

Challenges and Strategies in Halal Supply Chain Management for MSEs in West Sumatra: A Participatory Action Research Study



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ABSTRACT

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The study delves into the complexities of managing halal supply chains, specifically focusing on enhancing the quality and safety of halal food produced by Micro and Small Enterprises (MSEs) in West Sumatra. Utilizing the Participatory Action Research (PAR) approach, researchers actively collaborate with MSEs to develop halal processed food. Seventeen MSE communities involved in halal processed food production were engaged in this research. This methodology includes problem identification, planning, data collection, analysis, actions, and reflective evaluation. The primary findings spotlight the challenges and strategies in halal supply chain management that impact the quality and safety of halal food. These challenges span raw material procurement, production and processing processes, warehousing and distribution, product preparation and presentation, and monitoring and reporting. The study suggests that MSE owners can potentially enhance the quality and safety standards of their halal food products. This research offers practical guidance for MSEs engaged in processed food production to improve food quality and safety within their halal supply chain management practices. The recommendations include fostering halal awareness and education, establishing effective supplier relationship management, embracing innovation in halal supply chain technology, and ensuring compliance with halal regulations and certification.

1. INTRODUCTION

In today's world, ensuring the quality and safety of halal food is of utmost importance. The term "halal" denotes permissibility under Islamic law and encompasses more than dietary preferences. It entails a comprehensive framework governing food sourcing, preparation, and consumption. With the global Muslim population on the rise and increased awareness of nutritional needs, there's a growing demand for certified halal products [1]. This surge highlights the necessity of meeting religious obligations and maintaining strict cleanliness, integrity, and traceability standards throughout production and distribution channels. Consequently, ensuring the quality and safety of halal food emerges as a crucial element within the broader scope of food security and consumer confidence [2].

The increasing demand for high-quality and safe halal products underscores the importance of robust halal supply chain management practices [3]. It's imperative to adhere strictly to halal principles at every stage of the supply chain, from farm to consumer, to preserve the integrity and authenticity of halal products [4]. Halal supply chain management involves meticulous planning, vigilant monitoring, and rigorous certification processes to ensure that all ingredients, production methods, transportation, storage, and handling procedures align with halal standards [5].

Through effective halal supply chain management, stakeholders can build consumer trust, promote transparency, mitigate the risks of contamination or cross-contamination, and maintain the sanctity of halal food throughout its journey from production to consumption.

Halal supply chain management is closely intertwined with food quality and safety. Food safety is inherently promoted by ensuring compliance with halal standards at all supply chain stages, including procurement, production, handling, and distribution [6]. This alignment is crucial as halal requirements encompass hygiene, cleanliness, and the absence of harmful substances. Moreover, the rigorous monitoring and certification processes involved in halal supply chains contribute to the overall security of the food system by mitigating the risk of contamination, adulteration, or fraudulent practices, thereby safeguarding consumer health and confidence [7].

West Sumatra, an Indonesian province, plays a pivotal role in this landscape as a significant hub for several Micro and Small Enterprises (MSEs) involved in processed food production [8]. With most of its population adhering to Islam, West Sumatra is a crucial center for businesses operating in the halal food sector, ranging from small-scale enterprises to traditional producers. It addresses the increasing demand for halal food within and beyond the region. Additionally, the strategic geographical location and the substantial potential of

the Muslim entrepreneur population reinforce the significance of this region in the halal food industry to cater to the needs of Muslim consumers [9]. Hence, business owners in West Sumatra have a significant opportunity to tap into the halal product market [10].

The Halal Product Assurance Agency data indicates that only a few MSE owners are concerned about halal certification. In 2022, only 699 MSEs were eligible for halal certification in West Sumatra, highlighting the need for greater awareness of the halal supply chain, particularly among processed food producers. According to the 2020 Annual MSE Survey data, approximately 94.39 thousand Micro and Small Industries in West Sumatra are distributed across various districts and cities. However, the potential of the halal market in West Sumatra remains untapped mainly, given the low level of understanding and concern among owners of processed food businesses towards the halal supply chain [11].

The phenomenon highlights a notable lack of awareness of halal among MSE entrepreneurs in West Sumatra, especially those involved in halal supply chain management. MSE owners are yet to grasp the potential benefits of effectively managing the halal supply chain, including enhancing product competitiveness, accessing rapidly growing global markets, and nurturing robust consumer relationships [12]. Therefore, it is crucial to identify halal supply chain management issues and solutions for MSEs involved in processed food production in West Sumatra.

An overview of the challenges encountered in halal supply chain management includes navigating the complexities of halal certification processes, ensuring traceability throughout the supply chain, and minimizing the risk of contamination between halal and non-halal products [13]. Additionally, addressing issues related to fraud and misrepresentation, such as the intentional mislabeling of haram products as halal, remains a significant concern [14]. Moreover, the lack of uniformity in halal certification criteria and the need for heightened education and awareness among stakeholders pose persistent obstacles [15]. Furthermore, the globalization of supply chains adds complexity, requiring careful management to maintain halal integrity across borders and jurisdictions [16].

Participatory action research involves collaborative engagement with stakeholders, notably MSEs and processed food manufacturers in West Sumatra, to identify, analyze, and address halal supply chain management issues. This approach emphasizes stakeholders throughout the research process, from problem identification to solution development [17]. Through this method, the research aims to document the challenges processed food manufacturers face in halal supply chain management and collectively develop feasible solutions through collaboration with stakeholders [18]. By iteratively engaging in action and reflection, the participatory action research approach empowers processed food manufacturers, encourages community involvement, and ultimately enhances halal supply chain practices in West Sumatra.

The study addresses practical needs by enhancing halal supply chain management practices for MSEs and processed food manufacturers in West Sumatra. The study seeks to identify specific issues and propose practical solutions by employing a participatory action research approach, thereby improving business operations and ensuring compliance with halal standards. Furthermore, academically, the research contributes to the literature by adopting a unique methodological approach and generating empirical evidence tailored to the context of West Sumatra. The primary aim is to

advance both practical and academic understanding of halal supply chain management issues and solutions, ultimately fostering sustainable development and innovation within the halal food industry.

This study seeks to fill the research gap concerning the lack of comprehensive understanding and practical remedies regarding halal supply chain management tailored explicitly for processed food manufacturers in West Sumatra. Existing literature often focuses on large companies or general issues within the halal food industry without considering the unique conditions and needs of MSEs. This research aims to bridge this gap by actively engaging processed food manufacturers in identifying, analyzing, and addressing issues in their halal supply chains through a participatory action research approach. Through this endeavor, the research aims to provide relevant perspectives and feasible resolutions, enabling processed food producers to strengthen their management of halal supply chains. Therefore, the research questions are:

RQ1: What are the issues in implementing halal supply chain management for MSEs producing processed food in West Sumatra?

RQ2: What are the solutions to managing the halal supply chain for MSEs producing processed food in West Sumatra?

RQ3: How do the issues and solutions in managing halal supply chains relate to the quality and safety of halal products among MSEs engaged in processed food production in West Sumatra?

2. LITERATURE REVIEW

2.1 Food safety, food quality, and halal supply chain

Ensuring food safety, quality, and halal supply chain management are paramount in the food industry. These aspects require meticulous attention and robust systems to uphold consumer trust and compliance with religious dietary laws. Food safety involves implementing practices and protocols to prevent contamination, illness, and other health hazards associated with food consumption [19, 20]. It entails maintaining stringent hygiene standards throughout the supply chain, from production and processing to distribution and consumption [21, 22]. Measures such as regular sanitation, proper storage, temperature control, and adherence to food handling guidelines are imperative to mitigate risks [23].

Food quality, conversely, concerns the availability, accessibility, and affordability of food for all individuals within a population [24, 25]. It encompasses strategies to ensure consistent access to safe and nutritious food sources, particularly amidst climate change, economic instability, and geopolitical conflicts. Sustainable agricultural practices, diversification of food sources, and equitable distribution channels also contribute significantly to enhancing food quality on a global scale [26].

Halal supply chain management targets explicitly adherence to Islamic laws governing what foods are permissible (halal) and prohibited (haram) for Muslims to consume [27]. It involves compliance in avoiding forbidden ingredients and substances harmful to health and ensuring halal and haram product segregation throughout the supply chain [28]. Effective management of halal supply chains entails implementing comprehensive traceability systems, rigorous quality control measures, and collaboration with certified suppliers and regulatory authorities [29]. It ensures adherence

to religious requirements and fosters transparency, trust, and credibility within the halal market [30, 31].

2.2 Halal supply chain management

The essence of halal supply chain management is ensuring food safety throughout the supply chain, especially concerning halal products. It involves effectively utilizing resources from ingredients to finished goods to customers [30-32]. For this system to function efficiently, senior management's steadfast dedication is essential in executing halal policies, which form the foundation of the supply chain organization [33, 34]. Additionally, establishing strategic alignment between company strategies and halal policies is crucial [35].

Halal supply chain management employs a systematic strategy to oversee the movement of resources, data, and funds through strategic collaboration and alignment among all stakeholders. Its objective is to ensure that every supply chain step upholds halal principles [36]. Thus, it can meet quality standards, ensure product superiority, and deliver halal products as expected [37, 38].

Halal supply chain management benefits all components, not just MSE owners [35]. Hence, governance, infrastructure, appropriate information technology, competent human resources, and vertical and horizontal collaboration must support its implementation [36]. Here, the government plays a crucial role in formulating strategies and regulations and implementing halal supply chain programs to enhance national product competitiveness [39].

Optimizing halal management efficiency involves integrating critical elements throughout the supply chain process. Firstly, ensuring that raw materials strictly adhere to Halal standards is vital for halal food producers [40, 41]. Robust procurement practices and transparent processes for sourcing raw halal materials minimize the risk of contamination or non-compliance, thus safeguarding the integrity of halal products and ensuring consumer safety [42, 43]. Moreover, principles must be embedded into the production and processing phases to uphold the integrity of halal products [44]. Utilizing Halal-certified equipment, segregating production lines, and providing comprehensive staff training prevent deviations from Halal standards, maintaining product quality and safety [45].

