A Systematic Review on Halal Supply Chain Research

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Abstract

This paper presents a systematic review on halal supply chain (HSC) topic. HSC is a growing concept (since 2008) as a spin-off from classic supply chain concept due to the increasing awareness of delivering halal products for Muslim as well as non-Muslim customers. The study has reviewed 88 papers (65 empirical ones) and provides four main findings. Firstly, in term of theory, theory of planned behavior, theory of reasoned action, and arc of integration approach are the most theories used for studying HSC. Secondly, the choice of quantitative method dominates the empirical papers on HSC studies. Thirdly, the majority of HSC studies were conducted in Muslim countries with the food and beverage industries as the main studied sectors. Fourth, based on the results from social network analysis (SNA), the HSC studies are clustered into three research themes, namely HSC related issues, food issues, and supporting system issues. The study suggests future research agendas such as elaborating theoretical and methodological aspects by examining the three research themes. These would contribute to the HSC body of knowledge.

Keywords

Halal, halal supply chain, bibliometric technique, network analysis, systematic literature review.

1. Introduction

Halal market offers alternative in the middle crowd of conventional market segments, both in Muslim and non-Muslim countries. Its popularity was raising due to the increasing demand for high quality, safe, and concern to environment issue. Muslim people chose halal products due to the religious requirement based on the Islamic principles. Allah SWT said, "*Then eat of what Allah has provided for you [which is] lawful and good and be grateful for the favor of Allah, if it is [indeed] Him that you worship* (Q.S. An-Nahl verse 114)". On the other hand, non-Muslim people voluntarily chose halal products because the halal products were claimed to provide health benefits (Krishnan *et al.*, 2017). Moreover, several secular countries such as New Zealand, Thailand, Japan, Republic of South Korea have been producing mass halal certified products to be distributed and sold locally as well as globally (Petrilia, 2019).

The word "halal" is an Arabic language which means that all things and actions were granted permission by the Sharia (i.e. Islamic law) and it refers to the Islamic belief (Rejeb, 2018). Allah SWT said, "*And eat what Allah has provided you (which is) lawful and good. And fear Allah in whom you believe*" (Q.S Al-Maidah verse 88). Another important word related to halal is "thoyyib" (also an Arabic language) meaning wholesome and good (Tieman, 2011). The concept of halal and thoyyib as 'wholesome' covers nutritious, quality, cleanliness and safety for everyone. While they were not meant only for Muslim society (Omar et al. 2010) but also for all humanities in this world, both concepts were complementing one to another. For example, a meat from an animal that is allowed to be consumed in Islam rule but "not-thoyyib due to the process of delivering the meat (the animal was slaughtered not in accordance to the Islam way), the meat was not halal as a result. In contrast, when the meat is "thoyyib" (i.e. the process of preparing the meat complies with the Islam way) but the animal itself is forbidden to be consumed according to the Islam rules, it causes the meat becomes not halal as well. Both concepts should be fulfilled in order to be called the halal products.

Currently, customers demand to have not only halal products but also halal processes (Bonne and Verbeke 2008). They buy halal products particularly because of the halal process (Omar et al. 2011). Therefore, the concepts of halal and thoyyib needed in supply chain management to ensure the quality and integrity of halal products (see Lada et al. 2009; Wilson and Liu 2010; Tieman 2011). HSC management (HSCM) is an extension of the existing SCM focusing more on delivering the halal process along the upstream line to downstream one (Potluri et al. 2017; Osman and Aziz 2018). Additionally, the HSCM is the management of a halal network with the objective to extend the halal integrity from source to the point of consumer purchase and how to deliver halal products to the consumer point of purchase (Tieman et al. 2012). The process of HSCM must be halal from suppliers to end-customers (Omar et al. 2011) and must comply with Shariah law (Khan et al. 2018).

