Analysing *Halal* Integrity and Sustainability Nexus in an Emerging *Halal* Supply Chain Ecosystem (HSCE)

D. N. Shariff[1], Dahlan Abdullah[2]*, Azita Aboo Bakar[3], Mohd Rizaimy Shaharudin[4], Anderson Ngelambong[2]

[1]Faculty of Maritime Studies, Universiti Malaysia Terengganu, 21030 Kuala Terengganu, Terengganu, Malaysia

[2]Faculty of Hotel and Tourism Management, Universiti Teknologi MARA Cawangan Pulau Pinang, 13500 Permatang Pauh, Penang, Malaysia

[3]Business Technology Section, Universiti Kuala Lumpur Malaysian Spanish Institute, 09090 Kulim, Kedah, Malaysia

[4]Faculty of Business and Management, Universiti Teknologi MARA Cawangan Kedah, 08400 Merbok, Kedah, Malaysia

***Corresponding Author**

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ABSTRACT

Global demand for *halal* food has grown substantially. In 2020, about a quarter of the world's food trade comes from *halal* food sector, amounting to approximately USD 2 trillion. Over the past few decades, research on *halal* food has primarily focused on the demand side of the market economy, especially customer needs and satisfaction. Recently, researchers have begun to shift their attention to the supply side of the *halal* food industry, particularly exploring issues on *halal* integrity. Studies have revealed that the transportation and transiting sector poses a higher risk compared to manufacturing in establishing *halal* integrity assurance on *halal* products. This article analyses the factors that lead to *halal* integrity issues in the *halal* supply chain ecosystem based on the latest statistics, press releases, industrial reports, and recent research articles. The discussion concludes with some recommendations for improvement from the perspective of freight forwarders are provided. Along with other stakeholders, freight forwarding services play a crucial role in the supply chain ecosystem, acting as customers' brokers, assisting in forwarding and clearing cargo. In the post-COVID-19 context, the need to re-evaluate and enhance the efficiency, competitiveness, and sustainability of the ecosystem is crucial due to the current global GDP shrinkage and trade wars across countries. *Halal* supply chain services are eco-friendly, preferred by customers, and producing higher gross social welfare, but these benefits come along with higher production costs compared to conventional supply chain services. Hence, policy incentives, along with other sustainability strategies, are fundamental for the development and advancement of the *halal* supply chain ecosystem.

Keywords: *halal* integrity assurance, *halal* industry sustainability, critical zones in the *halal* food product cycle, *Halal* Supply Chain Ecosystem (HSCE).

INTRODUCTION

The global market for *halal* products, driven by increasing consumer awareness and demand among Muslim populations, has significantly expanded opportunities for *halal* manufacturing and freight services globally. This growth has sparked a surge in scholarly research focusing on the *halal* industry, particularly the critical role of the *halal* supply chain in maintaining product integrity (Mohamed et al., 2020). Despite the proliferation of studies, a clear understanding of the factors influencing *halal* integrity assurance within the supply chain remains incomplete. Ngah et al. (2014) categorised and analysed *halal* transportation and transit services, laying foundational groundwork for understanding how different supply chain segments impact overall *halal* compliance. Similarly, Zulfakar et al. (2014) developed a conceptual model illustrating the diverse elements of the *halal* supply chain that contribute to ensuring *halal* integrity. These studies highlight critical points where integrity can be compromised or strengthened, yet a comprehensive theoretical framework integrating these insights is lacking. Moreover, Bahrudin et al. (2011) integrated customer satisfaction metrics with *halal* integrity assurance, underscoring the importance of consumer trust in the *halal* certification process and suggesting avenues for further exploration within the *halal* transportation industry. Building on these foundational studies, this research aims to fill this gap by investigating the nuanced factors that influence *halal* integrity within the *halal* supply chain ecosystem. Specifically, this study will explore the *halal* transportation system as a focal point for developing a comprehensive theoretical framework. By introducing continuity variants and novel theoretical constructs, this research seeks to advance the conceptual understanding of the *Halal* Supply Chain Ecosystem (HSCE) adaptation, positioning it as a sustainable industry concept that ensures stringent *halal* integrity across all supply chain processes.

LITERATURE REVIEW

According to Jaakkola (2020), more conceptual papers are needed to generate new theories. The scholar discussed four potential forms for concept papers, namely theory synthesis, theory adaptation, typology, and model. Also discussed are the aims of the paper, approaches to applying theory, and its potential contributions. Just like empirical research papers, research design for conceptual papers also includes parameters and data analysis at its core. A concept paper also has a focal phenomenon or concept and a stream of additional literature or theory to enhance the main concept by adding value and eliminating inconsistencies (Hirschheim, 2008). The focal concept is also known as “domain theory” and the supplementary concept is known as “method theory”. Making the chain of evidence visible and easy to grasp is important for any conceptual paper, where structure is the most significant determinant of how easy it is to follow the chain of argumentation (Jaakkola, 2020). In a theory adaptation paper, revisiting extant knowledge (domain theory) and introducing alternative frames of reference (method theory) can propose a novel perspective of an existing concept (Maclnnis, 2011). Hence, for the purpose of this article, we have identified *Halal* Integrated Freight Service (HIFS) as the focal phenomenon and sustainability dimensions as method considerations to propose a novel *Halal* Supply Chain Ecosystem as a sustainable *Halal* industry theme. The basic research design would include the following elements: 1) *Halal* integrated freight service as the research phenomenon, 2) Sustainability dimensions as the method theory for variant consideration, and 3) Construction of a novel concept for a sustainable *halal* industry theme.

Necessity of Halal Logistic within Halal Manufacturing Industry

The largest constituent of the *halal* industry is *halal* food, which is no longer a niche market, comprising about a quarter of world food trade with current estimated value of USD 2.8 trillion in the coming year (Puri-Mirza, 2024). Manufacturers have the responsibilities throughout the supply chain by coordinating the supply chain through third-party logistics service providers’ services (Naumov & Kholeva, 2017).