Ensuring the quality and safety of halal food doesn't end with production and processing; it extends to warehousing and distribution. This phase is critical for maintaining the integrity of halal products throughout storage and transit [46]. Strict adherence to proper storage practices, implementation of traceability systems, and compliance with transportation standards are essential measures to prevent contamination or disruptions, thereby preserving product quality until consumption [27]. Additionally, meticulous preparation and presentation of halal products are essential [3, 47]. Proper labeling and packaging effectively communicate halal certification to consumers, enhancing trust and confidence in product quality and safety [48, 49]. Establishing robust monitoring and reporting systems ensures continuous compliance, upholding product quality and safety [50, 51].

Neglecting halal supply chain management can result in using non-halal ingredients or methods, risking non-compliance and eroding consumer trust [52, 53]. Cross-contamination between halal and non-halal products during production compromises halal food integrity and may lead to

religious concerns and reputational damage [30, 54]. Furthermore, inconsistencies or labeling errors due to the absence of halal supply chain management can cause confusion and distrust among consumers, affecting product marketability and causing financial losses [55, 56]. Therefore, prioritizing halal supply chain management is crucial for maintaining consumer trust, religious adherence, and brand reputation.

Halal supply chain management plays a critical role in ensuring the availability of top-notch halal food that meets the standards and preferences of Muslim consumers [37, 44]. Manufacturers are essential in this process, facilitating a reliable and steady supply of halal products through transparent and accountable procedures. By doing so, they address Muslim communities' dietary needs and foster inclusivity in the food industry [57, 58]. In essence, effective halal supply chain management is essential for meeting the diverse demands of Muslim consumers and promoting accessibility to high-quality halal food products.

Previous studies have investigated the impact of halal supply chain management on maintaining the authenticity of halal practices within Malaysia's food industry [54]. These findings suggest that the halal supply chain significantly influences the assurance of halal integrity in the food and beverage sector. Additionally, research has explored the halal supply chain specifically concerning apples [59], revealing concerns among Muslim consumers regarding potential risks associated with chemical processing that could compromise the fruit's halal status.

Earlier studies have proposed comprehensive halal and mixed models as primary strategies for halal food distribution, with operational expenses, product quality, and halal authenticity serving as benchmarks for evaluation [60]. Moreover, research has identified risks, risk agents, and mitigation measures, strengthening the risk management framework in the halal frozen food industry. Prioritized mitigations for frozen food companies include training in good manufacturing practices, implementing halal Standard Operating Procedures, and ensuring the use of halal ingredients [5].

In Brunei, previous research has identified four sustainable supply chain management strategies that halal-certified food enterprises can adopt to achieve Sustainable Development Goals (SDGs): ethical sourcing, eco-conscious procurement, sustainable packaging, and green transportation [61]. Critical factors in effective halal supply chain management have been examined, along with testing of halal supply chain management models and evaluating the impact of halal practices on company sustainability performance [42]. Finally, significant barriers in halal supply chain management have been highlighted, with declining demand for halal products identified as a critical obstacle [62].

3. RESEARCH METHOD

The method used in this research is participatory action research (PAR), which involves active collaboration between researchers and MSEs producing halal processed foods. This research involves 17 MSE communities producing halal processed foods as participants. The steps in this research are as follows [63, 64].

3.1 Problem identification

The process of identifying problems unfolds through a series of detailed steps. Initially, policymakers are interviewed. They are engaging with critical policymakers, including representatives from local government bodies and the Halal Product Assurance Agency. These interviews offer valuable insights into current policies, legal constraints, and governmental initiatives to support MSEs in integrating halal principles. Subsequently, direct observation plays a pivotal role. Conducting firsthand observations of MSE processes and their challenges in implementing halal supply chain management provides invaluable insights. It involves initial visits to production facilities, distribution centers, and other pivotal points in the supply chain to observe how MSEs handle halal-related issues in their day-to-day operations.

3.2 Planning

The next step involves strategizing and planning the research methodology. Once the issues are identified, it is essential to devise a strategy and research methods to address the questions arising from these challenges. This process includes selecting appropriate research methodologies, tools for analysis, and practical steps for conducting the research. An integral part of this planning process is determining the techniques for data collection. For example, conducting Focus Group Discussions (FGDs) can gather insights from various stakeholders, including producers, distributors, consumers, and regulatory authorities. In the final stages of planning, the focus shifts to developing the agenda and schedule for conducting the research. This agenda plays a crucial role in guiding the research process effectively. It outlines various details, including the topics to be discussed in FGDs, the timing and location of these discussions, and the allocation of time for data analysis and compiling the report.

3.3 Data collection

The FGD technique was employed as the primary method to gather insights. Participants representing MSEs producing halal processed foods in West Sumatra participated in these discussions. Each FGD session was meticulously structured around pertinent themes, covering various topics crucial to the industry. These themes encompassed challenges related to the procurement of raw materials, complexities inherent in production and processing, considerations in warehousing and distribution, strategies for product preparation and presentation, and essential functions in monitoring and reporting.

3.4 Data analysis

In preparation for data analysis, it is ensuring the systematic and organized handling of FGD data. This approach facilitates accessibility and structures the data for efficient analysis. It is imperative to furnish comprehensive and representative data from all MSEs involved in the study to ensure that the findings accurately portray the industry's diversity of experiences. Additionally, verifying the integrity of the data is essential to identify and rectify errors or potential information loss, thus maintaining the reliability of the analysis.

Data grouping occurs once the variables and parameters are identified, typically encompassing categories such as raw material procurement, production processes, distribution, and other relevant aspects of the halal supply chain. Analytical work entails scrutinizing the data to detect emerging patterns and trends. By examining both short-term fluctuations and long-term developments, a comprehensive understanding of the dynamics shaping the halal supply chain management landscape is attained.

The analysis focuses on uncovering significant findings related to the challenges MSEs encounter in implementing halal supply chain management. It involves identifying specific obstacles encountered at each stage of the supply chain, from raw material procurement to product monitoring and reporting. When delving deeper into the findings, the objective is to grasp the root causes of halal supply chain management challenges. It involves pinpointing the key factors contributing to non-compliance or difficulties in adhering to halal standards.

Based on the analysis, specifically tailored solutions are formulated to address the unique context and needs of stakeholders in West Sumatra. These solutions encompass specific steps to enhance raw material procurement, improve production processes, or refine distribution systems, ultimately enhancing the quality and safety of halal food.

3.5 Actions

Researchers and MSE owners identify specific solutions to address the challenges of halal supply chain management based on the identified issues. These solutions are tailored to overcome the obstacles MSEs encounter in implementing halal supply chain practices. The identified solutions undergo comprehensive evaluation to ensure their relevance, feasibility, and applicability within the context of MSE businesses in West Sumatra. Evaluation considerations include resource availability, effectiveness, and the potential impact of each solution. From selecting several critical solutions based on the identified issues, practical strategies for MSE owners are derived. These solutions are prioritized for their ability to address urgent and crucial matters within the context of the halal supply chain.

3.6 Evaluation and reflection

The evaluation and reflection process unfolds in detailed steps. Assessing whether the carefully crafted solutions align with halal food's quality and safety standards is crucial. This evaluation examines the suitability of the solutions for meeting the current quality and safety requirements of halal food. It ensures that each step to implement these solutions improves halal supply chain management and enhances the quality and safety of halal food products produced by MSEs in West Sumatra.

Continuous monitoring and evaluation of these solutions are essential to ensure their relevance to the ongoing challenges MSEs face in halal supply chain management in West Sumatra. This process involves continuing surveillance and assessment of the implemented solutions. The goal is to confirm that these solutions continue to address the challenges encountered by MSEs in halal supply chain management, ultimately enhancing the quality and safety of halal food.

4. RESULTS AND DISCUSSION

4.1 The issue of halal supply chain management

4.1.1 Procuring halal raw materials issues

MSE owners have pinpointed the acquisition of halal raw materials as their foremost concern, underscoring six critical issues with substantial implications. A thorough examination of these issues provides insight into the challenges MSEs face in safeguarding the halal integrity of their products.

Table 1. Procuring halal raw materials issues

Issues	F	%
Limited access to high-quality halal raw materials	16	94.12
The absence of an efficient system or distribution network for halal raw materials	15	88.24
High cost of procuring halal raw materials	14	82.35
Lack of information about reliable sources of halal raw materials	14	82.35
Issues in meeting halal certification requirements for imported or purchased raw materials from foreign suppliers	13	76.47
Fluctuations in price and availability of halal raw materials	12	70.59

Table 1 delineates the issues related to procuring raw halal materials and presents the choices made by MSE owners. The issue of “Limited access to high-quality halal raw materials” recorded the highest frequency, with 16 selections constituting 94.12% of responses. It indicates that MSE owners view limited access to quality raw materials as a significant hindrance to their operations. Conversely, “Fluctuations in price and availability of halal raw materials” received the lowest frequency, with 12 selections representing 70.59% of responses. While still noteworthy, this suggests that MSE owners may perceive other challenges as more pressing than this particular issue.

The discoveries mentioned above are intricately linked to halal food production’s quality and safety standards. Limited access to premium halal raw materials can compromise the quality and safety of halal food items. This situation may lead to the inclusion of substandard ingredients, potentially posing health risks [41]. Moreover, the absence of an efficient distribution system or network for halal raw materials exacerbates these concerns, resulting in delays in procurement and storage practices and ultimately impacting the quality and safety of the raw materials [3, 65].

Furthermore, the high expenses associated with acquiring halal raw materials may pressure companies into taking shortcuts or compromising on quality, thus potentially jeopardizing food safety standards [61, 66]. Additionally, the absence of information regarding dependable sources of halal raw materials adds to the quality and food safety concerns, heightening the likelihood of obtaining halal raw materials from unverified or uncertified suppliers with dubious practices [67].

Challenges in meeting halal certification criteria for imported raw materials or those procured from foreign suppliers can also impact food quality and safety. This uncertainty can arise from doubts about these materials’ compliance with halal standards [61]. Finally, fluctuations in the prices and availability of halal raw materials can disrupt supply chains and production processes, potentially

compromising the quality and safety of halal food products through ingredient substitution or procurement from less dependable suppliers [41].

