Halal Food Integrity:
Systematic Literature Review and Research Agendas

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Abstract

Particularly, Food integrity is a comprehensive construct that relates to food production. Halal Food Integrity (HFI) means that in producing food, Islamic law should be noticed and applied. Halal integrity of the product is a result of the various activities in the supply chain, so HFI encapsulates the whole of the Halal Food Supply Chain (HFSC). This paper presents a Systematic Literature Review (SLR) on HFI and some research agendas on it. Using SLR methodology and based on the Preferred Reporting for Systematic Reviews and Meta-Analyses (PRISMA) protocol. In total, by 89 articles from Scopus database, published in journals over 12 years, 34 articles were selected, mapped, and assessed. The bibliometric approach made it possible to extract a large amount of useful information which was previously scattered and to present it in a systematic way. The analysis of the co-occurrence network of keywords identified five distinct clusters, corresponding to the dominant research themes in the area, which suggested the design of a research agenda. The authors find that the key to improved halal integrity is transparency so that consumers can make informed decisions. Halal transparency along the food supply chain could be enhanced by a halal traceability system. Unfortunately, there are some barriers and challenges in adopting advanced traceability technology in Many companies, especially in developing countries. Future research agendas could be in the area of enhancing traceability technology to ensure HFI while considering the barrier and inhibitor that encountered by many food companies.

Keywords
Supply Chain, Halal Food Integrity, Transparency, Systematic Literature Review, PRISMA

1. Introduction
Halal food industry is evolving and thriving. It is the second-largest sector in the halal economy after Islamic finance (Khan et al. 2022). It has also created a new lifestyle in which consumers are now more aware of their consumption, particularly knowledgeable in terms of the ingredients and mechanism of the products that they use and consume, and celebrating value-added products that have good qualities (Rahim 2017). Muslim population is increasing fastly, so the halal food industry could be a a profitable market niche (Rejeb et al. 2021). According to Zulfakar et al. (2014) non-Muslim consumers also demand for halal foods as the halal foods maintain a reputation for cleanliness, hygiene, and palatability.

The Future of the Global Muslim Population Report published by Pew Research Center's Forum on Religion & Public Life stated that the world's Muslim population in 2020 will reach 1.9 billion people or 24.9% of the world's total population and that number will continue to grow and was predicted to increase by 2030 to reach 2.2 billion people (Indonesian Ministry of National Development Planning, 2018). Muslim population increase resulting an increasing

for halal product (Omar, 2011). Muslim spend on food increased by 6.9% in 2021 from US$1.19 trillion to US$1.27 trillion and is expected to grow by 7.0% and reach US$1.67 trillion in 2025 at a 4-year CAGR of 7.1% (Reuters & Standard 2022).

In the food industry, consumers cannot independently detect the halalness of the product. Along with the development and globalization of food industry, food materials and ingredients which originally halal can turn into haram because they go through a series of production processes using equipment, additional materials and packaging that can contaminate them. Halal food concept is holistic, starts from the source of food materials or ingredients, food processing, handling, packaging, storage and shipping. It is seriously important to assure the HFI. Integrity is the quality or state of being complete, entirely perfect, and whole. In this context, halal integrity means that the product remains halal from the upstream to the downstream supply chain, free from any activities and processes that might breach the halal status intentionally or unintentionally (Mohamed 2020).

Halal is an Arabic word which means permissible (Syazwan et al. 2015) and means permitted, allowed, lawful or legal (Tieman 2011). Halal practices apply to all aspects and activities of a Muslim, but it is more than just a religious obligation (Syazwan et al. 2015). Islam has outlined the rules and regulations for food preparation which suggest that the source, process and people should conform to the principles of the Islamic faith and covers the aspects of nurturing, slaughtering, storage, display, preparation, hygiene and sanitation (Samori et al. 2014). Halal is applicable not only to the Muslim people but also to the others, this causes the products to become well known globally as well as emphasizes the need for a halal supply chain. The term Halal with reference to food covers all the aspects starting from the farm and ending at the table of a halal observant home. Halal food must be free of any components that Muslims are prohibited from consuming, which is known as haram (Soon et al. 2017). In view of that, a halal supply chain is vital in ensuring that the concept of halal is not only applicable for the food itself but also for the entire supply chain starting from the farm to the customer (Omar 2011).

Halal certification and its logo are used to signify to consumers that a food product is halal compliant as validated by a relevant and official religious authorities. Regrettably, recent food scandals concerning the frozen meat issue in Malaysia (Fernando et al. 2022), the horse meat scandal in the UK (Ali & Suleiman 2018), detection of pork DNA in chicken sausages in Italy (Pinto et al. 2015), contamination of pork in halal certified chocolate in Malaysia *(*Tan et al. 2017), contamination of milk and infant formula, in China melamine (Marucheck et al. 2011) have increased consumers' apprehensions about their food supply. The integrity of halal food sold in the market has since become precarious (Fernando   et al. 2022).

Soon et al. (2017) argued that in the conventional stages of a food chain there is no halal integrity concept, so it is important to extend a critical consciousness for halal integrity within the food chain to fulfill the continuous grow of Muslim consumers' market. Manning (2016) introduced four factors that need to be considered in safeguarding integrity that involve product, process, people and data integrity. Vanany et al. (2020) proposed the conceptual framework and architecture for enhanced integration of halal food in the supply chain using blockchain technology in Indonesia. Halal integrity as one of the objectives of halal supply chain management was highlighted by (Azmi et al., 2018). Ali et al. (2017) proposed raw material, production, service and information integrity as four dimensions of food SC integrity. There were impacts of supply chain integrity on quality performance. In order to protect and prevent HFI, Zulfakar et al. (2014) proposed a conceptual framework for halal food supply chain integrity.

Food industry is becoming more customer-oriented and needs faster response times to deal with food scandals and incidents (Aung & Chang, 2014). Nowadays, unavoidably global trade has taken place. Food products are produced and came from all parts of the world. Frequently, raw materials imported or sourced from various part of the world and the majority comes from non-Muslim countries. This has led to growing concerns from the halal consumers, especially the Muslim communities with regards to whether the halal status of these food products can really be guaranteed throughout the supply chain in these countries and whether the halal foods claimed are authentic (Zulfakar et al. 2019). Furthermore, the food industry has changed markedly in recent times. Increasing population has made the market demand for food more complex and heterogeneous (Ali 2017).

Although several researches on HFI had been established, but HFI is still a new issue that has emerged following Halal Supply Chain Management (HSCM) and also regarding the complexity and the big challenge of HFI in Halal Food Industry, therefore it is needed to study deeper about HFI. This study is Systematic Literature Review (SLR) to answer the following two questions:

Q 1.   What we need to know further about Halal Food Integrity (HFI)?
Q 2.   What are the less-explored HFI topics in the literature as a basis for future research agendas?