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Discovery of challenges and syntheses of themes for making freight transport sustainable are critical for sustainable society (Abbasi & Nilsson, 2012). It is claimed that, besides Muslims, nowadays non-Muslims have started demanding for *halal* food due to the perception that *halal* foods are cleaner, more hygienic, hazard-free and non-toxic (Belkhatir et al., 2009; Talib et al., 2008) in a Muslim ecosystem known as " *halalan toyyiban*". In the *halal* food supply chain, the goal is not only to ensure customer satisfaction but also to retain *halal* integrity throughout whole process (Bahrudin et al., 2011). World food statistics prepared by Times Intelligence show that top ten *halal* food consumer countries and top ten *halal* food producing countries are not same; hence, supply chain matters between *halal* food producers and *halal* food consumers. Jaafar et al. (2011) argued that *halal* integrity of a food product remains intact as long the product is in custody of producer. Expressed and implied commitments of buyers and sellers that defines expectations and behaviours of both parties are known as trust (Pullman & Wu, 2012). Studies in various countries showed that trust plays important role in influencing consumer purchasing behaviour in the *halal* food industry in China (Ali et al., 2021), Belgium (Bonne & Verbeke, 2008), and Malaysia (Rahman et al., 2021). Hence, for trustworthiness, the *halal* food manufacturing industry must collaborate with *halal* supply chain as an emerging industry, both for *halal* integrity and customer satisfaction of *halal* consumers. Figure 1 presents the link between *halal* manufacturing and *halal* consumers, mediated by the *halal* supply chain within a *halal* food cycle framework.

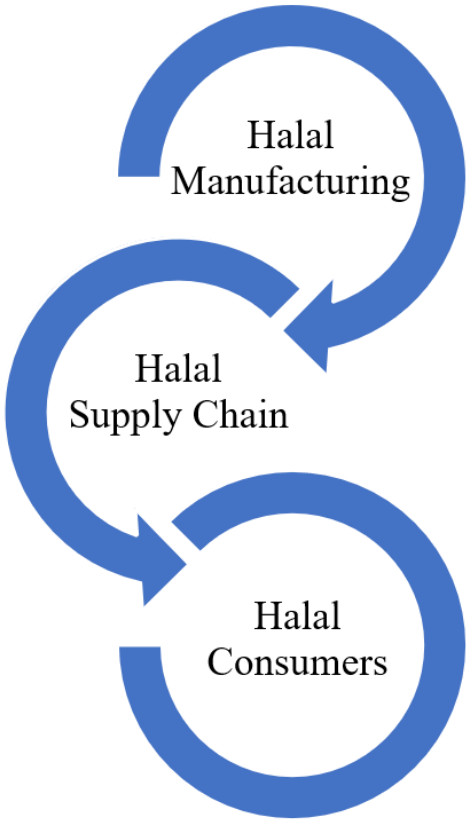

Figure 1: *Halal* supply chain within *Halal* food cycle

Interaction of Participants within Freight Forwarding System

Freight forwarding functions cover the full range of operations and delivery services from producer to consumer (Shanova et al., 2011). Supply chain integration has a direct impact on the following four main dimensions of *halal* integrity: raw materials integrity, production integrity, service integrity, and information integrity (Ali et al., 2017). To understand the stakeholders of *halal* freight services, we need to first understand the participants in a general freight forwarding scenario. Figure 2 is prepared based on an

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analysis of the interaction of participants in the freight forwarding system (Popovych et al., 2016). It shows that a freight forwarding company is connected to all other participants in a supply chain ecosystem.