Our data (see Figure 1) shows only one study in 2008 is increased to 41 studies in 2018 and 18 (until mid of 2019). The finding indicates the growing concern on HSC studies from time to time. However, to best of our knowledge, none of the studies provide a systematic review for the topic of HSC expect for traditional ones. A systematic study of HSC field within ten years is relevant to provide better mapping of the existing debates in the HSC topics.
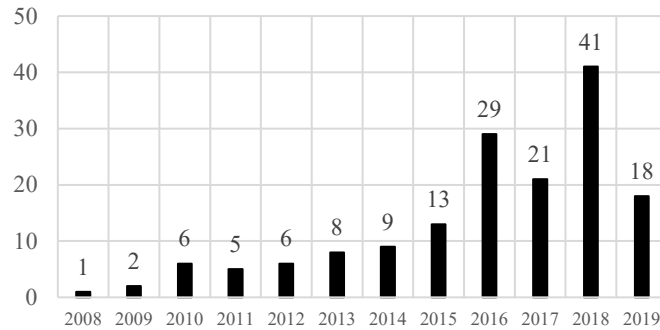
Figure 1. Number of HSC publications 2008-2019

Based on the abovementioned, the current study is expected to answer two research questions (RQ). *First*, what has been done in the HSC studies with respect to theories/perspectives, research methodology, research setting (i.e. sectors and country of origin)? *Second*, what are the research themes used in the HSC studies?

2. Methodology

The paper is outlined into three sections. The methodology section covers method used to collect, transcribe, process, and analyze the reviewed papers are presented in first section. The second section elaborates the results from the data processing and analysis to answer the RQs. Finally, discussion of the results which leads to recommendation for future studies are summarized at the end of this paper. The systematic review deployed a bibliometric technique adopted from previous bibliometric studies, such as Setyaningsih el al. (2018), and Wahyuni et al, (2019). The bibliometric technique consists of five steps as follows (see Figure 2).

The first step, *initial stage* is finding relevant publication papers by using Google scholar for its source of papers. We used Publish or Perish (POP) software with four combinations of keywords and title words to capture variety of HSC-related topics. First combination, we used initial keywords of "HSC" OR "halal logistic" OR "halal distribution" OR "halal value chain" OR "Islamic supply chain" and a title word of the "HSC". It resulted to 146 papers. Second combination, the same keywords – as the first combination -- used together with "halal logistic" as a title word. The results were six papers. After that, we used the same keywords together with "halal distribution" as a title word as the third combination and obtained two papers. The last combination, the same keywords with "halal value chain" as a title word were used and resulted to five papers. From the four combinations 159 papers based on journal, proceedings, conferences, symposiums, book, working paper/thesis, and citation are collected.

The second step, setting the specific criteria to select the relevant papers for further analysis. Three criteria were used to ensure the quality of the selected papers are: "language (English)", "has an index value (*Scimagojr*)", and "a non-predatory journal (*beallslist.weebly.com*)". We got 88 selected papers for further analysis, consist of three papers from Q1 (Scopus indexed); 16 papers from Q2, 18 papers (Q3), two papers of Q4, and 36 papers from non-Scopus indexed. In addition, 13 papers from conferences, symposiums, and proceedings were also included after carefully checking the quality and the relevance of the papers. The third step, inputting the data or documenting systematically the 88 selected papers based several key aspects from each paper, i.e. theories used in the study, research methodology, and research setting (i.e. sector/industry and country of origin), and research themes. This step is conducted with the help of Ms. Excel. The fourth step is data processing/analysis and presenting. To do this, we used the software of

