance

Linkage 3: Linkages Between Halal Supply Chain Management And Barriers

Barriers to effective Halal Supply Chain Management (HSCM) are closely tied to gaps in the institutional framework and challenges in halal certification processes. One of the key barriers identified is the reduced demand for halal products, which is exacerbated by improper laws and a lack of coherent policy frameworks (Khan et al., 2022). These structural issues hinder the development and implementation of robust halal supply chains. The absence of clear institutional guidelines leaves supply chain actors uncertain about compliance requirements, resulting in inconsistent adherence to halal standards. Consequently, a strong institutional framework is critical for mitigating these barriers by standardizing policies, enhancing regulatory clarity, and promoting halal awareness.

Halal certification processes also face significant challenges, particularly for small and medium enterprises (SMEs). Short-term validity and the cumbersome nature of halal certification issuance are key barriers for SMEs in adopting comprehensive HSCM practices (Lestari et al., 2021). Without streamlined and accessible certification processes, many SMEs struggle to maintain compliance, creating vulnerabilities in the halal supply chain. This underscores the need for institutional bodies to simplify certification procedures, extend the validity of certifications, and provide training to SMEs on halal requirements. Strengthening the institutional framework in this context ensures that halal certification becomes a tool for facilitating compliance rather than a barrier to participation in the halal supply chain.

Resistance among logistics service providers to adopt halal logistics operations further highlights the interplay between institutional support and operational barriers. Talib et al. (2015) found that the reluctance of logistics providers to implement halal logistics is often rooted in a lack of customer demand and insufficient institutional incentives. This issue is compounded by the unwillingness of customers to pay a premium for halal-certified logistics services (Susanty et al., 2020). Addressing these barriers requires institutional bodies to develop initiatives that incentivize halal logistics adoption, such as tax benefits or subsidies for compliant service providers, while simultaneously fostering consumer awareness about the value of halal-compliant logistics in ensuring product integrity.

Finally, the adoption of emerging technologies like blockchain offers a potential solution to many of these barriers. Blockchain technology enhances transparency, trust, and traceability in halal supply chains, directly addressing concerns about information disclosure and compliance (Surjandari et al., 2021). However, integrating such technologies requires institutional support in the form of funding, training, and the establishment of technical standards. By aligning halal certification bodies, regulatory institutions, and supply chain actors around the use of

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technology, the halal supply chain can overcome traditional barriers and achieve greater integrity and efficiency (Table 3).

Authors	Title	Source title	Year	Cited by
Talib M.S.A.; Hamid A.B.A.; Zulfakar M.H.; Chin T.A.	Barriers to Halal logistics operation: Views from Malaysian logistics experts	International Journal of Logistics Systems and Management	2015	35
Susanty A.; Puspitasari N.B.; Caterina A.D.; Jati S.	Mapping the barriers for implementing halal logistics in Indonesian food, beverage and ingredient companies	Journal of Islamic Marketing	2020	18
Lestari F.; Nurainun T.; Kurniawati Y.; Adzkia M.D.	Barriers and Drivers for Halal Supply Chain on Small-Medium Enterprises in Indonesia	Lecture Notes in Engineering and Computer Science	2021	2
Surjandari I.; Yusuf H.; Laoh E.; Maulida R.	Designing a Permissioned Blockchain Network for the Halal Industry using Hyperledger Fabric with multiple channels and the raft consensus mechanism	Journal of Big Data	2021	51
Khan M.I.; Khan S.; Haleem A.	Analysing barriers towards management of Halal supply chain: a BWM approach	Journal of Islamic Marketing	2022	44

Table 3: The Summary of Halal Supply Chain Management and Barriers

Linkage 4: Linkages Between Halal Supply Chain Management And Risk Factors

Halal Supply Chain Management (HSCM) is inherently intertwined with risk factors that impact the logistics and integrity of halal food products. A significant body of research has identified various risks in HSCM, with production-related risks being among the most critical (Sarwar et al., 2021). These risks often stem from non-compliance with halal standards during food manufacturing and processing, resulting in potential breaches of halal integrity. Improper handling, contamination, and inadequate adherence to halal practices in production stages create vulnerabilities that can compromise consumer trust. Addressing these risks requires integrating comprehensive risk management frameworks to ensure halal compliance throughout the supply chain.

Halal logistics is another critical aspect of HSCM that directly affects food integrity risk. Logistics-related risks include improper storage, contamination during transportation, and failure to segregate halal from non-halal goods (Azmi et al., 2020). Such issues arise due to limited adoption of halal logistics practices, a lack of standardized guidelines, and insufficient infrastructure to support compliance. These risks can significantly undermine halal food integrity, making it imperative for stakeholders to implement robust logistics solutions, including specialized transportation and storage facilities. Furthermore, the reluctance of logistics service providers to adopt halal-compliant practices often exacerbates these challenges (Khan et al., 2022).

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The prioritization and mitigation of these risks play a crucial role in safeguarding halal food integrity. Several studies have proposed advanced methodologies, such as fuzzy best-worst approaches and multi-criteria decision-making (MCDM) models, to prioritize and address risks within the halal supply chain (Khan et al., 2021). These approaches enable stakeholders to identify and focus on high-priority risks, such as production and logistics-related vulnerabilities, while allocating resources effectively. Additionally, the use of integrated frameworks combining expert inputs and quantitative models has proven to be valuable in developing targeted strategies to minimize risk and enhance halal compliance.