4.1.2 Production and processing process issues

Moreover, MSE owners also draw attention to a significant issue concerning the production and processing process. Seven notable constraints have been identified in this domain. A comprehensive exploration of these issues seeks to shed light on the obstacles MSEs encounter in enhancing their production and processing procedures.

Table 2. Production and processing process issues

Issues	F	%
Inadequate infrastructure and equipment for efficient production	15	88.24
Lack of skilled labor and training in food processing techniques	13	76.47
Difficulty in maintaining consistent product quality due to variations in raw materials	14	82.35
Issues in complying with halal, safety, and food hygiene standards	14	82.35
Limited access to technology and resources for process improvement and innovation	12	70.59
High operational costs affect profit margins	11	64.71
Issues related to waste management and environmental sustainability in the production process	12	70.59

Table 2 illustrates the challenges encountered in production and processing processes, highlighting the most and least frequently chosen options by MSE owners. “Inadequate infrastructure and equipment for efficient production” emerged as the most prevalent issue, garnering a frequency of 15 selections, constituting 88.24% of responses. It suggests that MSE owners perceive the lack of suitable infrastructure and equipment as a significant hurdle in achieving efficient production. Conversely, “High operational costs affecting profit margins” received the lowest frequency, with 11 selections representing 64.71% of responses. Although still noteworthy, this indicates that MSE owners may view other issues as more pressing than the impact of high operational costs on profit margins.

Inadequate infrastructure and equipment within food processing can lead to inefficiencies, jeopardizing food quality and safety through increased contamination risks or mishandling of materials [30, 52]. The scarcity of skilled labor and technical training exacerbates these risks, as untrained workers may inadvertently compromise product quality, safety, and compliance with halal standards [68].

Variations in raw materials make maintaining consistent product quality challenging, raising concerns regarding food safety and halal compliance [23]. Non-compliance with halal, safety, and cleanliness standards further heightens risks, potentially resulting in contamination, counterfeiting, or the inclusion of non-halal ingredients [41]. Limited access to technology and resources for process improvement and innovation exacerbates these challenges as MSEs struggle to implement effective food safety measures or adapt to evolving halal quality standards, compromising product integrity [69].

High operational costs compound these issues, potentially driving MSEs to take shortcuts, such as compromising quality or neglecting halal compliance to maintain profit margins [6, 45]. Lastly, poor waste management practices can lead to environmental contamination and health hazards, jeopardizing

food quality, safety, and the integrity of the halal supply chain [3].

4.1.3 Warehousing and distribution issues

Additionally, MSE owners often face substantial challenges related to warehousing and distribution. These issues span multiple facets of storage and logistics, influencing the efficiency and effectiveness of the distribution process for MSEs.

Table 3. Warehousing and distribution issues

Issues	F	%
Inadequate storage facilities for halal products	16	94.12
Lack of proper temperature control during storage and transportation, leading to potential spoilage or contamination	14	82.35
Issues in maintaining segregation and preventing cross-contamination of halal and haram products in warehouses	13	76.47
Limited availability of halal-certified logistics and transportation services	12	70.59
Transportation scheduling and logistics coordination issues lead to product delivery delays or inefficiencies	12	70.59
Difficulty in tracking and tracing halal products throughout the distribution process, affecting transparency and accountability	11	64.71
Compliance issues with halal certification requirements during transportation and storage	12	70.59

Within Table 3, the foremost concern among MSE owners is the inadequacy of storage facilities for halal products, as indicated by its frequency of 16 and a percentage of 94.12%. Conversely, the issue least favored by MSE owners is the challenge of tracking and tracing halal products throughout the distribution process, impacting transparency and accountability. This issue garnered a frequency of 11 and a percentage of 64.71%.

Underlying issues in warehousing and distribution significantly impact halal supply chain management, food safety and quality. Insufficient storage facilities for halal products threaten their integrity, potentially leading to contamination or spoilage, thus risking consumer health and eroding trust in the halal supply chain's integrity [70]. Poor temperature control during storage and transportation exacerbates these risks, as temperature fluctuations can accelerate bacterial growth, increasing the likelihood of foodborne illnesses and compromising safety standards [32].

Segregation challenges in warehouses and the risk of cross-contamination between halal and non-halal products raise ethical and religious concerns. The accidental consumption of non-halal items due to mingling violates religious dietary laws and undermines confidence in halal certification [23, 71]. Additionally, the scarcity of certified halal logistics services disrupts the flow of halal products, leading to delays, inefficiencies, and increased costs, ultimately impacting food quality and safety [31, 72].

Issues in transportation scheduling and logistics coordination further compound delays and inefficiencies in product delivery, disrupting supply chain operations and diminishing customer satisfaction [70]. Complications in tracking and tracing halal products during distribution processes hinder transparency and accountability, making addressing issues such as contamination or counterfeiting challenging, thereby posing risks to food quality and safety

[73]. Non-compliance with halal certification requirements during transportation and storage may result in regulatory breaches and legal repercussions, damaging the business's reputation and undermining the credibility of halal products and the integrity of the supply chain [14].

4.1.4 Product preparation and presentation issues

Another notable challenge encountered by MSE owners pertains to product preparation and presentation. Seven significant issues have been identified through the FGD process. These issues encompass various aspects of effectively preparing and presenting products, influencing the overall competitiveness and appeal of MSE offerings.

Table 4. Product preparation and presentation issues

Issues	F	%
Compliance with halal requirements during food preparation, such as sourcing halal-certified ingredients and avoiding cross-contamination	16	94.12
Maintaining consistent product quality and taste across different batches or production cycles is challenging	15	88.24
Limited availability of halal-certified packaging materials or container	13	76.47
Difficulties in properly labeling halal products to ensure transparency and consumer trust	15	88.24
Issues with staff training and awareness regarding halal food handling and preparation procedures	13	76.47
Ensuring proper hygiene and sanitation practices throughout the food preparation to maintain halal integrity	13	76.47
Cultural or regional preferences in food presentation while adhering to halal guidelines	12	70.59

Table 4 illustrates the concern most frequently highlighted by Micro and Small Enterprises (MSE) owners is "Compliance with halal requirements during food preparation, such as sourcing halal-certified ingredients and avoiding cross-contamination," which garnered a frequency of 16 occurrences, representing 94.12% of responses. Conversely, the issue least favored by MSE owners is "Cultural or regional preferences in food presentation while adhering to halal guidelines," selected 12 times, constituting 70.59% of responses.

These findings underscore several crucial food quality and safety aspects in halal production. Adherence to halal requirements, such as utilizing certified ingredients and preventing cross-contamination during food preparation, is imperative for maintaining halal food products' quality and safety standards [30, 54]. Challenges in ensuring consistent product quality and taste across different production cycles can raise concerns about food safety and authenticity, thereby impacting consumer satisfaction [15, 74].

Furthermore, the scarcity of certified halal packaging materials presents a challenge in ensuring that the packaging process aligns with halal standards, thereby preserving the quality and safety standards of halal products [25, 75]. Difficulty accurately labeling halal products undermines transparency and consumer trust, potentially leading to confusion or mistrust. Providing adequate training and awareness among staff regarding halal food handling procedures is crucial to prevent potential violations of halal requirements and uphold product quality and safety [23].

Maintaining good hygiene and sanitation during food preparation is essential for upholding halal product quality and

safety standards and preventing contamination that could compromise food safety [76]. Accommodating cultural or regional preferences in food presentation while adhering to halal guidelines adds complexity to ensuring food quality and safety, necessitating careful consideration to preserve halal integrity and ensure consumer satisfaction [77].

4.1.5 Monitoring and reporting issues

Another equally crucial issue concerns monitoring and reporting, with owners identifying eight significant matters. Table 5 will provide a comprehensive breakdown of these issues, shedding light on the complexities of monitoring and reporting practices.

Table 5 provides an analysis of monitoring and reporting issues. The concern most frequently highlighted by Micro and Small Enterprises (MSE) owners is “Lack of real-time tracking and monitoring systems across the supply chain,” which garnered a frequency of 16 occurrences, representing 94.12% of responses. Conversely, the issue least favored by MSE owners is “Inadequate mechanisms for addressing non-compliance or discrepancies in reporting,” selected 13 times, constituting 76.47% of responses.

Table 5. Monitoring and reporting issues

Issues	F	%
Lack of real-time tracking and monitoring systems across the supply chain	16	94.12
Inconsistent reporting standards among different entities involved in the supply chain	14	82.35
Difficulty in verifying the accuracy and authenticity of reported data	15	88.24
Limited transparency in reporting practices leads to information asymmetry	15	88.24
Issues in integrating data from various sources for comprehensive monitoring	14	82.35
Insufficient resources allocated for monitoring and reporting activities	14	82.35
Inadequate mechanisms for addressing non-compliance or discrepancies in reporting	13	76.47
Lack of standardization in reporting formats and protocols, hindering comparability and analysis	14	82.35

These findings underscore critical issues impacting the halal supply chain, food quality and safety standards. The absence of real-time tracking and monitoring systems throughout the supply chain presents significant challenges, hindering the ability to promptly identify and respond to threats to the quality and safety of halal food [78, 79]. Moreover, inconsistent reporting standards among different entities involved in the supply chain make it challenging to ensure the accuracy and authenticity of reported data concerning halal compliance, food quality, and safety [57, 80].

This lack of uniformity leads to uneven access to information, intensifying efforts to uphold the integrity of the halal supply chain and ensure the quality and safety of halal food products [81]. Additionally, challenges in verifying the accuracy and authenticity of reported data exacerbate this issue, increasing the risks of non-compliance and potential hazards to food quality and safety [2, 82]. Limited transparency in reporting practices further exacerbates the problem, making it difficult to grasp the status of halal compliance, food quality, and safety across the supply chain [56].

Furthermore, integrating data from various sources for comprehensive monitoring complicates efforts to track and

manage halal compliance, food quality, and safety risks [54, 83]. The insufficient allocation of resources for monitoring and reporting activities and the capacity to implement robust monitoring mechanisms and address emerging issues effectively also pose a challenge [84]. Additionally, mechanisms incapable of addressing non-compliance or discrepancies in reporting, combined with the lack of standardization in reporting formats and protocols, impede comparability and analysis, hindering efforts to mitigate food quality and safety risks and uphold the integrity of the halal supply chain [54].