VOSviewer to visualize the findings and SNA program to analyze interrelationship between a keyword (or node) to other keywords (or nodes). The results are then analyzed for answering the research questions.
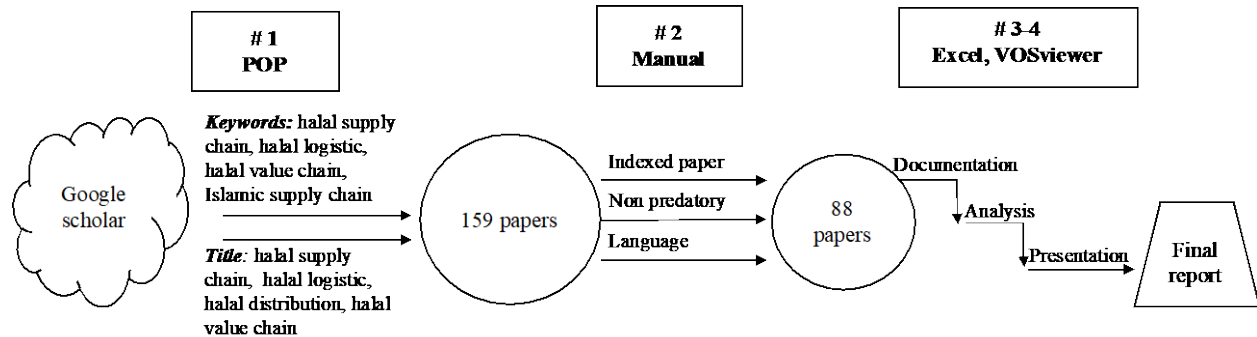

Figure 2. Research stage

3. Result and Discussion

This subsection discusses the results of 88 selected papers with addresses to the two research questions refer to theories/perspectives, research methodology, research setting (i.e. sectors and country of origin), and clusters of research themes.

3.1 Theories/perspectives used in the HSC studies

Various (ten) classical theories have been used to study HSC as shown in Table 1. Theory of Planned Behavior (TPB), the Arc of Integration Approach (AIA), and the Theory of Reasoned Action (TRA) are the most frequent classical theory used in this field. For example, the TRA and the TPB were used to explain consumer awareness of halal products, motivation and intention to buy halal products as called consumer buying behavior (Yusoff et al. 2015). Another study by Osman and Aziz (2018) examined the TPB and the TRA to predict the level of consumer behavior (attitude, social norms, and perceived behavioral control and intention), and the AIA was used to link with halal food integrity.

Table 1. Theories or approaches used in the HSC studies

No	Theories and Approaches	Number of Used
1	Theory of Planned Behavior	3
2	Arc of Integration Approach	3
3	Theory of Reasoned Action	2
4	Adaptive Theory	1
5	Agency Theory	1
6	Convention Theory	1
7	Fuzzy Set Approach	1