1.1 Objective
The objectives of this paper are: first, collecting relevant studies, synthesizing the findings, and assessing the state of academic knowledge regarding the term of HFI that resulting descriptive and thematic analysis; second our study will use VOSviewer software for cluster analysis that diversifying the results already in the literature; and third, based on keyword analysis will formulate a framework for discussion on HFI by finding the most relevant topics today.

2. Literature Review
Integrity requires responsible actions by doing the right thing in the right way. According to the Big Indonesian Dictionary (KBBI), the notion of integrity is the quality, nature, and condition that describes a unified whole, so that it has the potential and ability to radiate authority and honest. Therefore, the integrity of halal products should be upheld as halal integrity is a basis for the success of the halal industry (Kamisah et al. 2018). Halal integrity should demonstrate that the product remain halal throughout the supply chain, are free from any activities that might breached the halal status (intentionally or unintentionally) (Zulfakar et al. 2014). The food integrity has been defined by Elliott 2014, p.84 cited on (Ali & Suleiman 2018) as "Food integrity can be seen as ensuring that food which is offered for sale or sold is not only safe and of the nature, substance and quality expected by the purchaser but also captures other aspects of food production, such as the way it has been sourced, procured and distributed and being honest about those elements to consumers". HFI puts religious (halal and thoyyib as Islamic value) factor as a supreme element above safety, health, and quality.

Food integrity will be jeopardized when the following issues occur along the supply chain (Tan et al. 2017):
a. The presence of a prohibited animal (i.e. pig, boars, swine, carnivorous animals and birds and animals that have died from natural causes).
b. Contamination with blood or najis (filth) (i.e. carrion and dead animals).
c. The presence of intoxicants (alcohol).
d. Use of the wrong method of slaughter or the wrong blessing.

HFI is assuring food remain halal regarding any materials, activities, processes and equipment using in food production. Halal integrity means that the product remains halal from the upstream to the downstream supply chain, free from any activities and processes that might breach the halal status; intentionally or unintentionally (Mohamed et al. 2020; Khan et al. 2018). Halal supply chain is vital in ensuring that the concept of halal is not only applicable for the food itself but also for the entire supply chain starting from the farm to the customer (Omar 2011).

The purpose of halal food supply chain is to protect the halal status of that specific halal product throughout a sequence of movement from one supply chain channel to another channel until it reaches the final customer. At each stage must be free from any potential contamination that can make the product become non-halal (Zulfakar & Chan 2017). A halal food supply chain (HFSC) starts with sourcing various permitted raw materials and preparing them accordingly (such as, proper halal slaughter and no cross-contamination with haram products) (Soon 2017). Related to HFSC there are four distinctive dimensions of supply chain integrity for halal food that are proposed by (Ali, 2016), namely: raw materials integrity, production integrity, service integrity, and information integrity. The four constructs reflect each stage in the supply chain.

First is raw materials integrity, which reflects agricultural or farming phase. The inputs (such as seedlings, plantlets, fertilizers, pesticides, irrigation water, feed and veterinary products) used during this phase need to be sourced and used according to legal requirements. Irrigation water for produce and crops, drinking water in animal husbandry production, and water sources from where aquaculture products are grown/marine products (including freshwater fish) are caught should be safe and not within the vicinity of pig farms or run-off from pig farms (Soon et al. 2017).

Second is production integrity that explains slaughtering and processing phase. The slaughtering phase is a key stage as differentiation between halal and non-halal meat occurs at this point. For halal it is required to use the Islamic method provided that the animals are slaughtered by a Muslim slaughter man. The Muslim slaughter person must be an adult male or female of sound mind familiar with the process of slaughtering. A trained slaughter person will be more efficient and will minimize the damage to the skin and carcass. It is an absolute requirement that animals are slaughtered according to the halal method. The Muslim slaughter person must sever the front part of the neck, severing carotids, jugulars, trachea and esophagus without reaching the bone in the neck while pronouncing the name of god and with a swift blow. It is preferable to turn the animal or bird towards Makkah (Mecca) before slaughtering although this is only a secondary requirement. The processing phase usually consists of two sub-processes namely the assembly of the required materials and the actual processing of these materials. All materials and tools used must be halal, legally sourced, safe, and used in accordance with legal requirements (Soon et al. 2017).

Third is service integrity. Service integrity is considered important because it represents the interaction between the final product and the consumer (Ali 2016).   According to Soon et al. (2017) the service integrity is at the storage and logistics stage. Products are stored and separated from haram products to avoid cross contamination. Food packaging (starting from primary, secondary and tertiary packaging) plays a role in ensuring the product remains sealed to reduce potential contamination. Logistics service providers play an important role in ensuring raw materials, materials, packaging materials, storage and transportation of halal products are carried out so that they are not contaminated with haram products.

Fourth is production ex post (information integrity). Information integrity is a series of activities that aim to provide a concise description of food to consumers who are separate or far from producers. The integrity of this information is important because it allows for back-examination of food characteristics in consumer purchasing decisions. Thus, the information provided to consumers must uphold the integrity of the process and product material content. This integrity is represented using halal label (Ali 2016) which is expected to be traceable for its halal.

The challenge of HFI and food traceability is getting bigger when the product moves across geographical boundaries in which there is a different understanding of halal between countries, especially in the context of Muslim and non-Muslim- majority countries (Zulfakar & Chan 2017). According to (Poniman et al. 2015) problems in halal food supply chains are namely: there is no globally accepted unified halal certification as standards reflect differences in animal slaughtering legislation in the Muslim world; there have been unethical fabrications of halal logo cases where the halal logos were fabricated in order to attract consumers, when in reality, the products were not even halal certified and product technology advancement has led to the blurring of boundaries between halal and non-halal ingredients.

The consumer's behavior has shifted towards the safety and quality; food integrity, clear labeling and transparency of the food product, in the last three decades. This condition puts pressure on the food supply chain partners to implement traceability systems. The traceability implementation refers as to the integration of the system (i.e. traceability system) with the supply chain, which is capable of collecting, processing and transforming information about the product in a standardized way and exchanges it among different actors in the supply chain (Haleem et al., 2019). From a consumer perspective, traceability helps to build trust, peace of mind, and increase confidence in the food system (Aung & Chang 2014).

The important thing that needs to be done to improve halal integrity in international trade is transparency (Soon et al., 2017). Food product traceability systems provide transparency in food processing enabling consumers to gain confidence on halal product claims (Bonne & Verbeke 2008). Some traceability studies in the past have specifically explained the function of the traceability system in a particular field such as the food product supply chain from agriculture or farm, processing, packaging, and logistics and retail stores (Rahman et al., 2017), increase the halal transparency and strengthens the Halal integrity (Zulfakar et al. 2014).