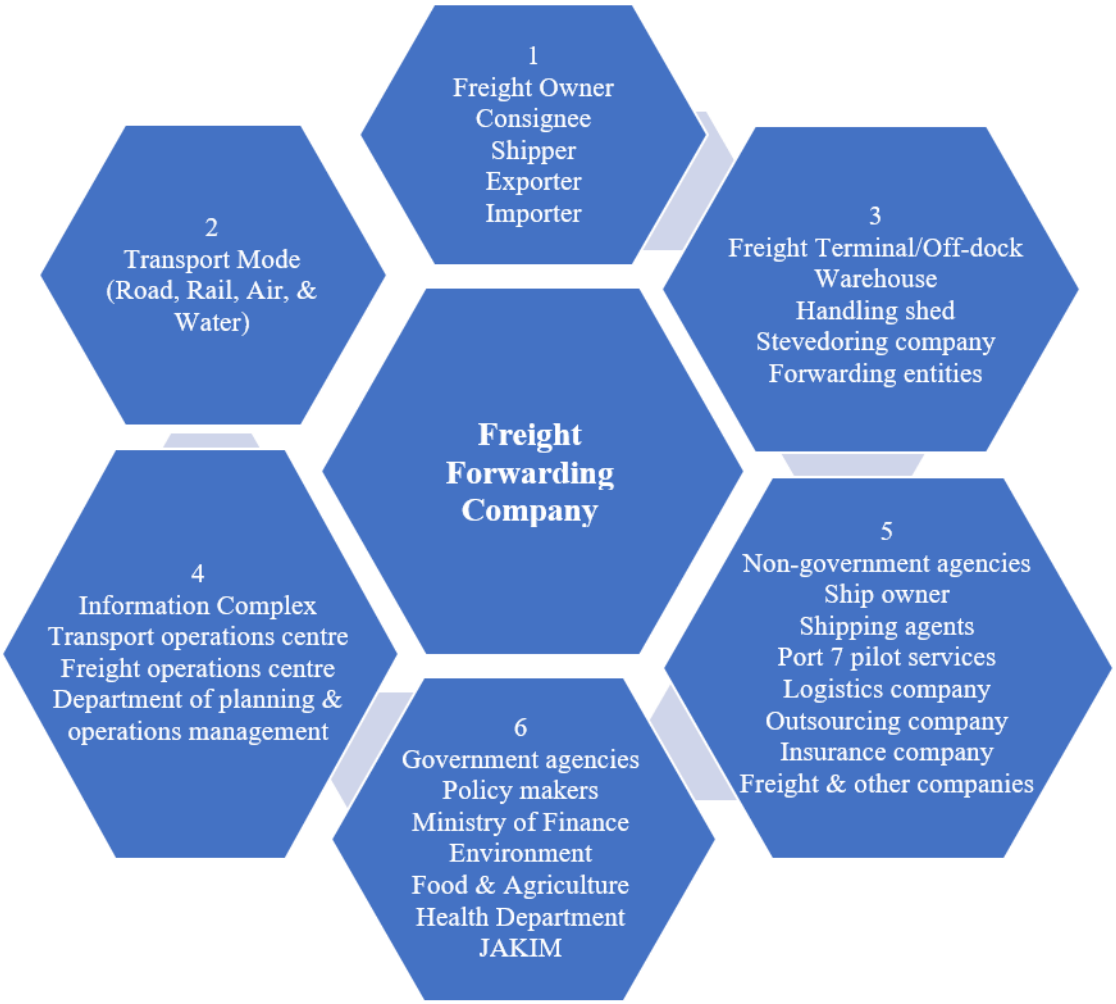

Figure 2. Positioning a freight forwarding company in supply chain ecosystem

Critical Zone in Halal Food Product Cycle

Adoption of *halal* logistics is the most significant strategy influencing manufacturers' effort to safeguard *halal* integrity (Yunan et al., 2020). Consensus has been achieved in the segregation of *halal* supply chains in terms of designated *halal* transport, storage and *halal* compliant terminals, for Muslim-majority countries, whereas in a non-Muslim-majority countries greater leniency is possible (Tieman et al., 2019). Elements of supply chain services could be classified as follows (Shyriaieva & Selivanova, 2014): 1) Chartering and transportation services, 2) Loading and unloading of cargo, 3) Warehousing, cold storage and freight handling, 4) Specialized arrangements and equipment services, 5) Registration, documentation, reception, and delivery of goods, 6) Logistics information including *halal* auditor services, 7) Custom services, 8) Cargo insurance, 9) Payment and financial services, 10) Networks, platforms, software and apps services, 11) Consulting, outsourcing and other forwarding services etc.

Halal integrity assurance is the key factor in building a trusted *halal* food supply chain in the current competitive and complex environment (Mohamed et al., 2020; Tieman et al., 2019). Consequently, it is essential for us to view *halal* freight forwarding in the context of the *halal* food product life cycle, to understand the "grey areas" or "critical zone" while building a *halal* supply chain service that maintain *halal* integrity and meet customer expectations. Grossly, when a *halal* food product moves beyond the

manufacturers' yard and before it arrives at distributor's jurisdiction, during the periods of transport and transit, it remains in grey areas with higher risk of *halal* integrity breach. This period needs to be identified as critical zone for *halal* integrity in the *halal* food product life cycle, which demands further study and research. Figure 3 shows the critical zones for *halal* integrity breach in the *halal* food product life cycle.

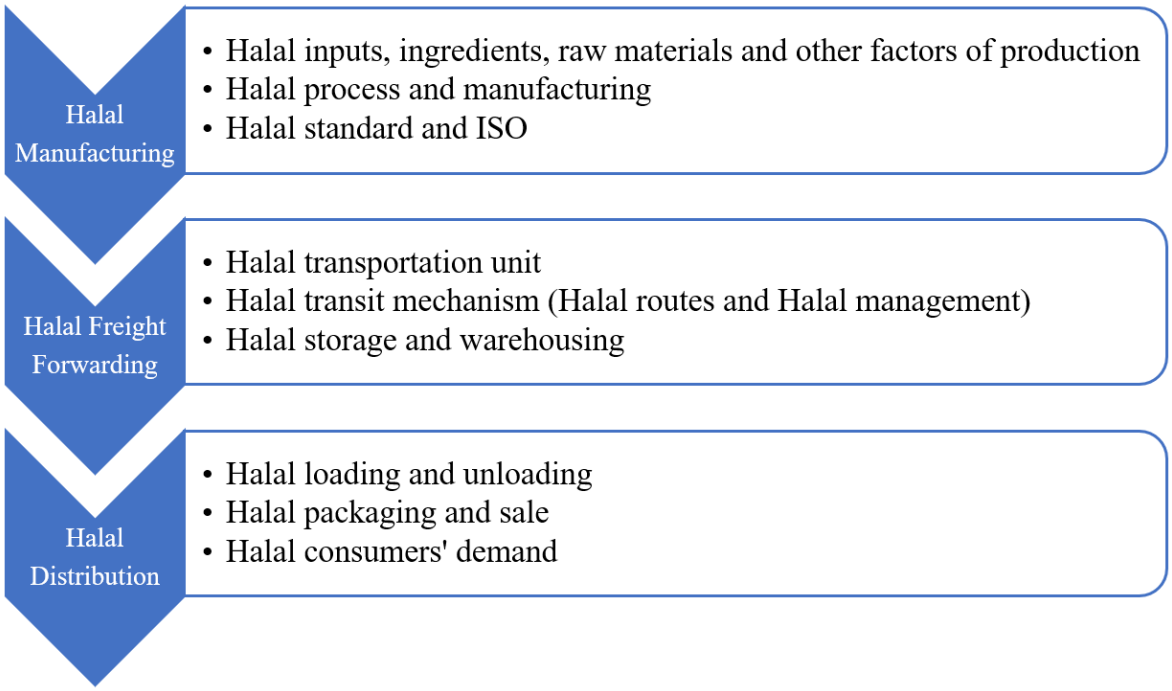

Figure 3. Critical zone in life cycle of a *Halal* food product for *Halal* integrity