8	Institutional Theory	1
9	Mean End Chain Theory	1
10	Math Model Approach	1

3.2 Research methodology used in the HSC studies

As shown in Figure 3, of 88 reviewed papers, 35 papers of HSC studies are in the form of conceptual paper (i.e. traditional literature review), and the rest paper are empirical works. In term of research method, interview (from qualitative paradigm) dominates the findings (34 studies). Of the 30 studies from qualitative paradigm, 25 studies used survey and five studies used mathematical modelling techniques, such as Multi Criteria Decision Making (MCDM), Best-Worst Method (BWM), Comprehensive Multi-Step Approach, House of Risk (HOR), and Analytical Hierarchy Process (AHP) twice. Furthermore, grounded theory method became the least (1 study) used research method in this study. Many empirical studies combined more than one approach, for instance, survey method and modelling, or modelling and case study to provide better and more comprehensive analysis. For example, Kusrini et al. (2018) conducted research using the case study approach and modeling (Analytical Hierarchy Process AHP method). The first phase was mapping supply chain structure that comprise of 5 process (i.e. planning, procurement, receiving and storage, distribution, return) and designed halal performance indicators validated by the General Manager who has full experience and responsibility for the halal retail supply chain. Next step was calculating weighting of indicators used AHP and calculating score of performance supply chain by multiplying the weighted and value of indicators.
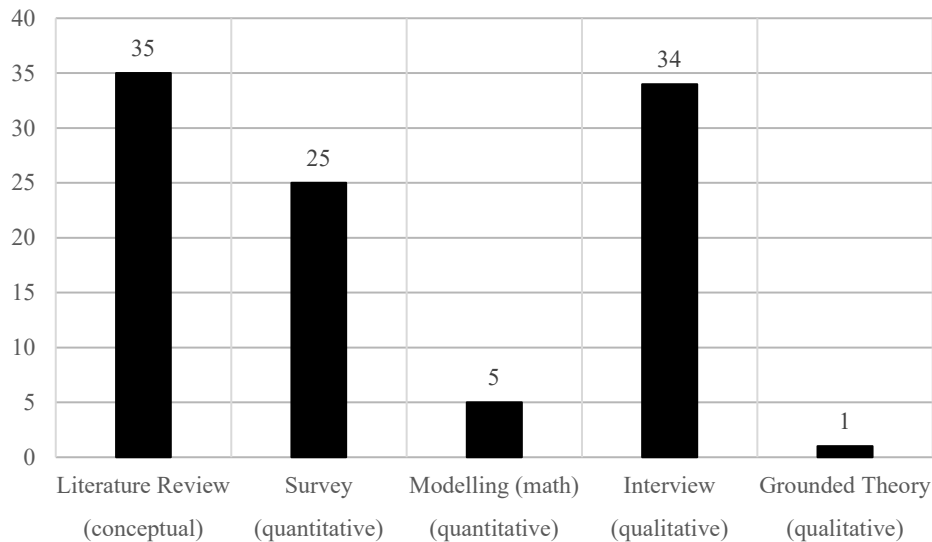
Note: one study may use more than one method

Figure 3. Methodologies used in the HSC studies

3.3 Research setting of the HSC studies, i.e. sectors/industries and country of origin

The research settings represent the situation or background in terms of culture, political, social, and other factors that provide better understanding of economic behavior, called as 'a context specific'. Context enables a connection to be made between environment, condition, and business opportunities (Welter 2011). In term of the industry/sector type, we found that food and beverage is the most sector/industry type used (31 of 57 papers) for studying the HSC (see Figure 4). This finding is expected since the nature of food and beverage sector is closely related to the presence of

halal and thoyyib issue (i.e. the process and the source/material). The second common sector used to study HSC is logistic sector. The logistic sector covers warehousing, transportation and terminal operations. Tieman (2013) stated that contamination was the key issue in the logistic industry as direct contact with haram object could happen along the delivery process and it should be taken care of carefully in favor of Muslim consumers.
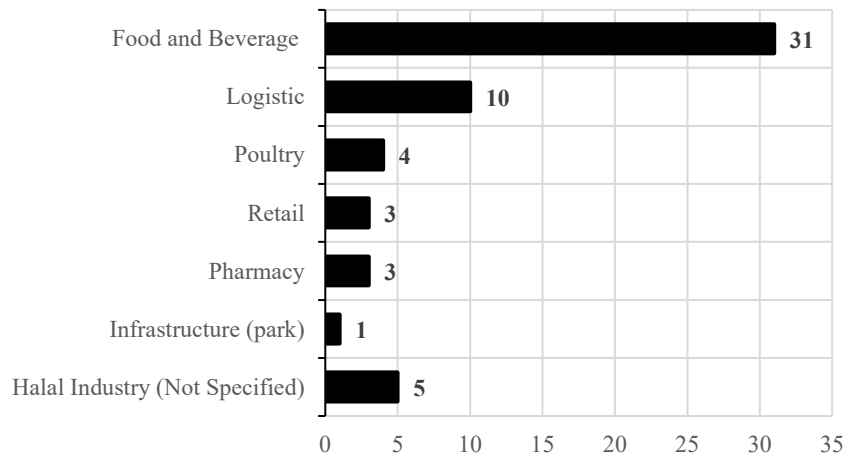

