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FROM RESILIENCE TO SUSTAINABILITY: ADVANCING THE HALAL SUPPLY CHAIN RESEARCH AGENDA

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Abstract:

The rising global demand for halal products calls for robust and sustainable supply chains. Unfortunately, studies in this area have been largely fragmented, especially with regards to resilience, sustainability, and incorporation of technology into halal supply chains. The research method employed includes systematic literature review as well as bibliometric analysis. Systematic literature review has been conducted with the help of Scopus AI. First, the targeted search was carried out; later, the concept mapping, topic identification through experts, and thematically clustering of articles were done. Three thematic layers are found to characterize the trajectory of research on halal supply chain management; these include (i) basic themes such as consumer trust and certification; (ii) emerging themes including sustainability incorporation and ESG initiatives; and (iii) transformational themes such as blockchain technology, artificial intelligence, and geospatial technologies. The study makes several contributions in terms of theory development by broadening the scope of supply chain resilience and sustainability to include dimensions of certification integrity, religious compliance, and consumer trust. From the practitioner's point of view, the study provides insights for policymakers and industry practitioners to enhance traceability, operational efficiency, and global competitiveness. The study also identifies current limitations and proposes future research directions, particularly in digital innovation and artificial intelligence to enhance halal supply chain performance.

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Blockchain Technology; Consumer Trust; Halal Supply Chain Management; Resilience; Sustainability



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Introduction

Over the last few decades, supply chains have faced more disruptions due to global crises, climate change, limited resources, and changing consumer expectations. These issues have increased the need for supply chains that are both resilient and sustainable. The need for resilient and sustainable supply chains in response to these challenges has consequently risen. Resilience refers to adaptability during crises, whereas sustainability is concerned with responsibility in the utilization of resources and the future prospects of the supply chain (Negri et al., 2021). Halal supply chains present a challenge because of their high level of adherence to religious norms.

Both resilience and sustainability are integral components of contemporary supply chain management. However, relations between the two concepts can be rather complicated. For example, researchers mention several perspectives adopted by managers towards sustainability and resilience – these include views on the contradiction between the two approaches and cooperation. There is also an opinion regarding them being distinct aspects that require different management practices (Cotta et al., 2023). The latter fact emphasizes the absence of a universally acceptable approach to the problem. In general, sustainability aims at achieving efficiency, while resilience concerns effectiveness and adaptiveness, which can result in conflicts (Negri et al., 2021; Warmbier et al., 2022). On the other hand, some factors, such as transparency and digital traceability, can facilitate both sustainability and resilience simultaneously (Borbon-Galvez et al., 2025).

Several theories have been put forward in earlier research in attempts to combine both of these constructs. For instance, there are composite indicator frameworks which would allow the simultaneous evaluation of the two constructs, i.e., resilience and sustainability (Borbon-Galvez et al., 2025). Moreover, there is a theory which proposes the use of a fuzzy-digraph matrix model for the assessment of Halal supply chain resilience and sustainability (Haleem et al., 2024). There is evidence that activities which contribute towards enhancing resilience also positively affect sustainability results despite some issues such as financial constraints and complexity of products (Doetsch & Huchzermeier, 2024). In areas like agri-food supply chains, sustainability is critical for resilience and provides valuable insights for the Halal sector (Arimany-Serrat et al., 2024).

Though there has been increased academic attention to the topic, few studies have examined the relationship between resilience, sustainability, and modern technologies in the context of halal supply chain management. The majority of the current literature is concerned with conventional supply chains, while little consideration has been given to the particular challenges that arise in the context of halal management. This study addresses these gaps by examining the development of halal supply chain research and identifying future directions. It is a detailed analysis of the literature on resilience and sustainability within halal supply chains based on Scopus data. Specifically, the paper aims to (i) examine the scope and development of research in this area, (ii) create a concept map to illustrate key relationships, (iii) identify experts and key contributions, and (iv) highlight new themes for promising future research.

In the present study, several contributions have been made to the body of literature. Firstly, the review helps to draw out the picture of resilience and sustainability in relation to halal supply chains and highlight some diverse perspectives on the issue. Secondly, the review helps to identify barriers and enablers related to halal supply chains; therefore, contributing not only theoretically but also practically. Finally, it sets out the direction for future research, focusing on integration, collaboration, and sector-specific aspects. The rest of the paper is organized as follows. Section 2 details the methodology for collecting and analyzing literature. Section 3 shares findings, including bibliometric results, concept maps, and thematic clusters. Section 4 explores key insights, research gaps, and future directions. Finally, Section 5 wraps up with theoretical and managerial implications.

Methodology

This study adopts a **systematic literature review (SLR) combined with bibliometric analysis** to examine the evolution of research on resilience and sustainability in halal supply chains. **Scopus AI** was selected as the primary database due to its comprehensive coverage of peer-reviewed journals and conference proceedings. Data collection was conducted on **25 September 2025** to ensure the inclusion of the most recent publications. The methodological design aligns with the study's aim to (i) analyze the scope and evolution of research in this domain, (ii) develop a concept map to visualize key relationships, (iii) identify topic experts and influential contributions, and (iv) highlight emerging themes signaling promising future directions.