4.2 Solutions for halal supply chain management issues

4.2.1 Solution for issue procuring halal raw materials

Conducting FGD with MSE owners has proven pivotal in identifying practical solutions to issues related to procuring halal raw materials.

Table 6. Solution for issue procuring halal raw materials

Solutions	F	%
Improve access to high-quality halal raw materials by fostering partnerships with reliable suppliers or producers	16	94.12
Establish an efficient system or distribution network tailored explicitly for halal raw materials	15	88.24
Explore cost-saving strategies to mitigate the high procurement costs of halal raw materials, such as bulk purchasing or negotiating better prices with suppliers	13	76.47
Enhance access to information about trustworthy sources of halal raw materials through collaborations with industry organizations or certification bodies	12	70.59
Develop a thorough understanding of halal certification requirements and work closely with foreign suppliers to ensure compliance with these standards	12	70.59
Implement proactive planning and monitoring mechanisms to manage and mitigate the impact of fluctuations in the price and availability of halal raw materials, including diversifying sourcing options and maintaining strategic stock levels	11	64.71

Table 6 provides a comprehensive breakdown of solutions for procuring halal raw materials, detailing their frequency and the percentage of MSE owners who have chosen them. The solution most favored by most MSE owners is “Improving access to high-quality halal raw materials by establishing partnerships with reliable suppliers or producers.” This solution has a frequency of 16 and a percentage of 94.12%. It emphasizes that MSE owners widely acknowledge the significance of improving access to high-quality halal raw materials through partnerships.

In contrast, the solution with the lowest frequency, selected by the smallest percentage of MSE owners, is “Implementing proactive planning and monitoring mechanisms to manage and mitigate the impact of fluctuations in the price and availability of halal raw materials, including diversifying sourcing options and maintaining strategic stock levels.” These solutions have a frequency of 11 and a percentage of 64.71%. It suggests that while these solutions remain significant, they are not as commonly favored by MSE owners compared to others listed in the table.

In Table 6, three prioritized strategies have been identified

for Micro and Small Business owners. The first is improving access to high-quality halal raw materials by fostering partnerships with reliable suppliers or producers, which was chosen by 94.12% of respondents. Following closely, establishing an efficient distribution network specifically for halal raw materials was favored by 88.24% of respondents. Lastly, exploring cost-saving strategies to alleviate the high procurement costs of halal raw materials, such as bulk purchasing or negotiating better prices with suppliers, was selected by 76.47% of respondents.

Ensuring the production of halal processed foods necessitates prioritizing several critical actions by MSEs. One crucial step is establishing supplier partnerships to uphold stringent quality and safety standards [38, 85]. This strategic collaboration is pivotal in ensuring reliability across the halal supply chain. By forming robust partnerships, MSE owners can secure a consistent and high-quality supply of halal raw materials, thereby upholding the safety and quality of their end products [41].

Developing an efficient system or network for the distribution of halal raw materials is also paramount [30]. A well-structured distribution system streamlines supply chain operations and optimizes the management of halal ingredients [3, 86]. MSEs can mitigate risks to product safety and quality through timely and efficient delivery. This simplified distribution network minimizes operational inefficiencies and reduces the likelihood of contamination or counterfeiting during transit, thus safeguarding the quality and safety of halal products from source to consumer [32, 87].

Furthermore, implementing cost-saving strategies, such as bulk purchasing or negotiating better prices, is vital for enhancing the efficiency of halal supply chain management [42]. By leveraging economies of scale and employing strategic negotiation tactics, MSEs can effectively control production costs while upholding product quality and safety standards. These cost-saving initiatives enable MSEs to improve business profitability without compromising the integrity of halal products [36]. By optimizing procurement processes, MSEs can maintain a competitive edge in the halal market, ultimately delivering high-quality, safe halal food products that meet consumer expectations and preferences.

4.2.2 Solution for issues in production and processing processes

Upon the conclusion of data collection through FGD with MSE owners, the researcher has effectively collated solutions to challenges related to production and processing processes. The subsequent table offers a thorough summary of these solutions, furnishing valuable insights for tackling significant issues within the domain.

Table 7 presents solutions for challenges encountered in production and processing processes, providing insights into their frequency and the percentage of MSE owners who have opted for them. The solution with the highest frequency, chosen by the most significant proportion of MSE owners, is “Investing in upgrading infrastructure and acquiring appropriate equipment to enhance production efficiency,” with a frequency of 16 and a percentage of 94.12%. It underscores improving production efficiency through infrastructure upgrades and equipment acquisition.

In contrast, the solution with the lowest frequency, selected by the smallest percentage of MSE owners, is “Implementing cost-saving measures such as energy-efficient practices or bulk purchasing to mitigate high operational costs and

maintain profit margins,” with a frequency of 11 and a percentage of 64.71%. While still noteworthy, this suggests that MSE owners may not consider cost-saving measures as critical compared to other solutions listed in the table.

Table 7. Solution for issues in production and processing processes

Solutions	F	%
Invest in upgrading infrastructure and acquiring appropriate equipment to enhance production efficiency	16	94.12
Provide training programs to develop skilled labor in food processing techniques, ensuring a competent workforce	13	76.47
Implement strict quality control measures and develop standardized processes to address variations in raw materials and maintain consistent product quality	15	88.24
Enforce rigorous compliance with halal, safety, and food hygiene standards through regular inspections and training programs	14	82.35
Facilitate access to technology and resources for process improvement and innovation through partnerships with research institutions or industry associations	12	70.59
Implement cost-saving measures such as energy-efficient practices or bulk purchasing to mitigate high operational costs and maintain profit margins	11	64.71
Develop waste management strategies and adopt environmentally sustainable practices to minimize waste and reduce the ecological footprint of the production process	12	70.59

Table 7 identifies three prioritized strategies for MSE owners regarding issues in production and processing processes. Investing in upgrading infrastructure and acquiring appropriate equipment to enhance production efficiency was chosen by 94.12% of respondents. Implementing strict quality control measures and developing standardized processes to address variations in raw materials and maintain consistent product quality was favored by 88.24% of respondents. Enforcing rigorous compliance with halal, safety, and food hygiene standards through regular inspections and training programs was selected by 82.35% of respondents.

Enhancing production efficiency through infrastructure and equipment upgrades represents a multifaceted endeavor crucial for the halal food industry. These investments extend beyond mere operational improvements; they also play a pivotal role in upholding the integrity and safety of halal products [32, 69]. By allocating resources towards appropriate infrastructure, companies can streamline the separation and handling of halal ingredients, ensuring their authenticity and guarding against contamination [71, 88]. This strategic alignment with halal standards ensures compliance and fosters consumer trust, demonstrating a commitment to maintaining the quality and safety of halal food throughout the production chain [54].

Stringent quality control measures form the cornerstone of consistent product excellence within the halal industry [58, 72]. Adherence to standardized processes throughout the supply chain is imperative, guaranteeing that each production stage meets established criteria. This meticulous approach enhances the overall quality of halal products and instills confidence in consumers regarding reliability and safety [23, 77].

Compliance with halal standards is not just a regulatory obligation but a fundamental pillar underpinning product credibility and consumer trust [14]. Routine inspections and robust training programs are essential for reinforcing adherence to these standards, thereby upholding the integrity of halal products [54]. Such dedication not only preserves consumer trust but also fosters enduring relationships, as consumers recognize and appreciate the efforts made to ensure the quality and safety of halal products [37, 82].

4.2.3 Solution for issues warehousing and distribution

By fostering collaborative efforts between researchers and MSE owners, seven comprehensive solutions have been identified to tackle challenges in warehousing and distribution. These solutions are meticulously outlined in the table below, providing clear pathways towards improving efficiency and effectiveness in these crucial operational domains.

Table 8. Solution for issues in warehousing and distribution

Solutions	F	%
Invest in expanding storage facilities designed for halal products to accommodate increasing demand	16	94.12
Install proper temperature control systems in storage areas and vehicles to maintain the integrity of halal products and prevent spoilage or contamination	15	88.24
Implement strict segregation measures and develop procedures to prevent cross-contamination among halal and haram products in warehouses	14	82.35
Collaborate with certified logistics and transportation providers to ensure the availability of halal-certified services throughout the distribution network	13	76.47
Improve transportation scheduling and logistics coordination to minimize delays and inefficiencies in product delivery	13	76.47
Implement robust tracking and tracing systems using barcodes to monitor halal products throughout distribution, enhancing transparency and accountability	12	70.59
Enhance training and awareness programs for transportation and storage personnel to ensure compliance with halal certification requirements, including proper handling and documentation procedures	13	76.47

After analyzing the data presented in Table 8, it's evident that the most favored solution among MSE owners is to "Invest in expanding storage facilities designed for halal products to accommodate increasing demand," garnering a frequency of 16 and a percentage of 94.12%. Conversely, the least preferred solution is to "Implement robust tracking and tracing systems using barcodes to monitor halal products throughout distribution, enhancing transparency and accountability," which obtained a frequency of 12 and a percentage of 70.59%.

In Table 8, three prioritized strategies have emerged for MSE owners concerning issues in warehousing and distribution. Firstly, investing in expanding storage facilities designed for halal products to accommodate increasing demand was favored by 94.12% of respondents. Secondly, installing proper temperature control systems in storage areas and vehicles to maintain the integrity of halal products and prevent spoilage or contamination was chosen by 88.24% of respondents. Lastly, implementing strict segregation measures and developing procedures to avoid cross-contamination

among halal and haram products in warehouses were selected by 82.35% of respondents.

For MSEs engaged in producing halal processed foods, implementing several priority solutions is imperative. Firstly, expanding dedicated warehousing facilities for halal products is essential [89]. This step is critical as it allows MSE owners to produce halal products safely, adhering to halal principles while maintaining high quality [90]. Having adequate warehousing facilities is vital to prevent the mixing of halal and non-halal products, thereby averting contamination that could compromise the integrity of halal items [50].