3. Methods

Undertaking a systematic literature review (SLR) is an important part of any research project. Conventional or traditional narrative reviews frequently lack thoroughness, and in many cases are not undertaken as genuine pieces of investigatory science, whereas systematic review identifies key scientific contributions to a field or question, meta-analysis offers a statistical procedure for synthesizing findings in order to obtain overall reliability unavailable from any single study alone (Tranfield et al. 2003).

This research followed the SLR stages proposed by Tranfield et al. (2003) that are: (1) planning the review, (2) conducting the review, (3) reporting /discussion of findings and knowledge dissemination. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) was used to select and collect data. Its four-phase flow diagram (identification, screening, eligibility and included) was used to synthesize the results (Moher et al., 2009). PRISMA flow diagram is widely used in the literature selection method to identify applicable publications for reporting (Naser et al. 2022).

4. Data Collection

4.1 Planning the review

Two sets of inclusion criteria for title and abstract screening, and full-text screening were developed (Denyer and Tranfield, 2009 in Lusiantoro et al.,2018) (see Table I). For an article to be included, all the criteria listed in Table 1 should have "yes" answers. This study uses Scopus online databases (that consisted of several publishers namely: Emerald, ScienceDirect, SpringerLink, Taylor& Francis, Wiley, Sage and IEEE Explore) for the extraction of research papers.

One of the important objectives of this paper is to know further about HFI and exploring what are the less-explored HFI topics in the literature as a basis for future research agendas. Accordingly, all research papers that cover food supply chain, integrity and halal were included in the SLR.

Table 1. Inclusion criteria for title, abstract, and full-text screening

Title and abstract inclusion criteria	Full-text inclusion criteria
Peer-reviewed articles?	Halal food context?
Academic journal articles?	Halal transparency Focus?
Written in English?	Halal food Integrity is the paramount?
Purpose(s), finding(s), and/or implication(s) talk about halal supply chain?	

4.2 Conducting the review

A systematic search begins with the identification of keywords and search terms, which are built from the scoping study, the literature and discussions within the review team. The reviewer should then decide on the search strings that are most appropriate for the study (Tranfield *et al*. 2003). In order to ensure the relevance and consistency of data across selected publications, the selection of search keywords is driven by research objectives and consists of two groups (see Table 2).

Table 2. Keyword and Search Strings

Keyword and Search String
"supply chain" OR "supply network" OR "supply management" OR "supply chain management" OR "logistic*" OR "logistic* management" OR "demand chain" OR "demand management" OR "demand chain management" OR "interorganisation*" OR "interorganisation* system" OR "value chain" OR "value chain management" AND "integrity" OR "wholeness" OR "quality" OR "safety" AND "halal food"

From the Scopus database, 89 articles were identified on the. In the first screening phase, all articles that were not peer-reviewed, non-academic journal, were not writing in English and did not discuss about halal supply chain were

excluded. 29 documents were excluded. The remaining 60 articles were screened based on relevance of the topic and purpose, findings, or implication of the articles contains the keywords. 22 articles were excluded. 38 full-text articles were assesed for eligibility and 4 articles were removed. Therefore, 34 peer-reviewed articles related to supply chain, HFI and halal food HFSC, HFI from an interdisciplinary range of journals, written in the last 12 years were then carefully selected, mapped, and assessed to answer the research questions. Figure 1 illustrates this process.

4.3 Reporting the review

There are 3 types of analysis used as a report that ensures the repeatability of the SLR and clarifies the overall results. First, based on the excel spread sheet, a descriptive analysis was conducted to show the "current map" of the collected papers. The descriptive analysis presents information such as the number of publications per year, citation per article, source of the study (conference or journal) and the main journals where papers have been published. This information was collected to understand the trend involving the subject under research.
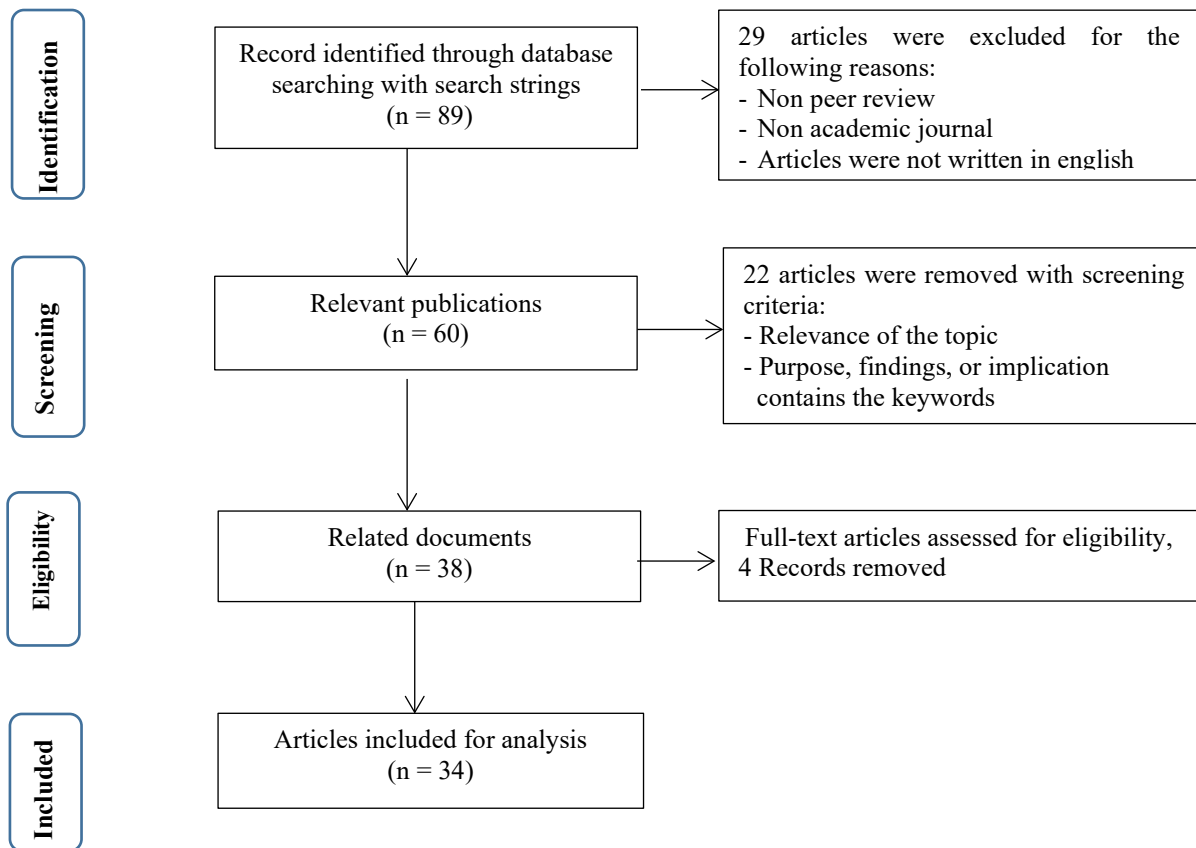

Figure 1. PRISMA flow diagram of the SLR
Source: Adapted from (Moher et al., 2009)

Second, the thematic analysis, provided an in- depth look at the key themes that emerged from the review. The thematic analysis was sought to compile and collect data to answer research questions. The analysis started with the full reading of the articles, which allowed familiarization with the contents. The authors generated initial codes according to the theme (research question) to classify the main information. At the second stage, the main topics within each theme were identified. These topics were recorded, combined and compiled (Lizarelli et al. 2022). Third, a bibliometric analysis was also presented to provide ideas for potential researchers and research agenda in this field (Mubarrok et al. 2022).