Using keywords related to halal supply chains, resilience, sustainability and digital technologies, a systematic search strategy was employed. After setting up inclusion and exclusion criteria to filter out irrelevant and redundant information, the resulting database was analyzed using bibliometric techniques, including concept mapping and thematic clustering. This approach enables the identification of key research trends, influential authors, and emerging themes.

By combining quantitative bibliometric analysis with qualitative interpretation, the study provides a comprehensive understanding of the intellectual structure and development of the field. To retrieve the relevant body of literature, a structured **search string** was formulated to ensure precision and comprehensiveness. The final search string used in Scopus AI was as follows:

("halal" OR "permissible" OR "lawful" OR "Islamic") AND ("supply chain" OR "logistics" OR "distribution" OR "procurement") AND ("resilience" OR "robustness" OR "durability" OR

"adaptability") AND ("sustainability" OR "sustainable" OR "eco-friendly" OR "green") AND ("food safety" OR "quality control" OR "traceability" OR "compliance") AND ("risk management" OR "crisis" OR "disruption" OR "continuity")

This search string was purposely designed to capture the multidimensional aspects of **Halal supply chains**, incorporating both operational (e.g., logistics, procurement, distribution) and strategic (e.g., risk management, sustainability, resilience) dimensions, as well as critical requirements of Halal assurance (e.g., food safety, traceability, compliance).

The **Scopus AI functions** were used systematically to structure and refine the analysis. After executing the search query, Scopus AI generated structured outputs across five key analytical sections (Refer Figure 1). First, the **Summary function** provided an aggregated overview of publication trends, highlighting annual growth in research output, core subject areas, and preferred publication outlets. Second, the **Expanded Summary function** offered rough details such as citation distributions, document typologies, and keyword co-occurrences, enabling an understanding of the thematic breadth of the field (Negri et al., 2021).

Third, the **Concept Map feature** was employed to visually represent key relationships among resilience, sustainability, and Halal supply chain dimensions. The map revealed interconnected clusters such as *traceability and compliance*, *risk management under disruption*, and *sustainable logistics practices*. This approach allowed for the identification of thematic overlaps and tensions, resonating with previous studies that emphasized complementarities and paradoxes between resilience and sustainability (Cotta et al., 2023; Warmbier et al., 2022).

Fourth, the **Topic Experts function** was utilized to identify leading scholars and influential publications shaping the discourse. This enabled the study to map intellectual contributions, highlight citation impact, and recognize pivotal research works that form the foundation of the field (Borbon-Galvez et al., 2025; Haleem et al., 2024). Finally, the **Emerging Themes function** provided forward-looking insights by clustering new research foci such as *digital traceability technologies in Halal logistics*, *integration of ESG (Environmental, Social, Governance) principles in Halal supply chains*, and *resilience-building through collaborative risk-sharing mechanisms*. These themes serve as critical signposts for advancing the research agenda (Doetsch & Huchzermeier, 2024).

The methodological integration of Scopus AI outputs ensures that the review is not limited to descriptive statistics as well as refers to the **conceptual and agenda-setting contributions**. By combining bibliometric mapping and thematic synthesis, this study provides a comprehensive overview of the current knowledge landscape and future research directions. This methodological rigour improves transparency, replicability, and credibility, in line with best practices for systematic literature reviews (Arimany-Serrat et al., 2024).

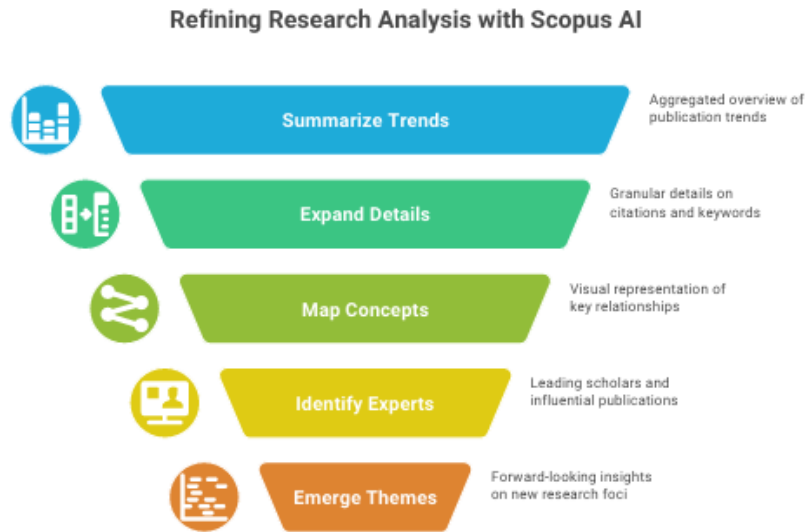


Figure 1: Five Core Elements of Scopus AI

Result and Discussion

The findings of this study are organized on four interconnected outputs derived from **Scopus AI analysis (25 September 2025)**, namely the (i) **Summary and Expanded Summary**, (ii) **Concept Map**, (iii) **Topic Experts**, and (iv) **Emerging Themes**. Collectively, these outputs provide a comprehensive understanding of the scope, intellectual structure, and future trajectory of research on resilience and sustainability within Halal supply chains.