Secondly, installing proper temperature control systems in warehouse areas is paramount [76]. Maintaining the correct temperature is crucial for preserving product quality and ensuring the safety of halal food. By implementing suitable temperature regulation systems, MSE owners can guarantee that halal products remain top-quality throughout distribution. This measure will mitigate the risk of damage or contamination due to incorrect temperatures, enhancing brand reputation and increasing customer satisfaction [45, 77].

Thirdly, MSE owners should enforce stringent segregation measures [91, 92]. Rigorous separation between halal and non-halal products is essential to comply with halal standards. By implementing strict segregation measures in storage warehouses and throughout the distribution process, MSE owners can ensure that haram products do not contaminate halal ones. Success in implementing strict segregation will preserve the authenticity of halal products, thereby upholding the quality and safety of food items [30, 37].

4.2.4 Solution for issues of product preparation and presentation

Expanding on the identified challenges, researchers and MSE owners collaborated to formulate solutions for product preparation and presentation issues. These solutions are visually represented in the subsequent table, providing valuable insights into improving the quality and presentation of products within MSEs.

Table 9 outlines a range of solutions addressing product preparation and presentation issues. The solution that emerged as the most frequently chosen involves "Building partnerships with suppliers that provide halal-certified ingredients and implement procedures to prevent cross-contamination during food preparation." This option received 16 votes, accounting for 94.12% of responses. Conversely, the solution least favored is to "Adapt food presentation to accommodate cultural or regional preferences while adhering to halal guidelines, thus meeting the needs of diverse consumers while maintaining halal compliance." This choice was selected by 12, representing 70.59% of responses.

Table 9 shows the three prioritized strategies for MSE owners regarding product preparation and presentation issues. It is building partnerships with suppliers that provide halal-certified ingredients and implementing procedures to prevent cross-contamination during food preparation, chosen by 94.12% of respondents. Developing well-documented standard recipes and consistently training staff to follow proper steps in the production process to ensure product quality consistency, favored by 88.24% of respondents. Ensuring adequate labeling of halal products to provide clear and accurate information, thus enhancing transparency and consumer trust, was also selected by 88.24% of respondents.

In light of the solutions proposed, three distinct approaches emerge as critical for MSEs operating within the halal food

sector. Firstly, MSES must forge partnerships with suppliers offering halal-certified components. This step ensures the integrity of their supply chain, guaranteeing that all ingredients used in the production process adhere to halal standards [52, 93]. To further bolster this, robust procedures must be implemented to prevent cross-contamination during food preparation, thus safeguarding the quality and safety of halal products [30].

Table 9. Solution for issues of product preparation and presentation

Solutions	F	%
Build partnerships with suppliers that provide halal-certified ingredients and implement procedures to prevent cross-contamination during food preparation	16	94.12
Develop well-documented standard recipes and consistently train staff to follow proper steps in the production process to ensure product quality consistency	15	88.24
Collaborate with packaging manufacturers or seek alternative options that meet halal certification requirements to address the limited availability of halal-certified packaging materials	14	82.35
Ensure proper labeling of halal products to provide clear and accurate information, thus enhancing transparency and consumer trust	15	88.24
Training sessions on halal food handling and preparation procedures should be conducted to improve staff awareness and compliance	14	82.35
Establish strict hygiene standards and routine inspections to ensure adequate sanitation practices throughout food preparation and to maintain halal integrity	13	76.47
Adapt food presentation to accommodate cultural or regional preferences while adhering to halal guidelines, thus meeting the needs of diverse consumers while maintaining halal compliance	12	70.59

Secondly, MSEs should concentrate on developing well-documented standard recipes and consistently training their staff. Standardized recipes form the bedrock for maintaining consistency in the quality and safety of halal products [32, 53]. By meticulously documenting recipes, MSEs can ensure that each product meets the requisite standards, irrespective of personnel or production variations. Additionally, investing in staff training ensures that employees possess the necessary knowledge and skills to adhere to correct procedures throughout the production process [23, 76].

Lastly, accurate labeling of halal products is paramount for MSEs. Clear and precise information on packaging plays a pivotal role in enhancing transparency and facilitating informed consumer choices [69]. Accurate labeling assures consumers of the product’s halal status and promotes trust and loyalty toward the brand [66, 94]. Furthermore, transparent labeling demonstrates a commitment to ethical business practices, fostering a positive relationship between MSEs and consumers [44].

4.2.5 Solutions for issues monitoring and reporting

Insights gleaned from MSE owners have played a pivotal role in devising monitoring and reporting solutions. The ensuing table delineates these solutions, providing a comprehensive overview to bolster the efficacy of monitoring and reporting mechanisms within MSEs.

Table 10 offers an in-depth look at solutions to tackle

monitoring and reporting issues. The solution most frequently favored by Micro and Small Enterprises (MSE) owners is to “Implement real-time tracking and monitoring systems throughout the supply chain to enhance product visibility and traceability,” with a frequency of 16 occurrences, representing 94.12% of responses. Conversely, the solution least preferred by MSE owners is “Develop mechanisms for addressing non-compliance or discrepancies in reporting, such as implementing corrective action plans and conducting regular audits,” selected 12 times, constituting 70.59% of responses.

Table 10. Solutions for issues monitoring and reporting

Solutions	F	%
Implement real-time tracking and monitoring systems throughout the supply chain to enhance product visibility and traceability	16	94.12
Establish consistent reporting standards among all entities involved in the supply chain to ensure uniformity and clarity in data reporting	14	82.35
Utilize technology such as barcodes or digital signatures to enhance the verification of reported data, thus improving accuracy and authenticity	15	88.24
Enhance transparency in reporting practices by promoting open communication and data sharing among stakeholders to reduce information asymmetry	15	88.24
Invest in data integration tools and systems to streamline collecting and analyzing data from various sources for comprehensive monitoring	13	76.47
Develop mechanisms for addressing non-compliance or discrepancies in reporting, such as implementing corrective action plans and conducting regular audits	12	70.59
Establish standardization in reporting formats and protocols across the supply chain to facilitate comparability and analysis of data	13	76.47

Table 10 presents the solutions that MSEs owners prioritized to tackle issues concerning monitoring and reporting within their businesses. The most favored solution, chosen by 94.12% of respondents, involves implementing real-time tracking and monitoring systems throughout the supply chain to enhance product visibility and traceability. Additionally, 88.24% of respondents opted to utilize technology such as barcodes or digital signatures to improve the verification of reported data, thereby enhancing accuracy and authenticity. Similarly, an equal % of respondents, also at 88.24%, highlighted the importance of improving transparency in reporting practices.

Integrating real-time tracking and monitoring systems throughout the halal supply chain can provide Micro and Small Enterprises (MSEs) with invaluable insights into their operations [78]. These systems offer business owners real-time visibility into the movement of raw materials, production processes, and distribution channels. Its heightened visibility facilitates proactive decision-making, ensuring the production of high-quality and safe halal food [80, 95]. Additionally, by monitoring each stage of the halal supply chain, MSEs can promptly identify and address potential issues or deviations from quality standards [41].

Adopting barcodes or digital signatures furnishes MSEs with reliable data verification, enhancing accuracy and authenticity across their operations. For example, barcodes facilitate seamless product tracking from production to delivery, streamlining inventory management and reducing

the likelihood of errors or discrepancies [96]. Similarly, digital signatures provide a secure method for validating transactions and documents, ensuring their integrity and authenticity [69, 97].

Fostering open communication and data exchange among stakeholders is essential for promoting transparency in reporting practices within the halal food industry [2, 52]. MSEs can play a pivotal role in facilitating this exchange by actively engaging with suppliers, distributors, regulatory bodies, and consumers. By advocating transparency and information sharing, MSEs can cultivate trust and credibility within the industry while also addressing concerns related to information asymmetry [98]. Moreover, open communication encourages collaboration and innovation, enabling MSEs to adapt to evolving market demands and regulatory requirements. By prioritizing a culture of transparency and cooperation, MSEs can position themselves as trusted partners in the halal food ecosystem [93].

5. CONCLUSION

Our research findings yield crucial solutions for stakeholders in the halal food industry. First and foremost, establishing reliable partnerships with suppliers or manufacturers is paramount. It ensures a consistent and high-quality supply of halal raw materials, thus upholding food safety and security standards. Furthermore, an efficient distribution network for these materials is essential to minimize product safety and quality risks, reinforcing food safety protocols.

In addition, implementing cost-saving strategies is vital for enhancing profitability and ensuring the affordability and accessibility of halal products. It, in turn, strengthens food resilience and safety throughout the halal supply chain. Upgrading infrastructure and acquiring suitable equipment is pivotal in improving production efficiency while maintaining the integrity of halal practices and addressing food security and safety concerns.

Moreover, enforcing strict quality control measures and standardized processes is imperative. It guarantees consistent product quality, meeting consumer expectations and regulatory standards in the constantly evolving landscape of the halal supply chain. Regular inspections and training programs enforce compliance with halal, safety, and food hygiene standards. These efforts maintain the credibility of halal products and foster consumer trust, contributing significantly to overall food safety.

Expanding dedicated warehousing facilities for halal products and installing appropriate temperature control systems are crucial. Implementing segregation measures, forging partnerships with halal-certified suppliers, and developing standard recipes are equally important. Ensuring transparent halal product labeling, integrating real-time tracking systems, utilizing digital verification methods, and advocating for transparency in reporting practices further reinforce the integrity of the halal supply chain.

6. RECOMMENDATION

The utilization of PAR methodology in this study significantly advances the theoretical framework of halal supply chain management. By employing this approach, the

research offers a comprehensive exploration of the challenges that MSEs face in processed food production. A thorough investigation of halal supply chains at the MSE level provides valuable insights into the hurdles encountered and potential solutions. Furthermore, by systematically identifying and proposing remedies to these challenges, the research enhances existing theoretical frameworks in supply chain management, particularly concerning food safety and security. It underscores the importance of addressing the unique challenges MSEs face in maintaining the authenticity and integrity of halal products throughout the supply chain.