5. Results and Discussion

5.1 Descriptive Analysis
5.1.1 Publication by year
Figure 2 shows the number of publications by the year and illustrates that research on halal food supply chain and halal food integrity has been started from year 2011 and has steadily progressed. The number of papers varied over the years with a general upward trend. This upward trend may be attributed to the advanced demand of halal food and the development of halal food industry.
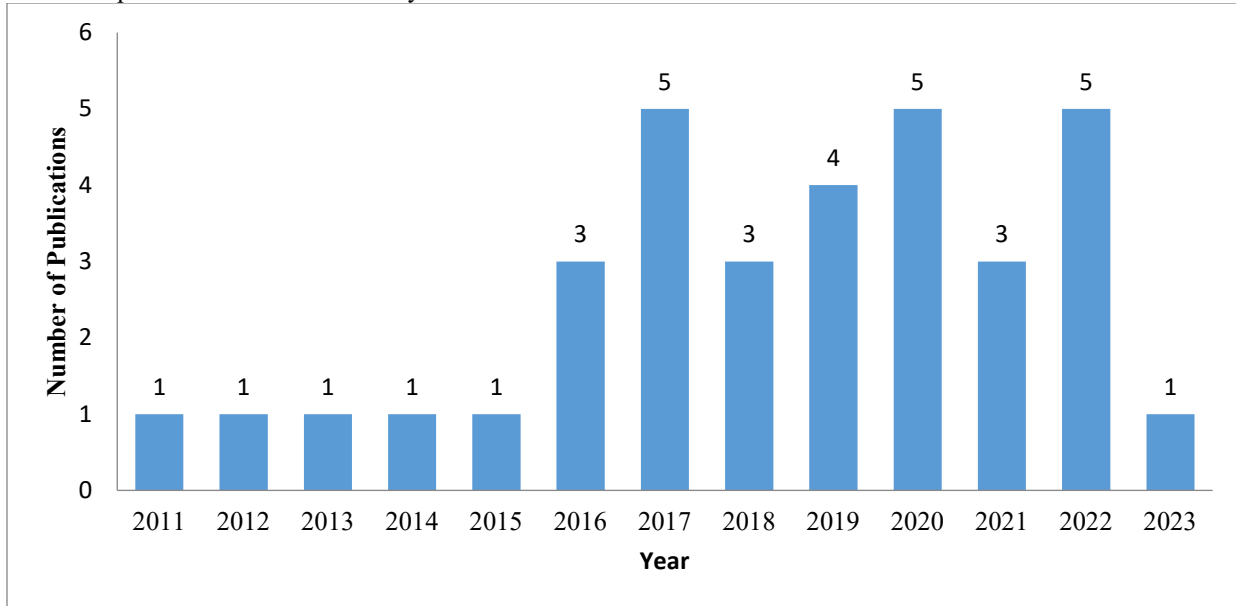

Figure 2. Publications by Year

5.1.2 Publication by country
Of the 34 papers reviewed, Malaysia is producing the most articles in the area of halal food supply chain management and halal integrity as amount of 70.6 percent, followed by United Kingdom 14.7 percent, Indonesia contributed 8.8 percent, India and Hungary contributed 2.94 percent. Related to halal issue, articles about halal food from non-Muslim countries began to arise because they send food products to Muslim countries, where Muslim consumers are increasingly aware of the importance of halal food whose integrity must be guaranteed through the existence of halal certificates and labels on the products they consume. The emergence of a new lifestyle related to healthy and good quality food for non-Muslim consumers is also the cause. Another factor is the growing awareness of non-Muslim producing countries that are actively pursuing the Muslim market as a segment to attract them by fulfilling their needs emotionally. Figure 3 shows the number of publications by the country.