Summary and Expanded Summary

Results and Discussion: Insights from Summary and Expanded Summary

The analysis of the Summary and Expanded Summary generated by Scopus AI (25 September 2025) provides important insights into the interrelationship between resilience and sustainability in halal supply chains. In addition to the conceptual discussions, this review provides a general overview of practical strategies, challenges, and new research directions that will influence the development of this research area.

Interrelationship Between Resilience and Sustainability

The nexus between resilience and sustainability in supply chains is intricate and multi-dimensional. While some managers see these two dimensions as conflicting, others view them as synergistic, and a third group perceives them as orthogonal and independent (Cotta et al., 2023). This divergence suggests that a universal way of integrating resilience and sustainability is not possible and requires a context-sensitive framework. There are also complementarities and tensions that often arise depending on the specific goals of actors in the supply chain. Sustainability practices are often concerned with efficiency through resource minimisation, whereas resilience requires effectiveness in responding to disruptions; two priorities that can

at times be conflicting (Negri et al., 2021). But scholars have argued that cross-cutting practices such as collaboration, transparency, and trust-building can enhance both (Borbon-Galvez et al., 2025).

Frameworks and Models

An important contribution from the Expanded Summary includes the formation of frameworks/models that seek to find a common ground amid the conflicting theories of resilience and sustainability. An example of such models would be Borbon-Galvez et al., (2025), who developed a composite indicator framework that permits the evaluation of both sustainability and resilience simultaneously, thus showing how these two terms can cross-fertilize one another. As far as the Halal aspect is concerned, Haleem et al., (2024) formulated a model based on the fuzzy digraph matrix approach to mitigate the risks associated with the Halal supply chain traceability and compliance.

Key Strategies and Practices

Risk mitigation strategies have been identified as an essential requirement to improve both sustainability and resilience in Halal supply chains. Such strategies include raising awareness among top management, applying digital traceability systems, encouraging information sharing, conducting employee training programs, and strengthening internal Halal control mechanisms (Haleem et al., 2024). These practices ensure Halal integrity and enhance adaptive capacity during disruptions. Similarly, resilience has been recognised as a pre-condition for achieving long-term sustainability goals in agri-food supply chains. Empirical research shows that the inclusion of resilience and sustainability through holistic frameworks enables agri-food supply chains to meet environmental, social, and governance (ESG) requirements and maintain competitiveness (Arimany-Serrat et al., 2024). Such lessons are particularly relevant for Halal supply chains that often connect with agri-food industries.

Challenges and Barriers

Despite advances, companies still encounter major obstacles to integrate resilience and sustainability practices. The most frequent ones include limitations imposed by budgets and products that can make investments in resilient solutions or sustainable projects difficult (Doetsch & Huchzermeier, 2024). Different skills can also create conflicts between the two concepts. For instance, redundancy as a strategy such as holding surplus inventories or extra facilities can be good for achieving resilience but, at the same time, can be bad for sustaining the project due to higher resource usage (Warmbier et al., 2022).

Emerging Research Directions

Expanded Summary indicates new research trends that provide potential paths for the resolution of resilience and sustainability. First of all, the use of Physical Internet (PI)-based supply chain can be considered an efficient way to address the issue in question. The empirical evidence shows that in comparison with traditional supply chain systems, PI-based systems are more successful in dealing with disruptions and at the same time have smaller negative impacts on the environment (Ivanov & Dolgui, 2021). Another perspective worth considering is the use of systematic literature network analysis. According to Negri et al. (2021), there are four

perspectives concerning the connection between resilience and sustainability: trade-off, synergy, coexistence, and paradox perspectives.

The findings from the Summary and Expanded Summary show that considerable advancement has been made by researchers in the field with regards to integrating the principles of resilience and sustainability. Nonetheless, issues relating to tension continue to pose a challenge especially within the Halal supply chain framework that adds other dimensions such as compliance and ethics.

Concept Map

The concept map that was developed is shown in the figure below. The figure shows the theme-based mapping of the Halal Supply Chain, along with the key research areas in the field. The Halal Supply Chain forms the central theme of the concept map, from which four important themes branch out. These include International Trade & Food Industry, Halal Principles, Optimization, and Sustainability.