Regarding implications for governmental bodies, the findings hold significance for policymakers seeking to fortify food safety and security within halal supply chains. By understanding the challenges confronting MSEs, policymakers can formulate targeted interventions and regulatory measures to assist these enterprises in enhancing their supply chain practices. Potential governmental initiatives may involve providing financial support for infrastructure upgrades, implementing training programs on halal certification and quality control, and enforcing stringent regulations to ensure adherence to halal standards across the supply chain. Such measures reinforce food safety and security protocols, benefiting consumers and fostering greater confidence in halal products.

The research findings unveil several practical implications for MSE owners involved in halal food production. One significant area lies in initiatives for awareness and education. MSE owners should initiate awareness campaigns and educational programs to augment their employees' comprehension of halal supply chain standards and regulations. Collaborating with local authorities and industry experts can furnish invaluable insights and resources to assist MSEs in implementing effective halal supply chain management practices, thereby ensuring the production of quality and safe halal products.

Another crucial aspect is supplier relationship management. MSEs must cultivate robust relationships with halal-certified suppliers to secure a consistent and dependable source of raw materials. Negotiating long-term contracts and conducting regular supplier audits can help uphold the integrity of the halal supply chain, mitigating risks of contamination or non-compliance and ultimately ensuring the production of quality and safe halal products.

Additionally, technology adoption and innovation play a pivotal role. Embracing technology like blockchain can facilitate transparent tracking and verification of halal compliance throughout the supply chain. MSEs should explore innovative solutions tailored to their specific needs and capacities, leveraging digital tools to streamline processes and enhance halal supply chain management efficiency, ultimately producing quality and safe halal products.

Moreover, compliance with regulations and certification is imperative. To ensure compliance and market credibility, MSEs must stay abreast of evolving standards and regulatory requirements, consistently producing quality and safe halal products. Seeking halal certification from reputable authorities demonstrates a commitment to halal integrity and enhances market competitiveness for MSEs, ensuring sustained success in the halal food industry.

The study's limitations may include its specific focus on MSEs producing processed food in West Sumatra, potentially restricting the generalizability of the findings to other regions or business types within the halal supply chain. Additionally,

the research relied on self-reported data from MSE owners, introducing possible biases or inaccuracies. Although valuable for its collaborative approach, the PAR method may have limitations concerning scalability and replicability across diverse contexts.

Hence, future researchers are encouraged to investigate the transferability of identified solutions to MSEs in different regions or countries and across various sectors of the halal supply chain, such as raw material producers or distributors. They should conduct comparative studies to assess the impact of different regulatory frameworks and policy interventions on MSEs' supply chain practices and the integrity of halal products. Furthermore, engaging in qualitative research can provide deeper insights into the socio-economic factors affecting MSEs' engagement in the halal supply chain and their capacity to implement suggested solutions.

REFERENCES

- [1] Mamun, M.A.A., Strong, C.A., Azad, M.A.K. (2021). Islamic marketing: A literature review and research agenda. *International Journal of Consumer Studies*, 45(5): 964-984. <https://doi.org/10.1111/ijcs.12625>
- [2] Najmi, A., Ahmed, W., Jahangir, S. (2023). Firm's readiness for halal food standard adoption: Assessing the importance of traceability system. *Journal of Islamic Accounting and Business Research*, 14(8): 1451-1473. <https://doi.org/10.1108/JIABR-09-2020-0293>
- [3] Mabkhot, H. (2023). Factors affecting the sustainability of halal product performance: Malaysian evidence. *Sustainability*, 15(3): 1850. <https://doi.org/10.3390/su15031850>
- [4] Susanty, A., Puspitasari, N.B., Rosyada, Z.F., Pratama, M.A., Kurniawan, E. (2024). Design of blockchain-based halal traceability system applications for halal chicken meat-based food supply chain. *International Journal of Information Technology*, 16(3): 1449-1473. <https://doi.org/10.1007/s41870-023-01650-8>
- [5] Kristanto, D., Kurniawati, D.A. (2023). Development of halal supply chain risk management framework for frozen food industries. *Journal of Islamic Marketing*, 14(12): 3033-3052. <https://doi.org/10.1108/JIMA-04-2022-0112>
- [6] Rejeb, A., Rejeb, K., Zailani, S. (2021). Are halal food supply chains sustainable: A review and bibliometric analysis. *Journal of Foodservice Business Research*, 24(5): 554-595. <https://doi.org/10.1080/15378020.2021.1883214>
- [7] Ling, E.K., Wahab, S.N. (2020). Integrity of food supply chain: Going beyond food safety and food quality. *International Journal of Productivity and Quality Management*, 29(2): 216. <https://doi.org/10.1504/IJPM.2020.105963>
- [8] Faridah, A., Holinesti, R., Syarief, W., Zahari, M.S.M. (2022). Characteristics and identification of critical points of halal food at restaurants in Padang. *Indonesian Journal of Halal Research*, 4(1): 9-18. <https://doi.org/10.15575/ijhar.v4i1.11203>
- [9] Wardi, Y., Trinanda, O., Abror, A. (2022). Modelling halal restaurant's brand image and customer's revisit intention. *Journal of Islamic Marketing*, 13(11): 2254-2267. <https://doi.org/10.1108/JIMA-01-2021-0034>
- [10] Farhan, F., Sutikno, B. (2022). The acceptance of halal food products among non-Muslim consumers in Indonesia. *Journal of International Food & Agribusiness Marketing*, 36(2): 125-146. <https://doi.org/10.1080/08974438.2022.2067281>
- [11] Indonesian Central Statistics Agency. (2022). West Sumatra Province Micro and Small Industry Profile 2020. Indonesian Central Statistics Agency. Jakarta, Indonesia.
- [12] Lim, Y.H., Lada, S., Ullah, R., Abdul Adis, A.A. (2022). non-Muslim consumers' intention to purchase halal food products in Malaysia. *Journal of Islamic marketing*, 13(3): 586-607. <https://doi.org/10.1108/JIMA-06-2020-0172>
- [13] Haleem, A., Khan, M.I., Khan, S. (2021). Understanding the adoption of halal logistics through critical success factors and stakeholder objectives. *Logistics*, 5(2): 38. <https://doi.org/10.3390/logistics5020038>
- [14] Al-Teinaz, Y.R., Al-Mazeedi, H.M.M. (2020). Halal certification and international halal standards. In: Al-Teinaz, Y.R., Spear, S., Abd El-Rahim, I.H.A., editors. *The Halal Food Handbook*, 1st ed. John Wiley & Sons, pp. 227-251. <https://doi.org/10.1002/9781118823026.ch15>
- [15] Shahabuddin, A.S.M., Sukor, M.E.A., Hashim, N.H. (2020). Product-centric halal business: A critique from an Islamic perspective. *Journal of Islamic Marketing*, 11(6): 1707-1724. <https://doi.org/10.1108/JIMA-06-2019-0129>
- [16] Vu, N., Ghadge, A., Bournakis, M. (2023). Blockchain adoption in food supply chains: A review and implementation framework. *Production Planning & Control*, 34(6): 506-523. <https://doi.org/10.1080/09537287.2021.1939902>
- [17] Shani, A.B., Coghlan, D. (2021). Action research in business and management: A reflective review. *Action Research*, 19(3): 518-541. <https://doi.org/10.1177/1476750319852147>
- [18] Bettencourt, G.M. (2020). Embracing problems, processes, and contact zones: Using youth participatory action research to challenge adultism. *Action Research*, 18(2): 153-170. <https://doi.org/10.1177/1476750318789475>
- [19] De Andrade, M.L., Stedefeldt, E., Zanin, L.M., Da Cunha, D.T. (2020). Food safety culture in food services with different degrees of risk for foodborne diseases in Brazil. *Food Control*, 112: 107152. <https://doi.org/10.1016/j.foodcont.2020.107152>
- [20] Imathiu, S. (2020). Benefits and food safety concerns associated with consumption of edible insects. *NFS Journal*, 18: 1-11. <https://doi.org/10.1016/j.nfs.2019.11.002>
- [21] Gallo, M., Ferrara, L., Calogero, A., Montesano, D., Naviglio, D. (2020). Relationships between food and diseases: What to know to ensure food safety. *Food Research International*, 137: 109414. <https://doi.org/10.1016/j.foodres.2020.109414>
- [22] Saeed, B.Q., Osaili, T.M., Taha, S. (2021). Foodborne diseases risk factors associated with food safety knowledge and practices of women in Sharjah-United Arab Emirate. *Food Control*, 125: 108024. <https://doi.org/10.1016/j.foodcont.2021.108024>
- [23] Okpala, C.O.R., Korzeniowska, M. (2023). Understanding the relevance of quality management in Agro-food product industry: From ethical considerations to assuring food hygiene quality safety standards and its