Halal Integrity Framework in HSCE

Research shows an association between global ethics, environmental purchasing, sustainable packaging, moral responsibility, *halal* supply chain management and *halal* sustainable supply chain performance (Ibrahim et al., 2018). Full participation of all stakeholders or parties involved in the *halal* supply chain is necessary to achieve *halal* supply chain integrity (Samsi et al., 2011). These stakeholders include companies, agents, logistic providers, employees, consultants, auditors, government authorities, NGOs, religious bodies, certification and monitoring bodies, associations, and the *halal* consumers. *Halal*-certified products instil confidence and trust that the purchased product comply with *Sharia* law (Zulfakar et al., 2014). According to Riaz and Chaudry (2004) and Talib et al. (2008), a *halal* certificate of compliance or *halal* logo, which shows that the product has sufficiently met Islamic dietary standard, must be authorized and issued by a trustworthy Islamic organisation to prevent from any fraud, fake, and misleading logo or certificate. The lack of *halal* standards has caused slow growth in the *halal* industry (Hassan, 2007). Evans (2007) noted that *halal* standards should be moderate instead of being too strict or too lenient to prevent fraudulent actions. Evans (2011) reiterated the need of one international *halal* standard for global acceptability and smooth operations. A comprehensive traceability system could increase *halal* transparency and strengthen *halal* integrity (Zulfakar et al., 2014). However, many researchers agree that current technology may not be adequate to ensure reliability, traceability, security, and real-time monitoring of *halal* integrity (Anir et al., 2008). Researchers also identified the need for dedicated assets, utensils, and handling equipment for *halal* integrity assurance (Ahmad & Shariff, 2016; Khan, 2009; Zulfakar et al., 2014). Jaafar et al. (2011) believes that creating a dedicated team of workers to handle *halal* items would reduce the possibility of cross-contamination to a minimum level, avoid unnecessary human error, and thus help protect the integrity of *halal* supply chain. According to Pullman and Wu (2012), trust is the expectations that buyers and sellers will behave in accordance with express or implied commitments. As business

evolved, trust in the supply chain is now based on the *halal* logo or *halal* certification (Tieman et al., 2019). Research identified that government roles in ensuring *halal* food supply chain integrity include planning, developing, implementing, regulating, promoting, and educating *halal* industrial players and *halal* consumers (Samsi et al., 2011). Deuraseh (2019) noted that the Department of Syariah Affairs from the Ministry of Religious Affairs in Brunei is authorized to handle *halal* matters in the country and is supported by the *Halal* Food Control Division (HFCD).

In Malaysia, the Department of Islamic Development Malaysia (JAKIM), a governing body supported by multiple government agencies, is responsible for *halal* certification matters in Malaysia, with sufficient backing from the government (Zulfakar et al., 2014). To overcome the issues and challenges, practitioners and academicians, together with policymakers, must standardize all the requirements, such as the acts, rules and regulations, and to make efforts successful (Selim et al., 2018). Figure 4 depicts the components of *halal* supply chain eco system's stakeholders, operating components, processes, and policy framework, based on Zulfakar et al's (2014) research on *halal* integrity frameworks.

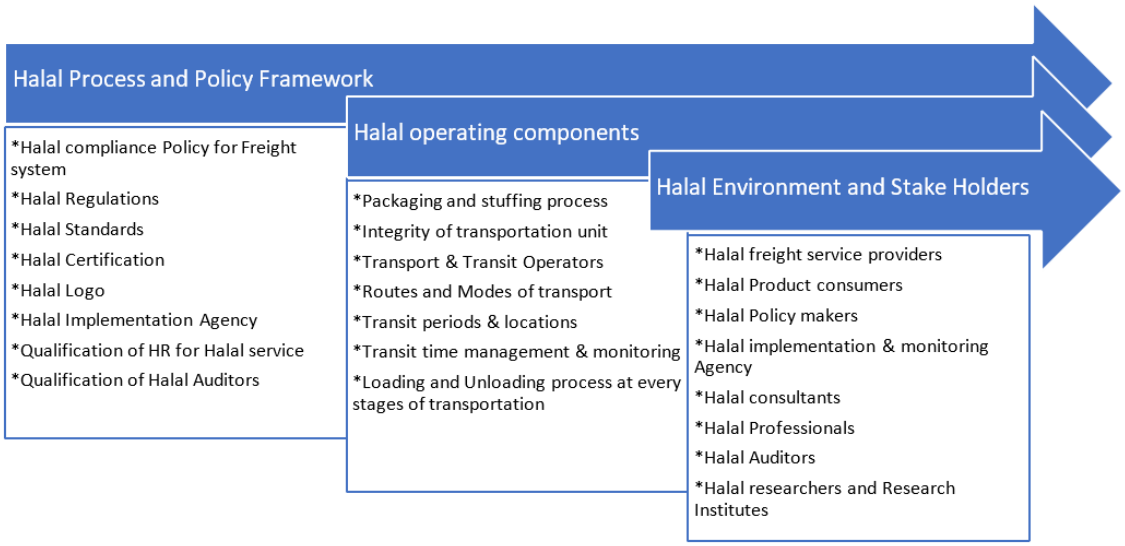

Figure 4. *Halal* supply chain integrity framework

Sustainability Dimensions for Halal Supply Chain Industry

Halal values have an innovative impact on product and service excellence, economic competitiveness, and sustainability (Karia, 2019). Research in Brunei Darussalam identified five factors impeding *halal* logistics growth in the country: the lack of trained *halal* logisticians, the absence of *halal* logistics standards, the paucity of *halal* logistics infrastructure, weak demand, and intense competition (Talib, 2021). As an emerging industry, the *Halal* Supply Chain needs to actively consider the following sustainability dimensions, in addition to *halal* integrity and customer satisfaction, for future growth in the current complex and competitive context.