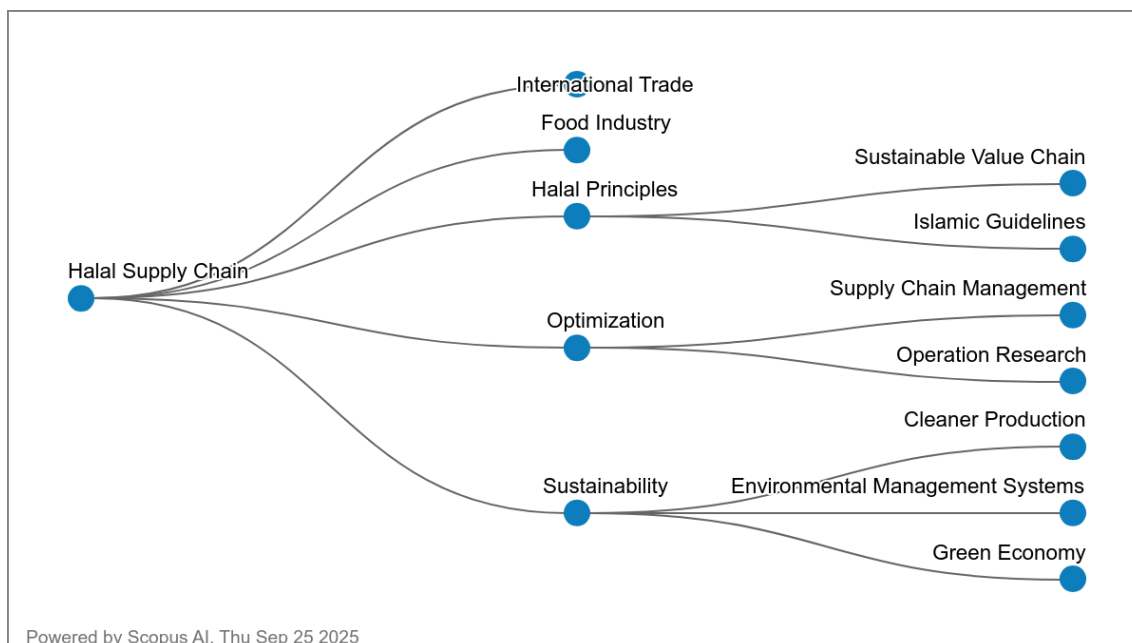


Figure 2: Concept Map

The first cluster pertains to Halal Supply Chains in relation to International Trade and the Food Industry, emphasizing on the fact that there is a globalization of the market as well as a requirement of conforming to standards in the industry. The second cluster concerns with Halal Principles in relation to Sustainable Value Chains and Islamic Guidelines, which pertain to the norms associated with operating in the Halal industry. The third cluster involves the subject of Optimization as it relates to Supply Chain Management, Operations Research, and Cleaner Production, which indicates that performance is crucial within the industry. Lastly, the fourth cluster involves sustainability in relation to Environmental Management Systems, Cleaner Production, and Green Economy.

From this perspective, the entire cluster highlights the fact that Halal supply chains exist in the interface where ethics, efficiency, and sustainability meet. This is because the concept map highlights the diversity of ideas in the academic literature as well as the concepts of resilience and sustainability which have gained more prominence in ensuring that Halal supply chains maintain their relevance.

A Review of Halal Supply Chain

Halal Supply chain is increasingly being identified as crucial in the global marketplace, whereby the need to ensure that goods adhere to religious principles combined with safety and quality considerations. In pursuing a sustainability-oriented research focus, there is a general need for the integration of digital innovations in halal supply chain management processes. Innovations such as blockchain, halal finance technology, and traceability innovations are crucial in ensuring not only transparency but also the safeguarding of the halal status at all levels of procurement, processing, and delivery. (Harsanto et al., 2024). These innovations are essential in addressing consumer concerns regarding authenticity, hygiene, and quality assurance, which are fundamental to both sustainability and resilience.

The third aspect of development is concerned with tackling the critical control points associated with halal processes, which are significant for ensuring the security and sustainability of organizations. Some of the critical control points to consider include product handling, sanitation processes, commitment of assets, staff training, and machinery maintenance (Yaacob et al., 2023). The critical control points represent the areas that, when not taken care of, may result in threats to halal standards, wastage of products, and even discontinuity of activities. Incorporating sustainability within such points will help improve their efficiency and effectiveness.

The importance of collaboration among all stakeholders and implementation of best practices is another key factor in achieving the sustainability of the halal supply chain. According to Alghazzawi & Saeed (2023), sustainable halal supply chains need collaboration among stakeholders regarding sourcing ingredients, production processes, and prevention of cross-contamination. Moreover, research on the halal food industry reveals that consumer demand focuses more on aspects such as cleanliness, safety, and quality, and sustainable practices play a significant role in gaining consumer trust and remaining competitive in the market (Jariyah et al., 2024).

However, to promote further development in this research direction, several gaps and challenges need to be considered. One of these is the low adoption rate of technology solutions, such as RFID, IoT, GPS, and blockchain, which are instrumental in providing strong traceability and continuous monitoring capabilities within the supply chain (Wan-Chik et al., 2023). Another gap concerns the lack of attention paid to supplier management, which has become the focus of empirical studies calling for more active involvement and evaluation of suppliers (Fujiwara, 2017). As a result, future research needs to pay more attention to the impact of digital tools, supplier relations, and governance on sustainable performance.