- associated processes. *Food Reviews International*, 39(4): 1879-1952.
<https://doi.org/10.1080/87559129.2021.1938600>
- [24] Clapp, J., Moseley, W.G., Burlingame, B., Termine, P. (2022). Viewpoint: The case for a six-dimensional food security framework. *Food Policy*, 106: 102164. <https://doi.org/10.1016/j.foodpol.2021.102164>
- [25] Pawlak, K., Kołodziejczak, M. (2020). The Role of agriculture in ensuring food security in developing countries: Considerations in the context of the problem of sustainable food production. *Sustainability*, 12(13): 5488. <https://doi.org/10.3390/su12135488>
- [26] Ulian, T., Diazgranados, M., Pironon, S., Padulosi, S., Liu, U., Davies, L., et al. (2020). Unlocking plant resources to support food security and promote sustainable agriculture. *Plants, People, Planet*, 2(5): 421-445. <https://doi.org/10.1002/ppp3.10145>
- [27] Handayani, D.I., Masudin, I., Haris, A., Restuputri, D.P. (2022). Ensuring the halal integrity of the food supply chain through halal suppliers: A bibliometric review. *Journal of Islamic Marketing*, 13(7): 1457-1478. <https://doi.org/10.1108/JIMA-10-2020-0329>
- [28] Hossain, M.A.M., Uddin, S.M.K., Sultana, S., Wahab, Y. A., Sagadevan, S., Johan, M.R., Ali, M.E. (2020). Authentication of halal and kosher meat and meat products: Analytical approaches, current progresses and future prospects. *Critical Reviews in Food Science and Nutrition*, 62(2): 285-310. <https://doi.org/10.1080/10408398.2020.1814691>
- [29] Hew, J.J., Wong, L.W., Tan, G.W.H., Ooi, K.B., Lin, B. (2020). The blockchain-based halal traceability systems: A hype or reality? *Supply Chain Management: An International Journal*, 25(6): 863-879. <https://doi.org/10.1108/SCM-01-2020-0044>
- [30] Ab Rashid, N., Bojei, J. (2019). The relationship between halal traceability system adoption and environmental factors on halal food supply chain integrity in Malaysia. *Journal of Islamic Marketing*, 11(1): 117-142. <https://doi.org/10.1108/JIMA-01-2018-0016>
- [31] Fernando, Y., Wahyuni-TD, I.S., Zainul Abideen, A., Mergeresa, F. (2023). Traceability technology, halal logistics brand and logistics performance: Religious beliefs and beyond. *Journal of Islamic Marketing*, 14(4): 1007-1031. <https://doi.org/10.1108/JIMA-06-2020-0183>
- [32] Rejeb, A., Rejeb, K., Zailani, S., Treiblmaier, H., Hand, K.J. (2021). Integrating the Internet of Things in the halal food supply chain: A systematic literature review and research agenda. *Internet of Things*, 13: 100361. <https://doi.org/10.1016/j.iot.2021.100361>
- [33] Usmanova, K., Wang, D., Sumarlia, E., Fauziyah, F. (2022). The link between company performance and supply chain orientation from the perspective of halal SMEs. *British Food Journal*, 124(12): 4250-4265. <https://doi.org/10.1108/BFJ-05-2021-0467>
- [34] Haleem, A., Khan, M.I., Khan, S. (2021). Conceptualising a framework linking halal supply chain management with sustainability: An India centric study. *Journal of Islamic Marketing*, 12(8): 1535-1552. <https://doi.org/10.1108/JIMA-07-2019-0149>
- [35] Indarti, N., Lukito-Budi, A.S., Islam, A.M. (2020). A systematic review of halal supply chain research: To where shall we go? *Journal of Islamic Marketing*, 12(9): 1930-1949. <https://doi.org/10.1108/JIMA-05-2020-0161>
- [36] Hendayani, R., Fernando, Y. (2023). Adoption of blockchain technology to improve halal supply chain performance and competitiveness. *Journal of Islamic Marketing*, 14(9): 2343-2360. <https://doi.org/10.1108/JIMA-02-2022-0050>
- [37] Fernando, Y., Ahmad Jasmi, M.F., Wahyuni-TD, I.S., Mergeresa, F., Khamis, K.A., Fakhrorazi, A., Omar, R. (2023). Supply chain integration and halal frozen meat product returns. *Journal of Islamic Marketing*, 14(5): 1369-1395. <https://doi.org/10.1108/JIMA-05-2021-0144>
- [38] Abd Rahman, A., Abd Mubin, N., Yusof, R.N.R., Kamarulzaman, N.H. (2023). Building supply chain performance through halal logistics, organisational capabilities and knowledge management. *International Journal of Logistics Research and Applications*, 26(4): 498-520. <https://doi.org/10.1080/13675567.2021.1969347>
- [39] Marjudi, S., Setik, R., Ahmad, R.M.T.R.L., Hassan, W. A.W., Kassim, A.A.M. (2023). Utilization of business analytics by SMEs in halal supply chain management transactions. *JOIV: International Journal on Informatics Visualization*, 7(2): 407-415. <https://doi.org/10.30630/joiv.7.2.1308>
- [40] Umar, U.H., Al-Faryan, M.A.S. (2024). The impact of working capital management on the profitability of listed halal food and beverage companies. *Managerial Finance*, 50(3): 534-557. <https://doi.org/10.1108/MF-12-2022-0606>
- [41] Hanifasari, D., Masudin, I., Zulfikariyah, F., Rumijati, A., Restuputri, D.P. (2024). Millennial generation awareness of halal supply chain knowledge toward purchase intention for halal meat products: empirical evidence in Indonesia. *Journal of Islamic Marketing*. <https://doi.org/10.1108/JIMA-01-2023-0012>
- [42] Khan, M.I., Haleem, A., Khan, S. (2022). Examining the link between halal supply chain management and sustainability. *International Journal of Productivity and Performance Management*, 71(7): 2793-2819. <https://doi.org/10.1108/IJPPM-07-2019-0354>
- [43] Harsanto, B., Farras, J.I., Firmansyah, E.A., Pradana, M., Apriladi, A. (2024). Digital technology 4.0 on halal supply chain: A systematic review. *Logistics*, 8(1): 21. <https://doi.org/10.3390/logistics8010021>
- [44] Islam, M.M., Ab Talib, M.S., Muhamad, N. (2024). Developing theoretical lenses for upstream halal businesses. *Journal of Islamic Marketing*, 15(1): 192-220. <https://doi.org/10.1108/JIMA-05-2022-0156>
- [45] Jaafar, H.S., Abd Aziz, M.L., Ahmad, M.R., Faisol, N. (2021). Creating innovation in achieving sustainability: Halal-friendly sustainable port. *Sustainability*, 13(23): 13339. <https://doi.org/10.3390/su132313339>
- [46] Vanany, I., Soon-Sinclair, J.M., Rahkmawati, N.A. (2024). Assessment of halal blockchain in the Indonesian food industry. *Journal of Islamic Marketing*, 15(6): 1498-1518. <https://doi.org/10.1108/JIMA-05-2022-0122>
- [47] Ramli, M.A., Abd Razak, M.A., Jaafar, M.H. (2023). Understanding non-Muslims' reluctance to halal food: A systematic review. *Journal of Islamic Marketing*, 14(2): 544-561. <https://doi.org/10.1108/JIMA-05-2021-0134>
- [48] Rejeb, A., Rejeb, K., Zailani, S., Kayikci, Y. (2023). Knowledge diffusion of halal food research: A main path analysis. *Journal of Islamic Marketing*, 14(7): 1715-1743. <https://doi.org/10.1108/JIMA-07-2021-0229>
- [49] Karyani, E., Geraldina, I., Haque, M.G., Zahir, A. (2024). Intention to adopt a blockchain-based halal certification:

- Indonesia consumers and regulatory perspective. *Journal of Islamic Marketing*, 15(7): 1766-1782. <https://doi.org/10.1108/JIMA-03-2023-0069>
- [50] Ng, P.C., Ahmad Ruslan, N.A.S., Chin, L.X., Ahmad, M., Abu Hanifah, S., Abdullah, Z., Khor, S.M. (2022). Recent advances in halal food authentication: Challenges and strategies. *Journal of Food Science*, 87(1): 8-35. <https://doi.org/10.1111/1750-3841.15998>
- [51] Popping, B., Buck, N., Bánáti, D., Brereton, P., Gendel, S., Hristozova, N., Chaves S.M., Saner S., Spink J., Willis C., Wunderlin D. (2022). Food inauthenticity: Authority activities, guidance for food operators, and mitigation tools. *Comprehensive Reviews in Food Science and Food Safety*, 21(6): 4776-4811. <https://doi.org/10.1111/1541-4337.13053>
- [52] Bux, C., Varese, E., Amicarelli, V., Lombardi, M. (2022). Halal food sustainability between certification and blockchain: A review. *Sustainability*, 14(4): 2152. <https://doi.org/10.3390/su14042152>
- [53] Suryawan, A.S., Hisano, S., Jongerden, J. (2022). Negotiating halal: The role of non-religious concerns in shaping halal standards in Indonesia. *Journal of Rural Studies*, 92: 482-491. <https://doi.org/10.1016/j.jrurstud.2019.09.013>
- [54] Mohamed, Y.H., Abdul Rahim, A.R., Ma'aram, A. (2020). The effect of halal supply chain management on halal integrity assurance for the food industry in Malaysia. *Journal of Islamic Marketing*, 12(9): 1734-1750. <https://doi.org/10.1108/JIMA-12-2018-0240>
- [55] Loyer, J., Whittaker, A.L., Buddle, E.A., Ankeny, R.A. (2020). A review of legal regulation of religious slaughter in Australia: Failure to regulate or a regulatory fail? *Animals*, 10(9): 1530. <https://doi.org/10.3390/ani10091530>
- [56] Latino, M.E., Corallo, A., Menegoli, M., Nuzzo, B. (2022). An integrative conceptual framework of food certifications: Systematic review, research agenda, and macromarketing implications. *Journal of Macromarketing*, 42(1): 71-99. <https://doi.org/10.1177/02761467211049071>
- [57] Ali, M.H., Iranmanesh, M., Tan, K.H., Zailani, S., Omar, N.A. (2022). Impact of supply chain integration on halal food supply chain integrity and food quality performance. *Journal of Islamic Marketing*, 13(7): 1515-1534. <https://doi.org/10.1108/JIMA-08-2020-0250>
- [58] Masudin, I., Rahmatullah, B.B., Agung, M.A., Dewanti, I.A., Restuputri, D.P. (2022). Traceability system in halal procurement: A bibliometric review. *Logistics*, 6(4): 67. <https://doi.org/10.3390/logistics6040067>
- [59] Nazaruddin, L.O., Miah, M.T., Susanty, A., Fekete-Farkas, M., Naárné Tóth, Z., Balázs, G. (2024). Apple fruit preference and food mile problems under halal supply chain. *Journal of Islamic Marketing*, 15(5): 1364-1395. <https://doi.org/10.1108/JIMA-03-2023-0088>
- [60] Kurniawati, D.A., Vanany, I., Kumarananda, D.D., Rochman, M.A. (2024). Toward halal supply chain 4.0: MILP model for halal food distribution. *Procedia Computer Science*, 232: 1446-1458. <https://doi.org/10.1016/j.procs.2024.01.143>
- [61] Ab Talib, M.S., Zulfakar, M.H. (2023). Sustainable halal food supply chain management in a small rentier halal market. *Arab Gulf Journal of Scientific Research*. <https://doi.org/10.1108/AGJSR-11-2022-0251>
- [62] Khan, M.I., Khan, S., Haleem, A. (2022). Analysing barriers towards management of halal supply chain: A BWM approach. *Journal of Islamic Marketing*, 13(1): 66-80. <https://doi.org/10.1108/JIMA-09-2018-0178>
- [63] Zuber-Skerritt, O. (2018). An educational framework for participatory action learning and action research (PALAR). *Educational Action Research*, 26(4): 513-532. <https://doi.org/10.1080/09650792.2018.1464939>
- [64] Guy, B., Feldman, T., Cain, C., Leesman, L., Hood, C. (2020). Defining and navigating 'action' in a Participatory Action Research project. *Educational Action Research*, 28(1): 142-153. <https://doi.org/10.1080/09650792.2019.1675524>
- [65] De Boni, A., Forleo, M.B. (2019). Italian halal food market development: Drivers and obstacles from experts' opinions. *Journal of Islamic Marketing*, 10(4): 1245-1271. <https://doi.org/10.1108/JIMA-05-2018-0087>
- [66] A Adekunle, B., Filson, G. (2020). Understanding halal food market: Resolving asymmetric information. *Food Ethics*, 5(1): 13. <https://doi.org/10.1007/s41055-020-00072-7>
- [67] Ali, M.H., Chung, L., Kumar, A., Zailani, S., Tan, K.H. (2021). A sustainable Blockchain framework for the halal food supply chain: Lessons from Malaysia. *Technological Forecasting and Social Change*, 170: 120870. <https://doi.org/10.1016/j.techfore.2021.120870>
- [68] Md Nawwi, N.H., Megat Ahmad, P.H., Ibrahim, H., Mohd Suki, N. (2023). Firms' commitment to halal standard practices in the food sector: Impact of knowledge and attitude. *Journal of Islamic Marketing*, 14(5): 1260-1275. <https://doi.org/10.1108/JIMA-10-2021-0333>
- [69] Purusottama, A., Sunitiyoso, Y., Simatupang, T.M. (2023). Exploring the potential of blockchain adoption for promoting value innovation: A case of the halal industry. *Business Process Management Journal*, 29(7): 2034-2058. <https://doi.org/10.1108/BPMJ-04-2023-0267>
- [70] Ngah, A.H., Ramayah, T., Ali, M.H., Khan, M.I. (2019). Halal transportation adoption among pharmaceuticals and cosmetics manufacturers. *Journal of Islamic Marketing*, 11(6): 1619-1639. <https://doi.org/10.1108/JIMA-10-2018-0193>
- [71] Ziegler, Y., Uli, V., Tatari, M. (2022). Implementing halal logistics in a non-Muslim-dominant environment: A proposal for reengineering the business processes in two stages. *Business Process Management Journal*, 28(8): 48-65. <https://doi.org/10.1108/BPMJ-12-2020-0593>
- [72] Selim, N.I.I.B., Zailani, S., Aziz, A.A., Rahman, M.K. (2022). Halal logistic services, trust and satisfaction amongst Malaysian 3PL service providers. *Journal of Islamic Marketing*, 13(1): 81-99. <https://doi.org/10.1108/JIMA-05-2018-0088>
- [73] Kurniawati, D.A., Handoko, A., Piplani, R., Rosdiahti, R. (2023). Optimized distribution of halal products using tabu search. *Journal of Islamic Marketing*, 14(4): 1058-1083. <https://doi.org/10.1108/JIMA-05-2020-0143>
- [74] Wilkins, S., Butt, M.M., Shams, F., Pérez, A. (2019). The acceptance of halal food in non-Muslim countries: Effects of religious identity, national identification, consumer ethnocentrism and consumer cosmopolitanism. *Journal of Islamic Marketing*, 10(4): 1308-1331. <https://doi.org/10.1108/JIMA-11-2017-0132>
- [75] Muneeza, A., Mustapha, Z. (2021). Halal certification process for fisheries products in Maldives. *Journal of Islamic Marketing*, 12(2): 451-466.