Profiling International Freight Forwarders to Understand the Industry Trends, Models and Weaknesses

Relationship marketing management and cost switching have a positive impact on service quality and customer satisfaction in the airfreight forwarding industry. The integration of complex supply chain services could improve sustainability (Yang & Chao, 2017). International freight forwarders (IFFs) are typically employed by companies of all sizes to facilitate their cross-border consignments (Lambert et al., 1998). IFF functions include booking vessel space or slots, preparing relevant documentation, paying freight charges,

and arranging inland transportation services (Coyle et al., 2003). The size of supply chain company is particularly relevant in terms of revenue generation and employment creation, with suggestions that smaller forwarders face a higher risk of extinction (Schwartz, 1998).

Murphy and Daley (1996), in their research on the USA market profiling international freight forwarders, identified key issues such as technology and Internet usage, ocean and air freight forwarding, custom-house brokerage, non-vessel operating common carriers, and electronic data interchange as important features of supply chain companies. They also suggested four characteristics for corporate demographic profiling in the freight forwarding industry: 1) firm age from year of incorporation, 2) firm size in terms of the number of employees, 3) firm revenue from annual gross earnings, and 4) firm diversification from other intermediary services.

Similar efforts could be made in the *halal* supply chain industry for corporate demographic profiling to understand the characteristics and sustainability potential of *halal* supply chain ecosystem providers, especially in Malaysia as a "Global *Halal* Hub".

Measurement of Halal Logistic Service Quality (HLSQ) in Freight Ecosystem

Service quality, particularly management-related factors, has a significant positive impact on customer satisfaction (Yeo et al., 2015). Supply chain service providers often grapple with meeting the service quality expectations and requests of clients. To successfully address these expectations, service quality must be continuously benchmarked, measured, monitored, and improved (Yeo et al., 2015). Halal Logistic Service Quality (HLSQ) should seize this opportunity to build better strategies that will attract not only Muslims consumer but also non-Muslim consumers who are willing to pay for *halal* logistics (Majid & Shamsudin, 2020). Managers in *halal* logistics service firms can use HLSQ items to evaluate their service quality and benchmark their performance against competitors (Selim et al., 2018).

Franceschini and Rafele (2000) utilized eight traditional dimensions of SERVQUAL: 1) lead time, 2) regularity, 3) reliability, 4) completeness, 5) flexibility, 6) correctness, 7) harmfulness, and 8) productivity as indicators of LSQ. Rafele (2004) later improved this by reducing eight dimensions to three: 1) information actions, 2) ways of fulfilment, and 3) tangible components for measuring LSQ. Numerous researchers argue that customer perspective should be added to the service attributes. Mentzer et al. (2001) distinguished two components: 1) physical distribution service quality (PDSQ) and 2) customer service quality. Katajajuuri et al. (2009) mentioned that LSQ consists of technical and functional components. Karim et al. (2006) proposed a two-dimensional model consisting of operational LSQ and relational LSQ. In third-party logistic (3PL), models for the quality of external logistic services were proposed (Rafiq & Jaafar, 2007). Bienstock et al. (2008) expanded a logistics service quality (LSQ) model through theoretical integration with the technology acceptance model (TAM) (Davis, 1989). Recently, using confirmatory factor analysis (CFA), Nikoličić et al. (2015) proposed a more comprehensive LSQ measuring scale, consists of five basic dimensions: 1) reliability, 2) responsiveness, 3) assurance, 4) empathy, and 5) tangibility. The *Halal* supply chain industry also needs to analyse and understand the SERVQUAL gap for continuous quality improvement, customer satisfaction, and the sustainability of *Halal* Supply Chain Ecosystem as an emerging industry theme.

Human Resource Competencies for Global Supply Chain Competitiveness

Chung et al. (2015) classified previous studies on competitiveness into four main focuses: 1) productivity, 2) efficiency, 3) competitive advantage, and 4) choice model. Scholars believe that human resource variables can significantly impact supply chain performance and competitiveness (Marwah et al., 2014). People with intangible knowledge-based resources have greater potential to create sustainable competitive advantages in a rapidly changing and challenging business environment (Pringle & Kroll, 1997). Youndt et

al. (1996, p. 839) stated, “In fact, numerous researchers have recently noted that people may be the ultimate source of sustained advantage since traditional sources related to market, financial capital, and scale economies have been weakened by globalization and other economic changes”, thus reinforcing the importance of people-related competencies.

Successful implementation and execution of industrial policy heavily depend on competent personnel (Thompson & Strickland, 2003). Recruiting, developing and retaining the right employees are crucial for successful strategy execution (Hashim, 2013). From an HRM perspective, competencies are viewed as the capabilities of people (Cardy & Selvarajan, 2006). Competencies encompass a cluster of knowledge, skills, abilities, motivation, beliefs, values, and interest that relate to significant parts of the job, are associated with effective and superior performance, are observable and measurable against well-accepted standards, are linked to future strategic directions, and can be improved via training and development (Lambert & Cooper, 2000).

Hunt et al. (2005) argued that individual employee competencies could be leveraged to increase efficient and effective production of market offerings and enhance firm performance. The people dimension is especially pertinent for the supply chain to achieve most of its objectives (van Hoek, 1999). Therefore, *halal* supply chain firms and the industry ecosystem as a whole need to utilize the potential of human capital for sustainable development.

Dynamic Organisational Capability and Eco-innovation

The presence of *halal* scientific dietary standards, consumption allowances, principles and methods, *halal* dietary needs manuals, nutritional allowances, and hunger definitions and standards are among the various elements that can influence global food safety, security, and sustainability (Khan et al., 2018). Eco-innovations encompass a wide range of innovations, including renewable energy technologies, pollution prevention schemes, waste management equipment, eco-design products, and the adoption of biological materials (Hsiao et al., 2010). Eco-activities, when based on dynamic organisational capability (DOC), are instrumental in identifying the correct and efficient resources or processes to meet economic and environmental challenges (Burgelman et al., 2009).