Figure 4. Research setting: sector or industry type

We also found that only one study conducted in the context of infrastructure sector (halal parking). According to the Halal Development Corporation (HDC) (HDC 2017), the halal park is a manufacturing and service business community located on a shared property and is designed to maintain the integrity of halal products. Halal parking may include green design of park infrastructure, cleaner production, pollution prevention, availability and accessibility of raw materials, energy efficiency, inter-company relations, consolidated services from public bodies, and relations for marketing. Even though, the number of studies on halal parking are still limited, the issue is very critical for future study. For example, In Indonesia, the existence of halal park is located in the capital city of Indonesia (at Senayan Park, Jakarta). This park is being transformed into halal district not only complying the halal principle but can be expected to have an impact on the economic growth of a region (Widodo 2019). Furthermore, several studies on HSC used more than one industry such as study by Maman et al. (2015) in the setting of food and beverage, logistics (transportation), and retail industry.

With regards to country of origin, we classified it into two categories, namely: predominantly Muslim countries and predominantly non-Muslim countries. The classification was based the number of people in the country who claimed to be follower of Islam religion. According to Wikipedia (2019), a country majority religion is a religion of which the number of followers is more than half of the country's population. As shown in Table 2, we found that studies on HSC topic is mainly conducted in the predominantly Muslim countries (53 studies) rather than in predominantly non-Muslim countries (11 studies). Malaysia and Indonesia are the most preferred Muslim countries among ASEAN region to study HSC issues (44 studies in Malaysia, and 7 studies in Indonesia). Country specific such as nature of Muslim environment which halal and thoyyib practices are required in economic activity within the nation can be of explanations of this finding. Malaysia is a well-known Muslim country which uses the Islamic law for all daily activities, while Indonesia is a country with almost 90% of the citizens are Muslim. However, this is not the case for UEA. The current finding also indicates that studies HSC in non-Muslim countries are increased due to the increased of awareness of the benefit of halal products around the world.

Table 2. Country of origin

Countries	# research	Countries	# research
Predominantly Non-Muslim	***11***	***Predominantly Muslim***	***53***
Australia	5	Malaysia	44
Japan	1	Indonesia	7
Singapore	1	UEA	1
United Kingdom	1	Brunei Darussalam	1
China	1		
India	1		
Netherlands	1		

3.4 Cluster of research themes of HSC studies

We used VOSviewer software to visualize potential clusters among the keywords and titles of the reviewed papers, following three procedures. First, we identified three major clusters based on three different colors (i.e. red, blue, and green) of each major topic presented in the diagram (see Figure 5, on the left side). Each color represents to specific topics that grouped together. The lines (also in color) indicates how often one node (e.g. integrity, red point) connects to other nodes (e.g. halal food, halal food supply chain, etc.). The difference in color marked the group of each node connected to other nodes within similar group of titles and keywords. Second, we analyzed each line using SNA concept, the larger the line between two points indicated the more frequent the two points are interrelated based on the keywords and titles from the selected 88 papers. Third, we identified central topics in each cluster based on the thickness level of the line and how "busy" the node connected to other nodes. Our analysis continues on the right side with giving a generic theme on each cluster based on our interpretation of the keywords in each cluster and generalize those keywords into one theme. Figure 5 summarizes the analysis process.
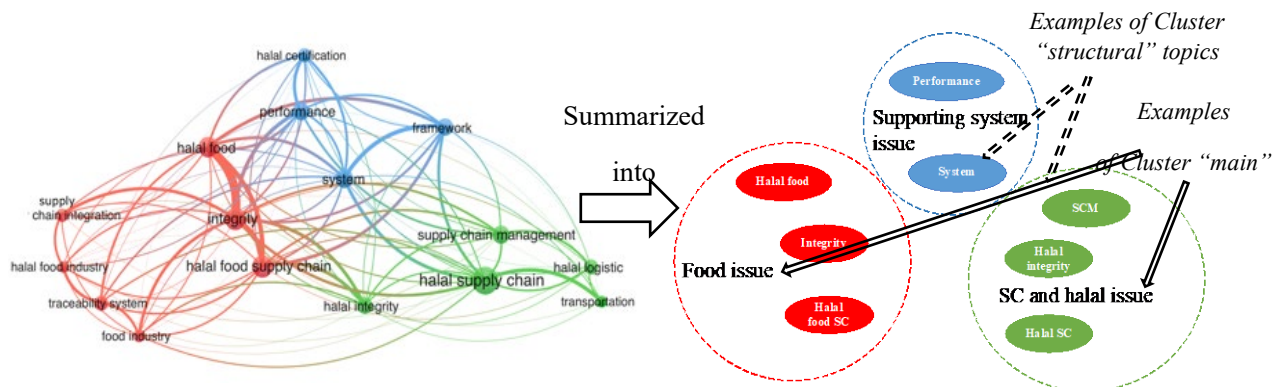