- <https://doi.org/10.1108/JIMA-02-2019-0035>
- [76] Lestari, F., Kurniawan, R., Arifin, J., Yasir, M., Muhammad Saleh, M., Akbarizan (2023). An integrated framework for the measurement of halal good manufacturing practices on the case of SMEs in the food sector. *Journal of Islamic Marketing*, 14(1): 82-105. <https://doi.org/10.1108/JIMA-04-2021-0105>
- [77] Rejeb, A., Rejeb, K., Simske, S., Keogh, J.G. (2023). Exploring Blockchain research in supply chain management: A latent Dirichlet allocation-driven systematic review. *Information*, 14(10): 557. <https://doi.org/10.3390/info14100557>
- [78] Masood, A., Zaidi, A. (2023). Empowerment of SME's sustainability in halal cosmetics' ecosystem by diagnosing growth constraints. *Journal of Islamic Marketing*, 14(2): 622-644. <https://doi.org/10.1108/JIMA-12-2020-0371>
- [79] Wong, L.W., Tan, G.W.H., Ooi, K.B., Chan, H.K. (2024). Blockchains for SMEs: A Fit-Viability perspective moderated by organizational innovation diffusion for supply chain performance. *Transportation Research Part E: Logistics and Transportation Review*, 182: 103396. <https://doi.org/10.1016/j.tre.2023.103396>
- [80] Tan, A., Gligor, D., Ngah, A. (2022). Applying Blockchain for halal food traceability. *International Journal of Logistics Research and Applications*, 25(6): 947-964. <https://doi.org/10.1080/13675567.2020.1825653>
- [81] Manning, L., Kowalska, A. (2021). Considering fraud vulnerability associated with credence-based products such as organic food. *Foods*, 10(8): 1879. <https://doi.org/10.3390/foods10081879>
- [82] Haleem, A., Khan, M.I., Khan, S. (2019). Halal certification, the inadequacy of its adoption, modelling and strategising the efforts. *Journal of Islamic Marketing*, 11(2): 384-404. <https://doi.org/10.1108/JIMA-05-2017-0062>
- [83] Wahyuni, H.C., Vanany, I., Ciptomulyono, U., Purnomo, J.D.T. (2020). Integrated risk to food safety and halal using a Bayesian Network model. *Supply Chain Forum: An International Journal*, 21(4): 260-273. <https://doi.org/10.1080/16258312.2020.1763142>
- [84] Yele, S., Litoriya, R. (2024). Blockchain-based secure dining: Enhancing safety, transparency, and traceability in food consumption environment. *Blockchain: Research and Applications*, 100187. <https://doi.org/10.1016/j.bcra.2023.100187>
- [85] Ali, M.H., Suleiman, N. (2018). Eleven shades of food integrity: A halal supply chain perspective. *Trends in Food Science & Technology*, 71: 216-224. <https://doi.org/10.1016/j.tifs.2017.11.016>
- [86] Balasubramanian, B., Liu, W., Pushparaj, K., Park, S. (2021). The epic of in vitro meat production—A fiction into reality. *Foods*, 10(6): 1395. <https://doi.org/10.3390/foods10061395>
- [87] Azmi, F.R., Abdullah, A., Musa, H., Wan Mahmood, W.H. (2020). Perception of food manufacturers towards adoption of halal food supply chain in Malaysia: Exploratory factor analysis. *Journal of Islamic Marketing*, 11(3): 571-589. <https://doi.org/10.1108/JIMA-12-2018-0236>
- [88] Zailani, S., Iranmanesh, M., Jafarzadeh, S., Foroughi, B. (2019). The influence of halal orientation strategy on financial performance of halal food firms: Halal culture as a moderator. *Journal of Islamic Marketing*, 11(1): 31-49. <https://doi.org/10.1108/JIMA-01-2018-0023>
- [89] Abdul Rahman, N.A., Mohammad, M.F., Abdul Rahim, S., Mohd Noh, H. (2018). Implementing air cargo halal warehouse: Insight from Malaysia. *Journal of Islamic Marketing*, 9(3): 462-483. <https://doi.org/10.1108/JIMA-09-2016-0071>
- [90] Alzeer, J., Rieder, U., Hadeed, K.A. (2018). Rational and practical aspects of halal and tayyib in the context of food safety. *Trends in Food Science & Technology*, 71: 264-267. <https://doi.org/10.1016/j.tifs.2017.10.020>
- [91] Karia, N. (2022). Halal logistics: Practices, integration and performance of logistics service providers. *Journal of Islamic Marketing*, 13(1): 100-118. <https://doi.org/10.1108/JIMA-08-2018-0132>
- [92] Susanty, A., Puspitasari, N.B., Silviannisa, S., Jati, S. (2023). Measuring halal logistics implementation. *Journal of Islamic Marketing*, 14(7): 1669-1695. <https://doi.org/10.1108/JIMA-08-2021-0266>
- [93] Sumarliah, E., Li, T., Wang, B., Khan, S.U., Khan, S.Z. (2023). Blockchain technology adoption in halal traceability scheme of the food supply chain: Evidence from Indonesian firms. *International Journal of Emerging Markets*. <https://doi.org/10.1108/IJOEM-05-2021-0678>
- [94] Sayogo, D.S. (2018). Online traceability for halal product information: Perceptions of Muslim consumers in Indonesia. *Journal of Islamic Marketing*, 9(1): 99-116. <https://doi.org/10.1108/JIMA-07-2016-0057>
- [95] Khan, S., Haleem, A., Khan, M.I., Abidi, M.H., Al-Ahmari, A. (2018). Implementing traceability systems in specific supply chain management (SCM) through critical success factors (CSFs). *Sustainability*, 10(1): 204. <https://doi.org/10.3390/su10010204>
- [96] Tsai, Y.S., Hung, W.H. (2023). A low-cost intelligent tracking system for clothing manufacturers. *Journal of Intelligent Manufacturing*, 34(2): 473-491. <https://doi.org/10.1007/s10845-021-01788-x>
- [97] Alamsyah, A., Hakim, N., Hendayani, R. (2022). Blockchain-based traceability system to support the Indonesian halal supply chain ecosystem. *Economies*, 10(6): 134. <https://doi.org/10.3390/economies10060134>
- [98] Neifar, S., Jarbou, A. (2018). Corporate governance and operational risk voluntary disclosure: Evidence from Islamic banks. *Research in International Business and Finance*, 46: 43-54. <https://doi.org/10.1016/j.ribaf.2017.09.006>