Several research indicate that DOC positively impacts performance (Guide et al., 2003; Krishnan & Winter, 2010). Eco–innovation and DOC, approached from an industrial dynamics perspective, emphasize that research should address environmental issues that are becoming integrated economic processes (Nasir & Karakaya, 2014). A firm’s long-term competitive advantage depends on its resource configuration capability (Saranga et al., 2018). Wu et al. (2016) proposed several evaluation aspects and criteria for exploring eco-innovation and dynamic organisational capability under incomplete information. The evaluation aspects and criteria are presented in Table 1.

Table 1. Evaluation aspects and criteria

Aspects	Criteria
Accurate volume and risk prediction in investment proposals	· Redesign system for eco-process innovations · Access to external information & knowledge for eco-innovation · Environmental management systems

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Integrative capacity	· Utilizing sustainable operational process insupply chain networks · Product-service process and deliverable eco-innovation · Collaboration with research institutes, agencies, and universities · Access to existing subsidies and fiscal incentives · Conversion time of new products · Abilities to perform organisational adjustments · Quality of the sales staff · Incentive systems for eco-organisational innovation
Incorporating substantial alterations to the business model with uncertain information	· Technology push for launching eco-innovation · Applying eco-certification towards sustainable developments · Development of eco-innovation program
Opportunity-sensing capability	· Existing government environmental policy · Expected future ecological regulations · Environmental patent applications · Potential revenue in eco-design
Path-dependent learning capability	· Eco-efficient solutions and optimization of sub-systems · Environmental research and development · Pollution control and prevention · Positive experience with stakeholder pressure · Improving the product design and subsequent process to reduce environment impact

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Re-configuration capability	· Development of additional components to improve environmental quality · Reuse and recycling · Technological transitions · Reduced energy consumption · Maximizing eco-efficient process to minimize energy use, pollution & waste
Client-focused learning capability	· Market pulls for green products · User development and acceptance of eco-product innovation · Improved image through implementing eco-labelling · Corporate social responsibility · Applying ecosystems to create added value for humans and nature

Source: Wu et al. (2015)

This cross-country and cross-industry evaluation aspects and criteria could be contextualized for the sustainable development of the *halal* supply chain ecosystem in Malaysia and elsewhere.

Institutional Pressure and Industrial Zone Support for Motivating Sustainable Production

Indicators of forwarding enterprises' sustainable development include: 1) the use of productive resources of the forwarding enterprise in the process of its operation within the framework of the macro logistical system of the transport market, 2) the impact of the results of the operation of forwarding companies on the environment, and 3) the social component of the operation of a forwarding enterprise as a socio-economic system (Naumov & Kholeva, 2017). Sustainable production (SP) for long-term industrial success has been promoted since the late 1990s. Several studies have examined how to reduce pollution emissions (Hankle, 2008), while others have studied resource consumption (Carlsson et al., 2011). Later SP was combined with sustainable consumptions as a systematic way for sustainable development (Akenji & Bengtsson, 2014). Therefore, in order to motivate SP among small companies, scholars urged governments to aid their financial constraints for eco-innovation (Cuerva et al., 2014). Mylan et al. (2015) found that cost reduction, customer requests, and legal requirements could be useful for the implementation of various SP-related technologies. Another trend in SP proposed identifying decoupling tools to keep economic gains while at the same time reducing environmental burdens (Nieuwenhuis & Katsifou, 2015).

In contrast, local government in China have transitioned from enforcing environment laws to supporting SP practices among companies (Rutten et al., 2014). Governmental support has demonstrated a significant positive effect on green technology practices among Chinese companies (Lin & Liang, 2011). Zhu (2016) proposed that exploratory factor analysis (EFA) with maximum likelihood and varimax rotation be used to extract the theoretical dimensions (factors) of SP practices, institutional pressure, and support from

industrial zone (authorities). Both the scree plot and the initial eigenvalue tests indicate five factors for SP practices: 1) material-saving practices, 2) energy-saving practices, 3) water-saving practices, 4) land-saving practices, and 5) preventive energy and material-saving practices. The same EFA was used to identify factors for institutional pressures and support from industrial zones. Factors for institutional pressures includes coercive, normative, and mimetic types, while support from industrial zones includes various incentives and benefits offered (Zhu, 2016). Similar practices could be introduced in the *halal* supply chain industry for its competitiveness and sustainable growth.

Policy Incentive for Price Competition and Social Welfare in Halal Freight Ecosystem

Firms in developing countries and newer industries often benefit from cheaper labour costs. However, developing countries planning to impose climate policy measures will inevitably push these firms to face higher production cost. Wang et al. (2016) argued that firms in developing country should be given incentives to cope with the adverse impact of price competition resulting from carbon tariff policies imposed by developed countries. Many have called this controversial, questioning the legality and anti-competitive influence of carbon tariffs (Ismer & Neuhoff, 2007; Malina et al., 2012). Wang et al. (2016) showed that higher production costs would lead to a drop in sales revenue for firms and lower consumption for customers, resulting in a reduction in gross global social welfare.

To overcome such challenges, all vulnerable industries must be included in governmental policy incentive schemes. The *halal* supply chain industry, being greener, more environment friendly, cleaner, more hygienic, less hazardous, less toxic, and less poisonous, may struggle to remain price competitive. Hence, to ensure competitiveness of the *halal* supply chain as a service industry by lowering production costs for customer affordability and gross social welfare, government authorities, NGOs and other associations must develop policy incentives for this emerging *halal* supply chain eco system.

CONCLUSION

From the literature on supply chain and *halal* issues and the analysis conducted, we can discern the development pathway of the emerging *halal* supply chain ecosystem. Initially, most research focused on customer needs, customer satisfaction, and customer demand for *halal* product and services. As the volume of *halal* products increased over time, shifting *halal* food from a niche market to a significant share of global food trade, questions arose about ensuring *halal* integrity throughout the entire process, from manufacturing to transport and delivery to consumers.