The Relationship Between Halal Supply Chains and International Trade

Halal chains and international trade represent opportunities and challenges in the effort to satisfy the increased need for halal products across the world. Halal consumption has moved beyond countries with significant Muslim populations to Western nations where Muslims form a powerful consumer group. Countries in ASEAN such as Malaysia and Indonesia are emerging as dominant players in the global halal supply chain business through their institutional and certification systems as well as existing supply chain mechanisms (Talib et al., 2020). Regional dominance puts ASEAN in a favorable position to dominate global halal supply chains.

The incorporation of halal chain management becomes very important in maintaining international business. This involves incorporating the aspect of halal across all stages of production, storage, manufacture, and distribution to ensure that halal products are maintained through the process of international transportation (Talib & Hamid, 2014; Zailani et al., 2017). Contamination, improper treatment, or failure to comply with the halal aspects during transportation across national borders may cause consumers not to trust the product, which will limit the markets it can access.

One of the major obstacles in international halal trade is that of logistics and the processes involved in custom inspection. There is currently no established system where halal compliance is concerned when crossing borders, hence making it difficult for the processes to run efficiently and effectively without compromising on halal status (Tieman, 2013). This shows that there is a need for an international system that involves incorporating halal standards into the process of facilitation in international trade. Creation of halal corridors or logistics bonded halal would be ideal.

Halal logistics standards are also significant in facilitating international business relations. It is important to comply with the principles of sharia in the processes of transport, storage, and distribution to avoid contamination and ensure the legitimacy of goods (Tieman & van der Vorst, 2012; Talib & Johan, 2012). However, due to the inconsistency in practices from one country to another, this creates complications both for importers and exporters. It would be helpful to establish universal standards that will ensure smooth international trade and increase consumer confidence worldwide.

In conclusion, there is a high global demand for halal products that continues to increase in an unprecedented manner, and this presents itself as an opportunity for the halal supply chains to become integrated into international trade networks. In this regard, the halal food industry alone is expected to experience rapid growth, which is motivated by not only Muslims but also non-Muslims who consider halal products to be healthier and better in quality (Bonne & Verbeke, 2008). In order to exploit such demand, it is important for the supply chain participants to embrace digitization, certification standards harmony, and cross-border cooperation in achieving efficiency and halal assurance.

The Relationship Between Halal Supply Chains and Food Industry

The increasing demands for halal food products around the world clearly point out to the need for ensuring the integrity of the halal status along the entire chain in order to sustain the supply chain process of the halal foods. Halal status should be guaranteed throughout all aspects of the supply chain including personnel, process, manufacturing environment, accreditation,

logistics, and tracking among others (Tieman, 2011). In the food industry, it is not sufficient to guarantee the halal assurance of the final products but the complete framework for sustaining halal status of food products through its supply chain.

While being highly promising, the adoption of Halal Supply Chain Management (HSCM) is fraught with challenges and risks that need to be considered. The first problem relates to the uncertainty of raw materials as well as the possible cross contamination with non-halal ingredients during production and transportation stages. It was recommended to implement systematic approaches, including the application of such methods as SCOR model and House of Risk framework, which would help to assess risks, identify them and take the necessary measures to deal with them (Ab Talib & Hamid, 2014). Considering the complexity of supply chains in the food industry, such an approach becomes absolutely necessary.

The other important outcome of an effectively designed halal food supply chain would be consumer trust and safety. Hygiene, documentation, traceability, quality control, and certification systems play an important role in protecting halal food products while at the same time complying with food safety standards (Alqudsi, 2014). Trust plays a very important role in the decision-making process for consumers when buying food items especially in countries where consumers pay heed to their religious principles. Food producers can take benefit from the inclusion of these practices in halal food supply chain management.

Technology has proved to be another way through which assurance of halal and sustainability have been strengthened in the food industry. Technological advancements such as Blockchain and Internet of Things (IoT) act as advanced approaches for increasing transparency and traceability in supply chains so that halal certification issues and other security problems can be addressed (Khan et al., 2021). To illustrate, blockchain makes sure that all transactions in the movement of commodities from procurement to shipment are captured in an unalterable way. This helps boost consumer confidence and leads to digitization of the food industry globally.

In all, the dynamics of the relationship between the halal supply chain and the food industry are strategic and multifaceted in nature. Through the process of compliance with halal regulations, minimization of supply chain risks, creation of trust among consumers, and technological innovation, the halal food industry is poised for meeting growing international demands. On the other hand, the efficiency of the halal supply chain management will greatly determine the sustainability of the food industry. The food industry in regions where there are robust halal markets, such as Southeast Asia and the Middle East, will benefit immensely from efficient halal supply chain management.