5.1.3 Publication by Journal
34 articles were published from 19 journals. Journal of Islamic Marketing tops the list with 9 articles published as they appear in the Scopus database. The second is British Food Journal and International Journal of Supply Chain Management with 4 articles. Figure 4 shows the number of publications by journal.
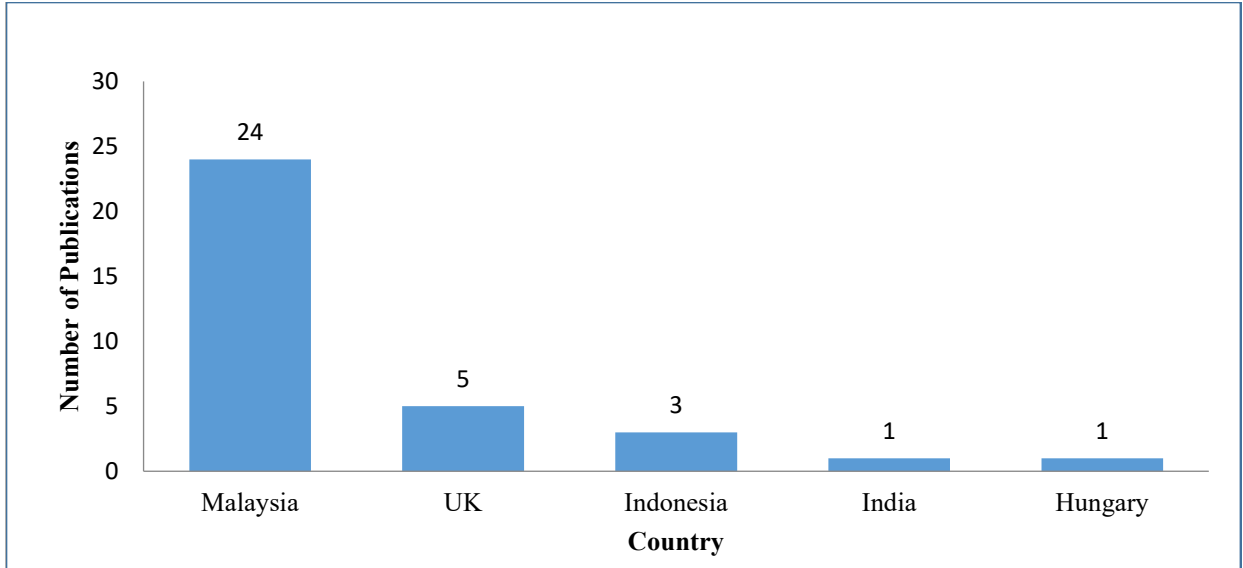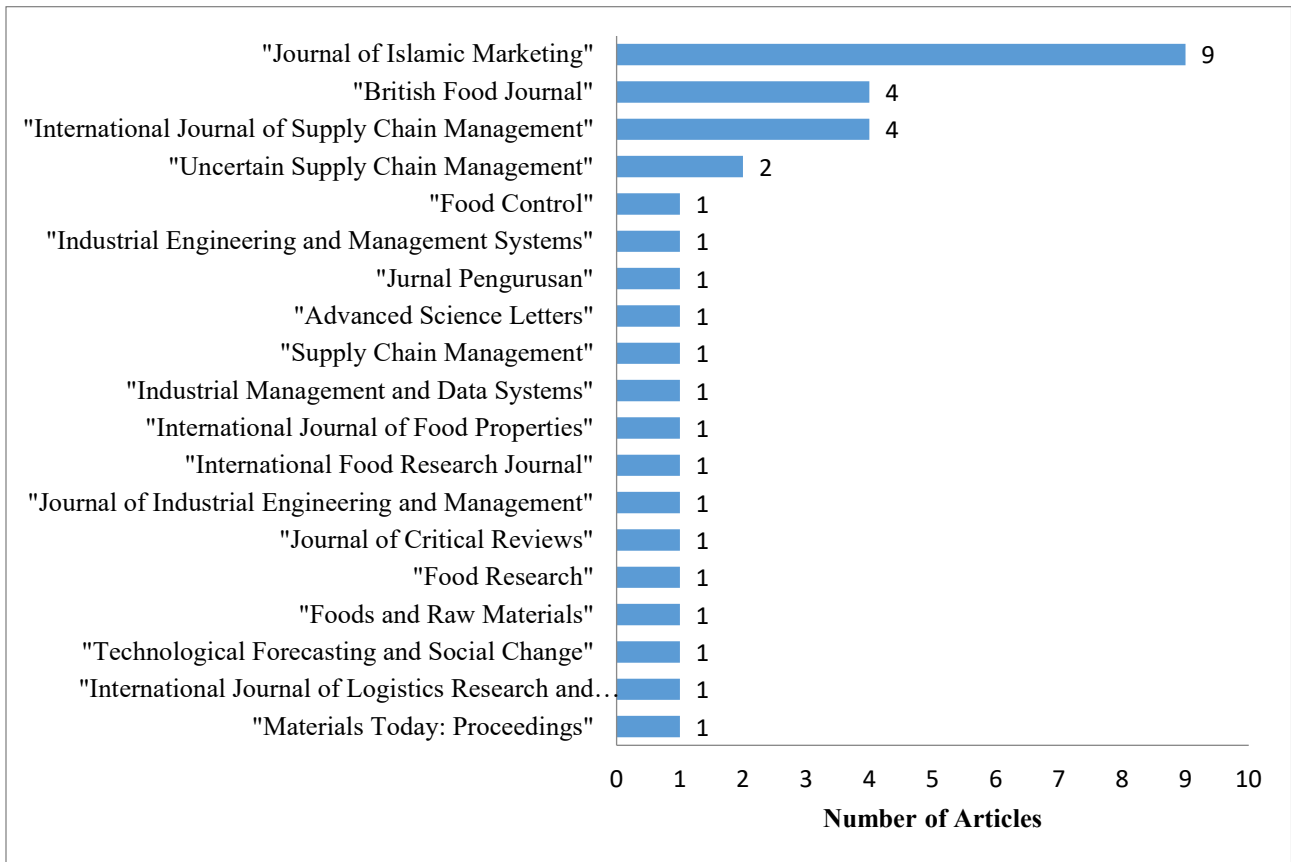
Figure 3. Publications by Country

Figure 4. Publications by Journal

5.1.4 Number of Citation
Table 3 shows top 10 articles that mostly cited and the authors. A summary based on table 3, Tieman's article was cited the most by other researchers with two articles.

Table 3. Number of citation

No	Title and Author	Cited By
1	The application of Halal in supply chain management: In-depth interviews (Tieman, 2011)	179
2	Principles in halal supply chain management (Tieman et al., 2012)	138
3	Halal integrity in the food supply chain (Soon et al., 2017)	82
4	A supply chain integrity framework for halal food (Ali et al., 2017)	65
5	Halal clusters (Tieman, 2015)	56
6	A sustainable Blockchain framework for the halal food supply chain: Lessons from Malaysia (Ali et al., 2021)	52
7	The impact of external integration on halal food integrity (Tan et al., 2017)	52
8	Prioritising the risks in Halal food supply chain: an MCDM approach (Khan et al., 2022)	38
9	Food supply chain integrity: The need to go beyond certification (Ali et al., 2017)	38
10	Applying Blockchain for Halal food traceability (Tan et al., 2022)	31
11	Food safety and halal food in the supply chain: Review and bibliometric analysis (Wahyuni et al., 2019)	31
12	Extenuating food integrity risk through supply chain integration: The case of halal food (Ali et al., 2014)	31

5.2 Thematic Analysis
Ensuring halal integrity is the biggest challenge in the halal industry. Halal integrity offers assurance and could create more demand for authentic halal products. As the integrity of halal products is the result of various processes along a supply chain, the supply chain approach is important to guarantee the halal integrity from the point of origin to the consumers (Mohamed et al. 2020). Halal food production requires quality and wholesomeness throughout the supply chain (Mohd Helmi Ali, Tan, et al. 2017). In light of this, the halal quality of food is best referred to as food integrity, which points to the typology highlighted by (Elliott 2014), food integrity encapsulates not only the issues of food safety and quality, but also the way it has been sourced, procured, and distributed – as well as the honest and accurate provision of information about those elements to consumers.

Halal transparency along the food supply chain could be enhanced by a halal traceability system that effectively encourages trust in consumers toward halal food products and food safety (Nawi *et al*. 2018). Traceability plays a vital role in the success of Halal Supply Chain (HSC) (S. Khan et al. 2018). Sharing product-related information is essential in the PFSC and is usually facilitated by traceability systems (Lusiantoro *et al*., 2018). Establishing an accurate and effective food safety traceability system has become a key solution to the food safety issues (Lin *et al*. 2019). From a consumer perspective, traceability helps to build trust, peace of mind, and increase confidence in the food system (Aung & Chang 2014).

Currently, the advancement of information and communication technologies (ICTs) has facilitated the creation of a novel approach to product traceability (Sayogo 2018). In the traceable food supply chain the emerging technologies are: Internet of Things (IoT), machine leaning, block chain and data mining (Dash & Jena 2022). Traceability system using advanced technology offers the opportunity to add value to consumers through improved product quality assurance. Recent technological advances also provide a constant information feed-back, allowing food chains to monitor all items (Morales *et al*. 2022).