This discussion of *halal* integrity has caused a multidimensional expansion of the *halal* supply chain ecosystem, encompassing stakeholders such as companies, agencies, logistic providers, government authorities, monitoring and religious agencies, auditors, freight professionals, consultants, and *halal* consumers. These stakeholders interact under given policies, regulations, and strategies to achieve *halal* integrity and trustworthiness in the services provided. Researchers have identified that *halal* assurance is not at risk as long as the product remains at the manufacturers' premises. However, transportation and transit periods have become grey areas for confirming *halal* integrity, necessitating continuous *halal* monitoring of the supply chain.

In the current global economic downturn and international trade war context, assessing the competitiveness of the *halal* supply chain and introducing sustainability dimensions for future growth is crucial. While industry efficiency, customer demand, and the perceived eco-friendly and cleaner services provided by *halal* systems are preferred by a wider customers base, the higher production costs associated with these services may render the *halal* supply chain less competitive, challenging the sustainability of this emerging industry during current economic turmoil. Therefore, policy incentives to lower production costs and enhance gross

social welfare could position the *halal* supply chain ecosystem on a sustainable foundations.

REFERENCES

1. Abbasi, M., & Nilsson, F. (2012). Themes and challenges in making freight transport sustainable: A logistics service providers' perspective. *53rd Annual Transportation Research Forum, Tampa, Florida , 1*, 1–16. https://doi.org/10.22004/ag.econ.207087
2. Ahmad, N., & Shariff, S. M. (2016). Supply chain management: Sertu cleansing for Halal logisitics integrity. *Procedia Economics and Finance*, *37*(16), 418–425. https://doi.org/10.1016/s2212-5671(16)30146-0
3. Akenji, L., & Bengtsson, M. (2014). Making sustainable consumption and production the core of sustainable development goals. *Sustainability (Switzerland)*, *6*(2), 513–529. https://doi.org/10.3390/su6020513
4. Ali, A., Sherwani, M., Ali, A., Ali, Z., & Sherwani, M. (2021). Investigating the antecedents of halal brand product purchase intention: an empirical investigation. *Journal of Islamic Marketing*, *12*(7), 1339–1362. https://doi.org/10.1108/JIMA-03-2019-0063
5. Ali, M. H., Tan, K. H., & Ismail, M. D. (2017). A supply chain integrity framework for halal food. *British Food Journal*, *119*(1), 20–38. https://doi.org/10.1108/BFJ-07-2016-0345
6. Anir, N. A., Nizam, M. N. M. H., & Masliyana, A. (2008). The users perceptions and opportunities in Malaysia in introducing RFID system for Halal food tracking. *WSEAS Transactions on Information Science and Applications*, *5*(5), 843–852.
7. Bahrudin, S. S. M., Illyas, M. I., & Desa, M. I. (2011). Tracking and tracing technology for Halal product integrity over the supply chain. *Proceedings of the 2011 International Conference on Electrical Engineering and Informatics, ICEEI 2011*, 1–7. https://doi.org/10.1109/ICEEI.2011.6021678
8. Belkhatir, M., Bala, S., & Belkhatir, N. (2009). Business process re-engineering in supply chains examining the case of the expanding Halal industry. *Proceedings of the 11th International Conference on Enterprise Information Systems – Information Systems Analysis and Specificatio*, 77–82. https://doi.org/10.5220/0001955800770082
9. Bienstock, C. C., Royne, M. B., Sherrell, D., & Stafford, T. F. (2008). An expanded model of logistics service quality: Incorporating logistics information technology. *International Journal of Production Economics*, *113*(1), 205–222. https://doi.org/10.1016/j.ijpe.2007.03.023
10. Bonne, K., & Verbeke, W. (2008). Religious values informing halal meat production and the control and delivery of halal credence quality. *Agriculture and Human Values*, *25*(1), 35–47. https://doi.org/10.1007/s10460-007-9076-y
11. Burgelman, R. A., Christensen, C. M., & Wheelwright, S. C. (2009). *Strategic Management of Technology and Innovation* (5th ed.). McGraw Hill.
12. Cardy, R. L., & Selvarajan, T. T. (2006). Competencies: Alternative frameworks for competitive advantage. *Business Horizons*, *49*, 235–245. https://doi.org/10.1016/j.bushor.2005.09.004
13. Carlsson, S. A., Henningsson, S., Hrastinski, S., & Keller, C. (2011). Socio-technical IS design science research: Developing design theory for IS integration management. *Information Systems and E-Business Management*, *9*(1), 109–131. https://doi.org/10.1007/s10257-010-0140-6
14. Chung, T. W., Ahn, W. C., Jeon, S. M., & Van Thai, V. (2015). A benchmarking of operational efficiency in Asia Pacific international cargo airports. *Asian Journal of Shipping and Logistics*, *31*(1), 85–108. https://doi.org/10.1016/j.ajsl.2015.03.004
15. Coyle, J. J., Bardi, E. J., & Langley, C. J. (2003). *The management of business logistics: A supply chain perspective* (7th ed.). South-Western/Thompson Learning.
16. Cuerva, M. C., Triguero-Cano, Á., & Córcoles, D. (2014). Drivers of green and non-green innovation: Empirical evidence in Low-Tech SMEs. *Journal of Cleaner Production*, *68*, 104–113. https://doi.org/10.1016/j.jclepro.2013.10.049
17. Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information