Finally, the integrity of halal food depends not only on mitigating individual risks but also on fostering collaboration among stakeholders, such as suppliers, manufacturers, and regulatory bodies. The establishment of a robust risk management ecosystem, supported by transparent halal certification processes and effective communication, is essential to maintaining the credibility of halal products (Fujiwara, 2017). Advanced technologies, such as blockchain, can further support this ecosystem by ensuring traceability and accountability across the supply chain. By addressing these interconnected risks and fostering collaboration, HSCM can enhance halal logistics and uphold the integrity of halal food products, ultimately strengthening consumer trust and industry resilience (Table 4).

Authors	**Title**	**Source title**	**Year**	**Cited by**
Fujiwara T.	Supplier management in halal food supply chain: A preliminary case study	Pertanika Journal of Social Sciences and Humanities	2017	12
Khan S.; Haleem A.; Khan M.I.	Assessment of risk in the management of Halal supply chain using fuzzy BWM method	Supply Chain Forum	2020	51
Azmi F.R.; Abdullah A.; Cahyadi E.R.; Musa H.; Sa'ari J.R.	Type of risk in halal food supply chain: A review	International Journal of Supply Chain Management	2020	6
Sumarliah E.; Li T.; Wang B.; Indriya I.	An examination of halal fashion supply chain management risks based on the fuzzy best-worst approach	Information Resources Management Journal	2021	29
Sarwar A.; Zafar A.; Qadir A.	Analysis and prioritization of risk factors in the management of Halal supply chain management	Discover Sustainability	2021	17
Khan S.; Haleem A.; Khan M.I.	Risk management in Halal supply chain: an integrated fuzzy Delphi and DEMATEL approach	Journal of Modelling in Management	2021	70

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Azmi F.R.; Musa H.; Chew B.C.; Jagiripu I.P.	Supply risk management: A case study of halal food industry in Malaysia	Uncertain Supply Chain Management	2021	11
Khan S.; Khan M.I.; Haleem A.; Jami A.R.	Prioritising the risks in Halal food supply chain: an MCDM approach	Journal of Islamic Marketing	2022	86
Khan S.; Haleem A.; Khan M.I.	Risk assessment model for halal supply chain using an integrated approach of IFN and D number	Arab Gulf Journal of Scientific Research	2023	8
Jasman N.A.; Ariffin N.H.M.	Risk Factors Analysis in Halal Supply Chain Management System	Journal of Advanced Research in Applied Sciences and Engineering Technology	2025	0

Table 4: The Summary of Halal Supply Chain Management and Risk Factors

Conclusion

This study has effectively achieved its objectives by identifying key risks associated with Halal supply chains, evaluating existing mitigation strategies, and analyzing their interconnections with crucial themes, including Halal supply chain integration, integrity assurance, barriers, and risk factors. The findings indicate that production-related risks constitute the most critical factor affecting Halal food integrity, while logistical challenges, such as contamination and improper handling, further complicate compliance efforts. Additionally, the reluctance of logistics providers to implement Halal-compliant practices, largely due to infrastructure limitations and inconsistent demand, underscores the necessity for regulatory interventions and industry-wide standardization.

From a theoretical standpoint, this study contributes to the existing body of knowledge by extending supply chain risk management frameworks to encompass Halal compliance requirements. The integration of risk prioritization methodologies, such as fuzzy best-worst and multi-criteria decision-making models, enhances the understanding of vulnerabilities within Halal supply chains. Furthermore, the study underscores the relevance of emerging technologies, particularly blockchain, in improving transparency, traceability, and trust within Halal logistics.

In terms of practical implications, the findings offer valuable insights for industry practitioners, policymakers, and Halal certification bodies. Supply chain managers can leverage risk prioritization frameworks to allocate resources effectively, concentrating on high-priority risks such as production-related vulnerabilities and logistical contamination. Policymakers play a crucial role in facilitating compliance by developing regulatory frameworks and providing infrastructure support. Moreover, Halal certification bodies can enhance enforcement mechanisms by streamlining certification processes and promoting digital tools for traceability, including blockchain applications, to bolster trust and transparency within the Halal supply chain.

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Despite its contributions, this study presents certain limitations. The reliance on secondary data may restrict the generalizability of the findings across diverse regions with varying levels of Halal awareness and infrastructure maturity. Additionally, the study predominantly focuses on production and logistics risks, potentially overlooking other critical factors, such as consumer behavior and market dynamics, which also influence Halal supply chain integrity. Future research should address these limitations by conducting empirical studies across different geographical contexts and examining additional risk dimensions within Halal supply chains. Moreover, further exploration of the integration of artificial intelligence and machine learning with blockchain technology may provide deeper insights into the automation of risk management processes and the enhancement of decision-making capabilities in Halal supply chain management.

In conclusion, this study provides a comprehensive assessment of risk factors, Halal logistics, and food integrity within the context of Halal supply chain management. By addressing theoretical, practical, and technological dimensions, the research establishes a foundation for future advancements aimed at ensuring the compliance and integrity of Halal products in an increasingly complex and globalized market.

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