The Relationship Between Halal Supply Chains and Halal Principles

Halal Supply Chain and Halal Principles are connected by the necessity of making sure that every aspect of the supply chain meets Islamic requirements. Halal Supply Chain involves certain steps that include halal requirement, supplier selection, manufacturing process, certification, documentation, employee training, storage, distribution, audit, and constant improvement (Tieman, 2011). Not only are these steps practical, but they also represent the implementation of Islamic teachings for resource management so as to make sure that halal remains intact throughout the whole process. The connection between the functioning of the supply chain and the halal requirements adds reliability to halal-certified goods.

An important component of this connection is incorporating Maqashid Syariah (higher objectives of Shariah) into Halal Supply Chain. Incorporating elements like the preservation of religion, life, mental faculty, lineage, and wealth into halal supply chain processes will ensure not only halal standards but also sustainability (AbTalib, 2017). For instance, adopting practices like supplier transparency and halal certification ensures adherence to the Shariah standards as well as good governance practices. It indicates that Halal Supply Chain is more than just logistics and operations; it is about ensuring justice and responsibility.

Despite these complementarities, however, there remain some difficulties associated with the implementation of halal principles throughout the supply chain. Some of these difficulties include fostering stakeholder trust, developing competencies and commitments, using cutting-edge technologies, and unifying international halal standards (Zulfakar et al., 2014). It is vital that organizations be ready to overcome such problems as they would affect the credibility of halal products in global supply chains that have become more complicated over time. Moreover, inconsistency of standards from one country to another could act as an impediment to trade and certification.

Halal Practices in the Supply Chain recognize the significance of documentation, traceability, and high standards of quality control. The certification of these practices by credible halal organizations, in addition to the improvement of operations, will allow companies to be compliant with the halal standards and increase their supply chain resilience (Borzooei & Asgari, 2013). An example is the use of halal traceability systems by the food industry, which helps prevent the risk of contamination and creates customer trust.

In conclusion, the relationship between Halal Supply Chain and Halal Principles is incorporated at all levels of supply chain management. The incorporation of halal principles is what makes operations ethically sound, credible, and Shariah-compliant, thus protecting the integrity of the products and ensuring the trust of consumers. On the other hand, the Halal Supply Chain is a systematic process that facilitates the implementation of the principles mentioned above in order to make sure that all the processes comply with the religious standards and contemporary market standards as well.

The Relationship Between Halal Supply Chains and Optimization

Optimization of Halal Supply Chains (HSCs) has become important research topic due to increased demand for halal products across the globe. Based on a literature survey, it has been identified that while HSC optimization has been used sparingly, there have been increasing calls for the application of OR methods for enhancing sustainability and efficiency in these chains (Khan et al., 2019). It is crucial to note that optimizing HSCs not only involves achieving cost and efficiency but also requires adherence to Shariah laws, thus adding more dimensions to the optimization process.

One framework that can be used for the optimization of the halal food supply chain includes the Halal Supply Chain Model. The Halal Supply Chain Model has been developed to optimize the halal food supply chain through the incorporation of certain design parameters and logistics control in the design process (Tieman, 2011). Incorporation of halal principles in the supply chain design, such as segregation of logistics, certification of products and monitoring, makes this framework very effective.

There is also evidence that new technology plays an essential part in optimizing halal supply chain processes. Such technology includes blockchain, halal financial technologies, and traceability systems, which increase transparency in halal supply chains, halal assurance, and improve business performance in terms of financial and non-financial aspects (Ali & Suleiman, 2018). Specifically, blockchain contributes to supply chain optimization in the field under discussion due to its ability to monitor halal products and decrease risks of contamination.

Optimization of halal supply chain operations is not limited to industry-specific activities only. In the case of biscuit production, some examples of industry practices in terms of halal supply chains involve the application of Sharia law, the use of hygienic raw materials, and compliance with hygiene standards (Talib et al., 2017). In addition, the application of Halal Critical Control Points (HCCPs) and sertu practices guarantees that proper control is applied to the handling process, hygiene management, asset segregation, and equipment maintenance (Karia & Asaari, 2016).

Lastly, flexibility in selecting halal suppliers has been shown to be increasingly important for optimization purposes. Scholarly work suggests approaches that systematically analyze the various criteria associated with flexibility in managing halal suppliers, highlighting the need for flexibility in the face of disruption in international business dealings (Zailani et al., 2017). The concept of flexibility is critical in optimizing the supply chain as it ensures that the supply chain can respond to demand variations and any disruptions that may arise without interfering with the halal standard.

The Relationship Between Halal Supply Chains and Sustainability

However, the relationship between halal supply chain and sustainability is one of the most crucial areas that require further research since researchers observe a big gap concerning empirical analysis that explores this issue. Even though the implementation of halal supply chain management ensures compliance with the Islamic standards, the combination of halal supply chain management and sustainability has not yet been studied properly (Aziz & Chok, 2013). It has become apparent that the concept of sustainability in halal supply chains should not only consider religious aspects but economic, social, and environmental aspects as well, which reflects the idea of responsible supply chain management.