5.3 Bibliometric Analysis
Of the 34 selected articles reviewed were analyzed using bibliometric tools and techniques to study the co-occurrence of the authors' keywords analysis of their publications and the co-authorsip analysis.

5.3.1 Co-occurrence analysis of keywords
The keyword co-occurrence is a scientific data mining method that is widely used in academic papers to reveal current research topics for a particular discipline or field of study (Sternitzke & Bergmann 2009). The appearance of two

keywords in several publications shows that there is a close relationship between the topics. The result showed there are approximately 121 keywords.

As shown in Figure 5, the large nodes are halal, halal food, food supply chain, food integrity and halal supply chain management, which means that the five words are high in frequency. There are five clusters based on color. Each color represents a specific topic grouped. The color line shows how often one node (e.g. food integrity, yellow node) is connected to another node (e.g. halal food, green node). The different colors mark each node's group linked to the other nodes in a similar title and keyword group. Each cluster's central topic is based on the line thickness and how busy the nodes are connected to others.
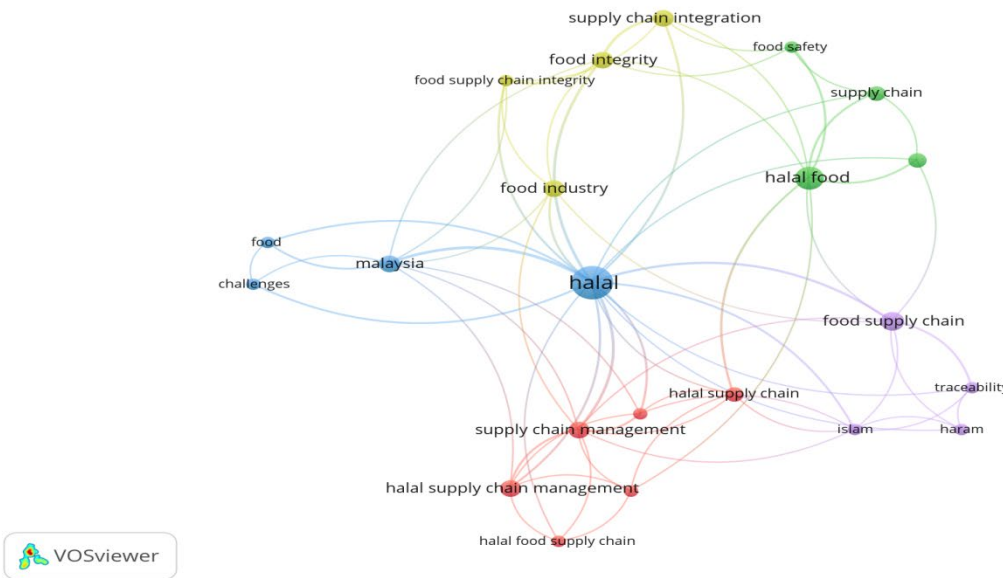

Figure 5. Co-occurrence network and visualization of keywords

From Figure 5, the occurrence of keyword were identified. The occurance of halal (15), malaysia (4), food (2) and challenges (2) belonged to cluster one (blue color). Supply chain management (4), halal supply chain management (4), halal supply chain (3) and halal food supply chain (2) belonged to cluster two (red color). Then, food supply chain (5) , traceability (2), Islam and haram (2) belonged to cluster three (purple color). Finally halal food (7), supply chain (3), blockchain technology (3) and food safety (2) belonged to cluster four (green color). Food integrity (4), supply chain integration (4), Food industry (4) and food supply chain integrity (2) belonged to cluster five (yellow color). Lastly, these 10 most frequent keywords are showed in Table 4.

Table 4. Keywords by Authors

Rank	Keyword	Total link Strengh
1	Halal	35
2	Supply chain management	14
3	Malaysia	13
4	Food integrity	12
5	Halal food	12
6	Food suplly chain	11
7	Halal logistics	8
8	Halal supply chain management	8
9	Supply chain integration	8
10	Food supply chain integrity	7

5.3.2 Co-authorship analysis of authors.

Based on VOSviewer software, co-authorship analysis is divided into the unit of analysis, namely, authors, institutions and countries. The co-authors' analysis also revealed the result of the most productive authors, affiliations and countries (Pahlevi 2022). Nevertheless, this study only focused on coauthorship of author analysis. The result showed 102 authors; however, based on VOSviewer, most of them have not connected. Only 10 authors have the largest set of connected items among them, as presented in Figure 6. Figure 6 shows the relationship among the 10 authors. These authors were classified into four clusters represented by the colors
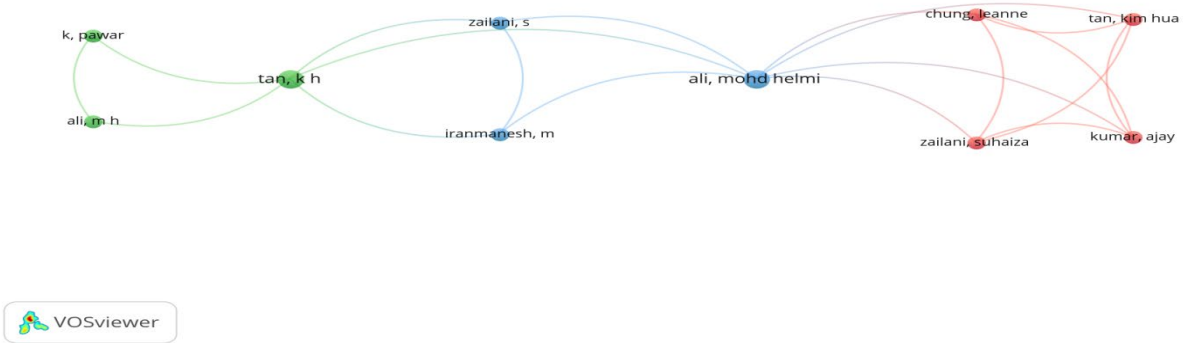

Figure 6. Co-authorship analysis of authors

6. Conclusion

At the beginning of this paper, two research questions were identified, in the following we provide answers:

RQ1. According to the study, HFI is assuring food remain halal regarding any materials, activities, processes and equipment using in food production. Halal integrity means that the product remains halal from the upstream to the downstream supply chain. Ensuring halal integrity is the biggest challenge in the halal industry. The key to improved halal integrity is transparency so that consumers can make informed decisions. Halal transparency along the food supply chain could be enhanced by a halal traceability system

RQ2. The less-explored HFI topics in the literature that could be a basis for future research agendas are: implementation of traceability technology to add value to consumers through improved HFI and research related to some barriers and challenges in adopting advanced traceability technology. Traceability technologies provide great opportunities but their adoption rate is rather low (Corso *et al*. 2010). Many companies, especially in developing countries, struggle to start their digital supply chain transformation effort due to several challenges. Limitations in obtaining information, difficult accessibility especially for perishable food with many ingredients and variable composition (Olsen & Borit 2013) or several transformation processes (Storøy *et al*. 2013). Lack of skilled staff to implement traceability, lack of awareness and knowledge regarding available technologies and frameworks (Bosona & Gebresenbet 2013; Canavari *et al*. 2010) and reluctance especially from small businesses that are used to work in a certain manner.