Figure 5. Network visualization and central topic clusters

Based on the 88 reviewed papers, the study found that the research themes on HSC topic can be classified into three clusters, namely a) food-related issues; b) supporting system-related issues; and c) supply chain and halal-related issues (see Figure 5). The cluster of food-related issues focus on how to provide good quality of food involving all steps or processes (i.e. raw material provider, warehouse, transportation, distribution) along the supply chain. Topics used in this cluster such as the need for integration in the operations by considering the risk issues to provide better traceability and visibility in the supply chain (Ali et al., 2015). For instance, studies from Ab Rashid et al. (2019); Zulfakar et al. (2014); and Bahrudin et al. (2011) found that the implementation of comprehensive and reliable traceability system would definitely strengthen the halal food supply chain and increase the halal integrity.

The second cluster of research theme is supporting system-related issues which cover the support system and its impact to supply chain or firm performance. Examples for this cluster, for instance, a study by Ab Talib et al. (2015) proposed five critical success factors to ensure the integrity process in HSC, namely government support, dedicated assets, information technology, human resource management, collaborative relationship, and halal certification. The third cluster is the supply chain and halal-related issues elaborates topics on the extended definition on SCM and its relationship to SCM integrity and halal product concerns. Studies of Alqudsi (2014) and Ngah at al. (2014) focusing on the successful implementation of halal logistics are the example of the studies in this cluster.

4. Concluding Remarks and Future Research Agenda

The HSC studies received an increased attention from management scholars within 11 years. Based on the findings of 88 selected papers on HSC, the current study summarizes the following remarks which lead to suggestions of future research. First, the majority of studies on HSC used the classical theories such as TPB or TRA and AIA approach to examine the antecedents of intentions towards halal products consumptions. The use of existing theories is often independently solely upon the objective of the HSC studies. The main aim of the existing studies on HSC is a theory testing. In order to provide comprehensive understanding of the HSC phenomenon, integrating or combining at least two theories/approaches are relevant for future research. In addition, exploring or understanding the process of halal products by utilizing more process-oriented theories (such as dynamic capabilities, institutional theory, stakeholder theory) are of interesting agendas for future research.

Second, with regards to the research methodology, the majority of the studies are using quantative method (i.e. deductive approach) with survey as the main data collection while qualitative methods are not often used as well as (math) modeling. As pointed out in the previous suggestion, there is a need to understand how and why organizations adopt and implement HSC principles, more inductive approaches or interpretivist paradigm such as multiple-case study or phenomenology and etc. are essential to be conducted. Third, our results show that most studies are done in the setting of food and beverage industry mainly in Muslim countries such as Malaysia and Indonesia. A very relatively few is conducted for other sectors such as halal infrastructure (i.e. parking), tourism and hospitality (Islamic hotels and halal restaurants), financial services (Islamic banking), health (tibb nabawi), beauty (cosmetics and salon), pharmacy (medicine), general education (integrated Islamic school), real estate (sharia housing), and toiletry products (shampoo, soap, toothpaste and toothbrush). In addition, taking other Muslims countries or non-Muslim countries and combined with various potential sectors are relevant to be explored for future research agenda. Finally, our study identified three research theme clusters that also relevant to be investigated further. For instance, future research can focus on several possible topics such as examining deeper the potential relationship between supply chain and the HSC, exploring in detail food-related issues within the HSC, or focusing more on the support system-related factors for HSC implementation.