The approach that has been gaining popularity in recent years includes the combination of Environmental, Social, and Governance (ESG) factors together with halal supply chains. The interaction between ESG factors, halal criteria, and the United Nations' Sustainable Development Goals (SDGs) can create opportunities for improving the sustainability of the supply chain (Talib et al., 2020). It should be noted that the inclusion of ESG factors implies the preservation of nature, adherence to proper labor conditions, and good corporate governance, all of which correspond to the principles of Islam.

Sustainability of the halal supply chain is also determined byn issues related to the environment. Some research suggests that halal activities, especially in the field of food production, may have an effect on carbon emissions, freshwater consumption, and waste management and thus require some new approaches to ensure that their environmental impact remains minimal (Ngah et al., 2019). Examples include energy-efficient storage, environmentally friendly packaging, and greener logistics.

It is important to note that these efforts have demonstrated the need for the integration of halal assurance processes along with sustainability of resources in order to enhance consumer confidence as well as environmental stewardship. In terms of actual processes, it has already been reported that the application of sustainable processes within the halal supply chain has taken place through pre-slaughtering, warehousing, ensuring halal assurance, and even packaging (Khan et al., 2021). For example, pre-slaughtering processes that are considered ethically correct would meet halal standards as well as sustainable goals, while using biodegradable packaging would minimize environmental contamination.

Lastly, the aspects of leadership and governance are essential in fostering sustainability in halal supply chains. Research suggests that spiritual leadership is critical when it comes to affecting halal processes, which lead to sustainability and profits through the halal supply chain being the mediating variable (Ahmad et al., 2020). Systematic reviews reveal that quality management systems, halal labeling, and digital solutions such as blockchain and IoT contribute to ensuring both halal compliance and sustainability (Tieman & Darun, 2017). Hence, one may say that creating sustainability in halal supply chains is a complex process which requires all aspects discussed above.

Topic Expert

Topic experts identified within the area of Halal Supply Chain Management offer important information about the thought leaders behind this particular field. The most prominent amongst these authors is Abid Haleem, whose research efforts have made great contributions towards building the discussion on resilience and sustainability within Halal Supply Chains. His work centers around creating risk mitigation models that satisfy the requirements of halal practices. With over 22,000 citations and an h-index of 82, Haleem's scholarship underscores the centrality of risk management in maintaining the integrity of halal operations while simultaneously supporting sustainability objectives. His contributions have become foundational references for researchers and practitioners seeking to balance halal assurance with modern supply chain complexities.

Another equally prominent researcher is Sadia Samar Ali, who has done significant work with regard to the application of fuzzy logic techniques in halal supply chain risk management. In her work, Ali has managed to incorporate innovations in technology and methods for resolving risks in halal processes, especially in the context of international operations (Ali & Suleiman, 2018). She has successfully employed decision support systems for assisting managers in their decisions and improving their performance in terms of sustainability. This has made it evident that there is a need for technological innovation within halal supply chain research.

There is another important figure whose research has contributed significantly to risk management practices within halal supply chains, namely Shahbaz Khan, who has made significant strides in the emerging research field of risk management in halal supply chains. Recently published research by Khan et al. discusses new approaches to halal supply chain management through modeling approaches that incorporate sustainability practices in halal supply chains (Khan et al., 2020). Having received more than 3,000 citations to date and achieving an h-index of 35, Shahbaz Khan has established himself as a rising researcher in this niche.

Taken as a whole, the combined knowledge from the studies of Haleem, Ali, and Khan highlights the significance of risk management as a theme for promoting halal supply chain sustainability. Certain aspects of challenges have to be resolved in the halal supply chain framework, such as adherence to religious laws, issues associated with logistics in an international setting, and the creation of stability despite disruption.

Moreover, the importance of such researchers can also be attributed to the recognition by scholars that the issue of halal supply chains as an area of study is valid within the scope of supply chain management research. The findings of their research show the need for the incorporation of Islamic beliefs in relation to supply chain management. In fact, it is fascinating to point out that aside from contributing to the needs of Muslim countries, their research also benefits the entire world because of the demand for products that are halal. Considering where such scholars are headed in their research agendas, it appears that there are indeed exciting areas in halal logistics.

Emerging Themes in Halal Supply Chain Research

One of the most persistent themes found in academic papers is the use of blockchain technology in halal supply chains, an area that has attracted considerable scholarly interest owing to its potential for increasing transparency, traceability, and trust within the supply chain. Blockchain offers a distributed and immutable ledger that guarantees halal quality in the process starting at the farm and ending at the fork. Academics have highlighted blockchain's ability to prevent any form of fraud, certify products, and increase consumer confidence in halal food items (Abeyratne & Monfared, 2016; Saberi et al., 2019). In this regard, blockchain has become increasingly important in today's globalized markets with complicated and contaminated supply chains.