Eventually, this research has some limitations. First, this study is based purely on a literature review, which is used to explore HFI in the halal food supply chain management. Future work should use an empirical research on HFI. Second, this research is only based on a single international Scopus database that readers can see as a possible limitation. Future research could combine Scopus, EBSCO, ABI/Inform, and Web of Science to see if there could be even more integrated results. Finally, although the SLR provides rigorous methodology to avoid interpretative bias, however it is possible that relevant articles were not captured by the search engines. Future studies could bring interesting new research lines that have not covered by this research.

Acknowledgements

References

Ali, M.H., Chung, L., Kumar, A., Zailani, S., & Tan, K. H., A sustainable Blockchain framework for the halal food supply chain: Lessons from Malaysia, *Technological Forecasting and Social Change*, vol. 170, no. May, pp. 120870, 2021.

Ali, M.H., Zhan, Y., Alam, S. S., Tse, Y. K., & Tan, K. H., Food supply chain integrity: The need to go beyond certification, *Industrial Management and Data Systems*, vol. 117, no. 8, pp. 1589–1611, 2017.

Ali, M H, & Suleiman, N., Eleven shades of food integrity: A halal supply chain perspective, *Trends in Food Science \& Technology*, vol. 71, pp.216–224, 2018.

Ali, M H, Tan, K. H., & K, P., Extenuating food integrity risk through supply chain integration: The case of halal food, *Industrial Engineering and Management Systems*, vol. 13, no. 2, pp. 154–162, 2014.

Ali, M. H., Tan, K. H., & Ismail, M. D., A supply chain integrity framework for halal food, *British Food Journal*, vol. 119, no. 1, pp. 20–38, 2017.

Aung, M. M., & Chang, Y. S., Traceability in a food supply chain: Safety and quality perspectives, *Food Control*, vol. 39, no. 1, pp. 172–184, 2014.

Azmi, F. R., Abdullah, A., Bakri, M. H., & Musa, H., Perception of small medium and enterprises towards Halal food supply chain in Malaysia., *International Journal of Mechanical ENgineering and Technology*, vol. 9, no. 11, pp. 821-828,2018.

Bonne, K., & Verbeke, W., Religious values informing halal meat production and the control and delivery of halal credence quality, *Agriculture and Human Values*, vol. 25, pp. 35–47, 2008.

Bosona, T., & Gebresenbet, G., Food traceability as an integral part of logistics management in food and agricultural supply chain, *Food Control*, vol. 33, no. 1, pp. 32–48, 2013.

Canavari, M., Centonze, R., Hingley, M., Adams, H., & Spadoni, R., Traceability as part of competitive strategy in the fruit supply chain, *British Food Journal*, vol. 112, no. 2, pp. 171–186, 2010.

Corso, M., Dogan, S. F., Mogre, R., & Perego, A., The role of knowledge management in supply chains : Evidence from the Italian food industry, *International Journal of Networking and Virtual Organisations*, vol. 7, no. 2/3, pp. 163–183, 2010.

Dash, A., & Jena, S. K., Modeling traceability in food supply chain, *Benchmarking: An International Journal*, vol. ahead-of-print. mo. ahead-of-print, 2022

Elliott, C. T., Food Integrity and Traceability . Centre for ASsured , SafE and Traceable Food (ASSET), *Trends in Food Science & Technology*, vol. 28, no.2, pp. 61, 2014.

Fernando, Y., Jasmi, M. F. A., Wahyuni-TD, I. S., & Mergeresa, F., Supply chain integration and halal frozen meat product returns integration, *Journal of Islamic Marketing*, vol. ahead-of-print, no. ahead-of-print, 2022

Haleem, A., Khan, S., & Khan, M. I., Traceability implementation in food supply chain: A grey-DEMATEL approach, *Information Processing in Agriculture*, vol. 6, pp. 335–348, 2019.

Indonesian Ministry of National Development Planning. (2018). *Indonesia Islamic Economic Masterplan 2019-2024*.

Kamisah, S., Mokhtar, A., & Hafsah, A., Halal practices integrity and halal supply chain trust in Malaysian halal food supply chain, *International Food Research Journal* , vol. 25, no. Suppl. 1, pp. S57-S62, 2018.

Khan, A., Arafat, M. Y., & Azam, M. K., Role of halal literacy and religiosity in buying intention of halal branded food products in India, *Journal of Islamic Marketing*, vol. 13, no. 2, pp. 287–308, 2022.

Khan, S., Haleem, A., Khan, M. I., Abidi, M. H., & Al-Ahmari, A., Implementing traceability systems in specific supply chain management (SCM) through critical success factors (CSFs), *Sustainability*, vol. 10, no, 1, pp. 1-26, 2018.

Khan, S., Khan, M. I., Haleem, A., & Jami, A. R., Prioritising the risks in Halal food supply chain: an MCDM approach, *Journal of Islamic Marketing*, vol. 13, no. 1, pp. 45–65, 2022.

Lin, Q., Wang, H., Pei, X., & Wang, J., Food Safety Traceability System Based on Blockchain and EPCIS. *IEEE Access*, vol. 7, pp. 20698–20707, 2019.

Lizarelli, F. L., Torres, A. F., Antony, J., Ribeiro, R., & Salentijn, W., Critical success factors and challenges for Lean Startup : a systematic literature review, *The TQM Journal*, vol. 34, no. 3, pp. 534–551, 2022.

Lusiantoro, L., Yates, N., Mena, C., & Varga, L., A refined framework of information sharing in perishable product supply chains, *International Journal of Physical Distribution & Logistics Management*, vol. 48, no. 3, pp. 254–283, 2018.

Manning, L., Food fraud : policy and food chain. *Current Opinion in Food Science*, vol. 10, no. 2, pp. 16–21, 2016

Marucheck, A., Greis, N., Mena, C., & Cai, L., Product safety and security in the global supply chain : Issues , challenges and research opportunities, *Journal of Operations Management*, vol. 29, no. 7–8, pp. 707–720, 2011.

Mohamed, Y. H., Rahim, A. R. A., & Ma'aram, A., The effect of halal supply chain management on halal integrity assurance for the food industry in Malaysia., *Journal of Islamic Marketing*, vol. 12 No. 9, pp. 1734-1750, 2020

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. , Preferred Reporting Items for Systematic Reviews and Meta-Analyses : The PRISMA Statement, *Annals of Internal Medicine*, vol. 151, no. 4, pp. 264–269, 2009.