References

Ab Rashid, N., Supian, K. and Bojei, J. (2019) 'The relationship between halal traceability system adoption and environmental factors on halal food supply chain integrity in Malaysia', *Journal of Islamic Marketing*. doi: 10.1108/JIMA-01-2018-0016.

Ab Talib, M. S., Abdul Hamid, A. B., & Zulfakar, M. H. (2015). Halal supply chain critical success factors: a literature review. *Journal of Islamic Marketing*, *6*(1), 44-71.

Ali, M. H. *et al.* (2015) 'The impact of supply chain integration on food integrity: Evidence from halal food manufacturers', *23rd International Conference for Production Research, ICPR 2015*. International Foundation for Production Research (IFPR).

Alqudsi, S. G. (2014) 'Awareness and Demand for 100% Halal Supply Chain Meat Products', *Procedia - Social and Behavioral Sciences*. Elsevier B.V., 130, pp. 167–178. doi: 10.1016/j.sbspro.2014.04.021.

Bahrudin, S. S. M., Illyas, M. I. and Desa, M. I. (2011) 'Tracking and tracing technology for halal product integrity over the supply chain', in *Proceedings of the 2011 International Conference on Electrical Engineering and Informatics, ICEEI 2011*. Institute of Electrical and Electronics Engineers. doi: 10.1109/ICEEI.2011.6021678.

Bonne, K. and Verbeke, W. (2008) 'Religious values informing halal meat production and the control and delivery of halal credence quality', *Agriculture and Human Values*, 25(1), pp. 35–47. doi: 10.1007/s10460-007-9076-y.

HDC (2017) *What is Halal Park?* Halal Industry Development Corporation. Available: http://www.hdcglobal.com/publisher/halal_park_what_is, November 13, 2019.

Khan, M. I., Haleem, A. and Khan, S. (2018) 'Defining Halal Supply Chain Management', *Supply Chain Forum: An International Journal*. Taylor & Francis, 19(2), pp. 122–131. doi: 10.1080/16258312.2018.1476776.

Krishnan, S. *et al.* (2017) 'Halal Food: Study on Non-Muslim Acceptance', *Halal Food: Study on Non-Muslim Acceptance*, 2017(1), pp. 41–45. doi: 10.5923/j.economics.20170701.05.

Kusrini, E., Qurtubi, Q. and Fathoni, N. H. (2018) 'Design Performance Measurement Model for Retail Services Using Halal Supply Chain Operation Reference (SCOR): A Case Study in a Retail in Indonesia', *Journal of Advanced Management Science*, 6(4), pp. 218–221. doi: 10.18178/joams.6.4.218-221.

Lada, S., Harvey Tanakinjal, G. and Amin, H. (2009) 'Predicting intention to choose halal products using theory of reasoned action', *International Journal of Islamic and Middle Eastern Finance and Management*, 2(1), pp. 66–76. doi: 10.1108/17538390910946276.

Maman, U., Mahbubi, A. and Jie, F. (2015) 'Halal risk mitigation in the Australian–Indonesian red meat supply chain', *Journal Islamic Marketing*.

Ngah, A. H., Zainuddin, Y. and Thurasamy, R. (2014) 'Adoption of Halal Supply Chain among Malaysian Halal Manufacturers: An Exploratory Study', *Procedia - Social and Behavioral Sciences*. Elsevier B.V., 129, pp. 388–395. doi: 10.1016/j.sbspro.2014.03.692.

Omar H.S, E. N. & J. (2011) 'Halal transportation in the Food Industry - A Conceptual Model', *IEEE Symposium on Business, Engineering and Industrial Applications (ISBEIA)*, pp. 384–389.

Omar, E. N., Jaafar, H. S. and Osman, M. R. (2010) 'Halal Supply Chain: A Preliminary Study of Poultry Industry', *Advances in Business Research International Journal*, pp. 98–109.