Other aspects related to halal supply chain management and continuously emphasized in literature concern consumer behavior and intention to buy certain products. Religiousness, trust, and certification are mentioned in the literature as the crucial variables influencing consumer decisions (Elseidi, 2018; Mukhtar & Butt, 2012). The variables influence Muslim consumers in their buying behaviors and may also affect non-Muslim consumers, especially when they have concerns regarding product quality and hygiene standards certified by halal. Hence, the studies suggest that certification processes should be strengthened to retain customers' trust and attract consumers from halal markets.

From the emerging trends, it is clear that one of the topics' attracting attention is the overlap of sustainability and halal logistics. There is now an understanding that there is a lot of correlation between the concepts of halal, which include ideas about cleanliness, ethical procurement, and social benefit, and the goals of sustainability, which relate to ESG factors (Khan et al., 2021). In particular, the introduction of ESG principles in halal logistics would allow for better environmental sustainability and attract consumers who prioritize ethical procurement processes. Another topic is related to digitalizing halal supply chain management with the use of modern technology such as artificial intelligence, Internet of Things, and blockchain systems (Rejeb et al., 2022).

The two new themes observed in the literature include the importance of sustainable halal supply chain management among SMEs and the implementation of geospatial technologies in halal supply chain management. In spite of being the foundation of halal products' supply

chains, SMEs may find it challenging to apply sustainability principles due to resource constraints. On the other hand, applying sustainability strategies may increase their resilience, competitiveness, and overall effectiveness in the market (Ali et al., 2020). The second theme is based on the fact that geospatial technologies are relatively new tools that have become available recently. Therefore, applying them in managing halal supply chains will enable companies to conduct real-time monitoring and enhance traceability (Mollah et al., 2021).

Overall, the results clearly point out that the research on halal supply chain is shifting from the basics of certification and trust to more innovative aspects such as sustainability incorporation, digitization, and technology incorporation. The emerging themes add dynamism and flexibility to the halal system when responding to global challenges, especially digital transformation and sustainability.

Conclusion

This study highlights the important of resilience, sustainability, and technology to enhance the operations of halal supply chains. The main insights indicate that although consistency with regard to certain topics like blockchain implementation and consumer confidence is evident, emerging topics related to incorporation of sustainability principles and digitalization of supply chains show the adaptability of this industry to the problems encountered globally. Emerging areas, such as sustainable business practices in SMEs and geospatial technology applications, also reveal the dynamic nature of research in halal supply chain management. In general, it can be stated that there is a need for halal concepts to be aligned with modern sustainability initiatives, which will help them stay competitive and environmentally friendly (Ali et al., 2020; Rejeb et al., 2022; Saberi et al., 2019).

Theoretical contribution is made through expanding the scope of applicability of supply chain management theories. By applying concepts related to supply chain resilience that are focused on risk management and adaptability, the concept of halal integrity becomes integrated into the existing frameworks and expands the scope of application for traditional theories related to supply chain resilience. At the same time, the integration of halal supply chain management concepts with sustainability theories, especially the ESG (environmental, social, and governance) frameworks, opens up interesting possibilities for integrating faith-related approaches to management with universally applicable concepts of sustainability (Khan et al., 2021).

The practical implications of this study are for policymakers, industry experts, and even certifying organizations. In particular, businesses have opportunities for developing through technologies such as blockchain, artificial intelligence (AI), and Internet of Things (IoT) solutions. As noted above, SMEs, although limited by available resources, can still benefit from sustainable approaches which may help become more competitive and prosperous (Ali et al., 2020). For their part, policymakers and regulatory agencies should concentrate on strengthening halal certification processes and supporting initiatives focused on ESG and SDGs within halal industries. In addition, practitioners may use their knowledge about consumer behavior patterns in order to develop marketing strategies focusing on halal certification and ethical production.

However, the current study is not without limits. Literature concerning the subject matter is still rather fragmented, with little empirical evidence provided to determine the interrelationships between halal supply chain management strategies, resilience, and sustainability. Most academic literature revolves around theoretical and case-study investigations, and such research is primarily conducted within Muslim-dominated nations, making it less applicable to other parts of the world (Elseidi, 2018). Furthermore, even though modern technologies have been mentioned extensively in the literature, there seems to be no longitudinal studies on the effect of technology adoption within the halal supply chain.

Future research must focus on filling these knowledge gaps through empirical research conducted in various geographical and cultural settings, especially in non-Muslim majority countries where halal products are becoming increasingly popular. A comparative study of both halal and non-halal supply chain management would offer insights into sustainability and resilience issues within the various types of supply chain ecosystems. Another aspect that needs further investigation is the role played by SMEs in ensuring sustainability despite limited resources and ways in which this can be achieved through networking and the use of technology among other factors.

Overall, this study emphasizes one of the areas within halal supply chain management, which associate the needs for religious conformity and sustainability in general on a global level. With a clear understanding of the themes and innovations in this particular area, the future studies in this discipline will ensure that the halal supply chain management process remains ethical and profitable.

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