Morales, L. E., Ehmke, M. D., & Sheridan, A., Consumer Trust and Purchase of Perishable Fresh Food Online Versus In-Store : The Case of beef Consumer Trust and Purchase of Perishable Fresh Food, *Journal of International Food & Agribusiness Marketing*, vol. *0, no.* 0, pp. 1–23, 2022.

Mubarrok, U. S., Ulfi, I., Sukmana, R., & Sukoco, B. M., A bibliometric analysis of Islamic marketing studies in the "journal of Islamic marketing, *Journal of Islamic Marketing*, vol. 13, no 4, pp. 933–955, 2022.

Naser, A., Saif, M., & Islam, A. Blockchain in human resource management : a systematic review and bibliometric analysis. *Technology Analysis & Strategic Management*, vol. 0, no. 0, pp. 1–16, 2022.

Nawi, N. M., Basri, H. N., Kamarulzaman, N. H., & Shamsudin, M. N., Factors influencing consumers' preferences towards meat and meat products with traceability systems in Malaysia. *International Food Research Journal*, vol. 25, no. Suppl.2, pp. s157–s164, 2018.

Olsen, P., & Borit, M., How to define traceability. *Trends in Food Science & Technology*, vol. 29, no. 2, pp. 142–150, 2013.

Omar, E., Halal supply chain in the food industry - A conceptual model, *ISBEIA 2011 - 2011 IEEE Symposium on Business, Engineering and Industrial Applications*, pp. 384–389., 2011

Pahlevi, R. W., Mapping of Islamic corporate governance research: a bibliometric analysis, *Journal of Islamic Accounting and Business Research*, vol. ahead-of-print No. ahead-of-print, 2022.

Pinto, A. Di, Bottaro, M., Bonerba, E., Bozzo, G., Ceci, E., & Marchetti, P., Occurrence of mislabeling in meat products using DNA-based assay, *Journal of Food Science and Technology*, vol. 52, no. 4, pp. 2479–2484, 2015.

Poniman, D., Purchase, S., & Sneddon, J., Traceability systems in the Western Australia halal food supply chain. *Asia Pacific Journal of Marketing and Logistics*, vol. 27, no 2, pp. 324–348, 2015

Rahim, N. F., Consumer Behaviour, Perception and Planning Towards Halal Marketing, In *Advances in Islamic Finance, Marketing, and Management* , pp. 271–307, 2017

Rahman, A. A., Singhry, H. B., Hanafiah, M. H., & Abdul, M., Influence of perceived benefits and traceability system on the readiness for Halal Assurance System implementation among food manufacturers, *Food Control*, vol. 73, pp. 1318-1326, 2017.

Rejeb, A., Rejeb, K., Zailani, S., Treiblmaier, H., & Hand, K. J., Integrating the Internet of Things in the halal food supply chain: A systematic literature review and research agenda, *Internet of Things*, vol. 13, pp. 1–18, 2021.

Reuters, T., & Standard, D. *State of the Global Islamic Economy Report 2022 Highlights.* https://www.muslimadnetwork.com/2022/04/06/state-of-the-global-islamic-economy-report-2022/

Samori, Z., Ishak, A. H., & Kassan, N. H., Understanding the Development of Halal Food Standard: Suggestion for Future Research, *International Journal of Social Science and Humanity*, vol. 4, no. 6, pp. 482–486, 2014

Sayogo, D. S., Online traceability for halal product information: perceptions of Muslim consumers in Indonesia, *Journal of Islamic Marketing*, vol. 9, no.1, pp. 99–116, 2018.

Soon, J M, Chandia, M., & Regenstein, J. Mac., Halal integrity in the food supply chain, *British Food Journal*, vol. 119, no. 1, pp. 39–51, 2017

Sternitzke, C., & Bergmann, I., Similarity measures for document mapping : A comparative study on the level of an individual scientist, *Scientometrics*, vol. 78, no. 1, pp. 113–130, 2009.

Storøy, J., Thakur, M., & Olsen, P., Principles and guidelines for implementing traceability in food value chains,

Journal of Food Engineering, vol. 115, pp. 41–48, 2013..

Syazwan, M., Talib, A., Bakar, A., Hamid, A., & Hafiz Zulfakar, M., Halal supply chain critical success factors: a literature review, *Journal of Islamic Marketing*, vol. 6 *No.1*, pp. 44–71, 2015.

Tan, A., Gligor, D., & Ngah, A., Applying Blockchain for Halal food traceability, *International Journal of Logistics Research and Applications*, vol. 25, no. 6, pp. 947–964, 2022.

Tan, K. H., Ali, M. H., Makhbul, Z. M., & Ismail, A., The impact of external integration on halal food integrity, *Supply Chain Management*, vol. 22, no. 2, pp. 186–199, 2017.

Tieman, M, Vorst, J. G. A. J. van der, & Ghazali, M. C., Principles in halal supply chain management, *Journal of Islamic Marketing*, vol. 3, no. 3, pp. 217–243, 2012.

Tieman, Marco., The application of Halal in supply chain management: In-depth interviews, *Journal of Islamic Marketing*, vol. 2, no. 2, pp. 186–195, 2011.

Tieman, Marco., Halal clusters, *Journal of Islamic Marketing*, vol. 6, no. 1, pp. 2–21, 2015.

Tranfield, D., Denyer, D., & Smart, P., Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review *, *British Journal of Management*, vol. 14, pp. 207–222, 2003.

Vanany, I., Rakhmawati, N. A., Sukoso, S., & Soon, J.M, Indonesian halal food integrity: Blockchain platform. International Conference on Computer Engineering, Network and Intelligent Multimedia (CENIM), 297-302, 2020.

Wahyuni, H., Vanany, I., & Ciptomulyono, U., Food safety and halal food in the supply chain: Review and bibliometric analysis, *Journal of iIdustrial Engineering and Management*, vol.12, no. 2, pp. 373-391 , 2019.

Zulfakar, M.H, Anuar, M. & Syazwan Ab Talib, M., Conceptual Framework on Halal Food Supply Chain Integrity Enhancement, *Procedia - Social and Behavioral Sciences*, vol. *121*, pp. 58–67, 2014.

Zulfakar, M H, Chan, C., Jie, F., & Sundram, V. P. K., Halal accreditation and certification in a non-muslim country setting: Insights from Australia halal meat supply chain, *International Journal of Supply Chain Management,* vol. 8 no. 1, pp. 10-17, 2019.

Zulfakar, Mohd Hafiz, & Chan, Institutional forces on Australian halal meat supply chain (AHMSC) operations, *Journal of Islamic Marketing*, vol. 9, no. 1, pp. 80–98, 2018.

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