Osman, L. H. and Aziz, R. S. (2018) 'Millennial generations' awareness of halal supply chain and related food product in Malaysia', *International Journal of Accounting, Finance and Business*, 3(12), pp. 12–24.

Petrilia (2019) 'Aturan jaminan prouk halal diyakini tak ganggu dunia usaha di Indonesia'. Ekonomi Bisnis. available at: https://ekonomi.bisnis.com/read/20190116/12/879307/aturan-jaminan-produk-halal-diyakini-tak-ganggu-dunia-usaha-di-indonesia, November 1, 2019.

Potluri, R. M., Lee, J. W., & Potluri, L. S. (2017). An Exploratory Treatise on Consciousness and Espousal of Halal Supply-Chain: An Indian Perspective. *The Journal of Asian Finance, Economics and Business*, *4*(2), 69–74.

Rejeb, A. (2018) 'Halal Meat Supply Chain Traceability based on HACCP, Blockchain and Internet of Things', *Acta Technica Jaurinensis*, 11(4), pp. 218–247. doi: 10.14513/actatechjaur.v11.n4.467.

Setyaningsih, I., Indarti, N. and Jie, F. (2018) 'Bibliometric analysis of the term "green manufacturing"', *International Journal Management Concepts and Philosophy*, 11(2), pp. 315–339.

Talib, M. S. A., Hamid, A. B. A. and Zulfakar, M. H. (2015) 'Halal supply chain critical success factors: A literature review', *Journal Islamic Marketing*, 24(5), pp. 41–49. doi: 10.1108/EL-01-2014-0022.

Tieman, M. (2011) 'The application of Halal in supply chain management: In-depth interviews', *Journal of Islamic Marketing*, 2(2), pp. 186–195. doi: 10.1108/17590831111139893.

Tieman, M. (2013) 'Establishing The Principles In Halal Logistics', *Journal of Emerging Economies and Islamic Research*, Vol.1, pp. 1–13.

Tieman, M., Vorst, J. G. A. J. van der and Ghazali, M. C. (2012) 'Principles in halal supply chain management', *Journal of Islamic Marketing*, 3(3), p. 31.

Wahyuni, H., Vanany, I. and Ciptomulyono, U. (2019) 'Food safety and halal food in the supply chain: Review and bibliometric analysis', *Journal of Industrial Engineering and Management*, 12(2), p. 373. doi: 10.3926/jiem.2803.

Welter, F. (2011). Contextualizing entrepreneurship—conceptual challenges and ways forward. *Entrepreneurship theory and Practice*, *35*(1), 165-184.

Widodo, J. (2019) 'Resmikan Halal Park, Jokowi Ingin Angkat Industri Syariah RI ke Tingkat Globa'. Liputan 6. Available: https://www.liputan6.com/bisnis/read/3942876/resmikan-halal-park-jokowi-ingin-angkat-industri-syariah-ri-ke-tingkat-global, November 1, 2019.

Wikipedia (2019) 'Majority', *wikipedia*. Wikipedia. Available: https://id.wikipedia.org/wiki/Majority, November 1, 2019.

Wilson, J. A. J. and Liu, J. (2010) 'Shaping the Halal into a brand?', *Journal of Islamic Marketing*, 1(2), pp. 107–123. doi: 10.1108/17590831011055851.

Yusoff, F. A. M., Yusof, R. N. R. and Hussin, S. R. (2015) 'Halal food supply chain knowledge and purchase intention', *International Journal of Economics and Management*, 9(Special Issue), pp. 155–172.

Zulfakar, M. H., Anuar, M. M. and Ab Talib, M. S. (2014) 'Conceptual Framework on Halal Food Supply Chain Integrity Enhancement', *Procedia - Social and Behavioral Sciences*. Elsevier B.V., 121, pp. 58–67. doi: 10.1016/j.sbspro.2014.01.1108.

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