technology. *MIS Quarterly*, *13*(3), 319–340. http://www.jstor.org/stable/10.2307/249008
18. Deuraseh, N. (2019). Brunei Darussalam standard Halal food PBD24: 2007 Towards the local and global need and challenge in Halal industry. *International Conference of Islam BorneoAt: Institut Islam Negeri (IAIN)*, *January*, 1–15.
19. Evans, A. (2007). At the cross-roads. *The Halal Journal*, 14–15.
20. Evans, A. (2011). Towards a Halal economy: The power of values in global markets. *The Halal Journal*, *April–Jun*, 26–28.
21. Franceschini, F., & Rafele, C. (2000). Quality evaluation in logistic services. *International Journal of Agile Management Systems*, *2*(1), 49–54. https://doi.org/10.1108/14654650010312589
22. Guide, V. D. R., Harrison, T. P., & Van Wassenhove, L. N. (2003). The challenge of closed-loop supply chains. *Interfaces*, *33*(6), 3–6.
23. Hankle, W. (2008). Sustainable material production. *American Ceramic Society Bulletin*, *87*(8), 23–25.
24. Hashim, F. (2013). The critical review on human resource competencies of third party logistics (3PL) companies by service users. *2nd International Conference on Technology Management , Business and Entrepreneurship*, *December*, 454–462.
25. Hassan, W. M. W. (2007). Globalising Halal standards: Issues and challenges. *The Halal Journal*, *July –Augus*, 38–40.
26. Hirschheim, R. (2008). Some guidelines for the critical reviewing of conceptual papers. *Journal of the Association for Information Systems*, *9*(8), 432–441. https://doi.org/10.17705/1jais.00167
27. Hsiao, H. I., van der Vorst, J. G. A. J., Kemp, R. G. M., & Omta, S. W. F. O. (2010). Developing a decision-making framework for levels of logistics outsourcing in food supply chain networks. *International Journal of Physical Distribution and Logistics Management*, *40*(5), 395–414. https://doi.org/10.1108/09600031011052840
28. Hunt, I., Wall, B., & Jadgev, H. (2005). Applying the concepts of extended products and extended enterprises to support the activities of dynamic supply networks in the agri-food industry. *Journal of Food Engineering*, *70*(3), 393–402. https://doi.org/10.1016/j.jfoodeng.2004.06.031
29. Ibrahim, I., Zawahair, M. D. M., Shah, B. M. M., Roszalli, S. B., Rani, S. F. S. A., & Amer, A. (2018). Halal sustainable supply chain model: A conceptual framework. *Advances in Transportation and Logistics Research*, 488–503.
30. Ismer, R., & Neuhoff, K. (2007). Border tax adjustment: A feasible way to support stringent emission trading. *European Journal of Law and Economics*, *24*(2), 137–164. https://doi.org/10.1007/s10657-007-9032-8
31. Jaafar, H. S., Endut, I. R., Faisol, N., & Omar, E. N. (2011). Innovation in logistics services – Halal logistics. *Proceedings of the 16th International Symposium on Logistics (ISL), Berlin, Germany, 10-13 July*, 844–851.
32. Jaakkola, E. (2020). Designing conceptual articles: four approaches. *AMS Review*, *10*(1–2), 18–26. https://doi.org/10.1007/s13162-020-00161-0
33. Karia, N. (2019). Halal logistics: practices, integration and performance of logistics service providers. *Journal of Islamic Marketing*. https://doi.org/10.1108/JIMA-08-2018-0132
34. Karim, K., Marosszeky, M., & Davis, S. (2006). Managing subcontractor supply chain for quality in construction. *Engineering, Construction and Architectural Management*, *13*(1), 27–42. https://doi.org/10.1108/09699980610646485
35. Katajajuuri, J. M., Gronroos, J., & Usva, K. (2009). Environmental impacts and related options for improving the chicken meat supply chain. *Proceedings of the 6th International Conference on LCA in the Agri-Food Sector – Towards a Sustainable Management of the Food Chain, June 2009*.
36. Khan, M. I., Haleem, A., & Khan, S. (2018). Defining Halal supply chain management. *Supply Chain Forum: An International Journal*, 1–10. https://doi.org/10.1080/16258312.2018.1476776
37. Khan, N. (2009). Special report: Halal logistics. In *Logistics Middle East*. https://www.logisticsmiddleeast.com/logistics/article-385-special-report-halal-logistics
38. Krishnan, H., & Winter, R. A. (2010). Inventory dynamics and supply chain coordination. *Management Science*, *56*(1), 141–147. https://doi.org/10.1287/mnsc.1090.1100

39. Lambert, D., Cooper, M. C., & Pagh, J. D. (1998). Supply chain management: Implementation issues and research opportunities. *The International Journal of Logistics Management*, *9*(2), 1–20. https://doi.org/10.1108/09574099810805807
40. Lambert, D. M., & Cooper, M. C. (2000). Issues in supply chain management. *Industrial Marketing Management, 29*, 65–83. https://doi.org/10.1016/s0019-8501(99)00113-3
41. Lin, J. S. C., & Liang, H. Y. (2011). The influence of service environments on customer emotion and service outcomes. *Managing Service Quality*, *21*(4), 350–372. https://doi.org/10.1108/09604521111146243
42. Maclnnis, D. J. (2011). A framework for conceptual contributions in marketing. *Journal of Marketing*, *75*(July), 136–154. https://doi.org/10.1509/jmkg.75.4.136
43. Majid, Z. A., & Shamsudin, M. F. (2020). Halal integrity, Halal logistics service providers (LSP). In N. A. A. Rahman, A. Hassan, & M. F. N. Mohammad (Eds.), *Halal Logistics and Supply Chain Management in Southeast Asia* (1st Editio, p. 14). Routledge. https://doi.org/https://doi.org/10.4324/9780429329227
44. Malina, R., McConnachie, D., Winchester, N., Wollersheim, C., Paltsev, S., & Waitz, I. A. (2012). The impact of the European union emissions trading scheme on US aviation. *Journal of Air Transport Management, 19*(1), 36–41. https://doi.org/10.1016/j.jairtraman.2011.12.004
45. Marwah, A. K., Jain, S., & Thakar, G. (2014). Implications of human resource variables on supply chain performance and competitiveness. *International Journal of Engineering*, *8*(1), 11–21.
46. Mentzer, J. T., Flint, D. J., & Hult, G. T. M. (2001). Logistics service quality as a segment-customized process. *Journal of Marketing*, *65*(4), 82–104. https://doi.org/10.1509/jmkg.65.4.82.18390
47. Mohamed, Y. H., Abdul Rahim, A. R., & Ma'aram, A. (2020). The effect of halal supply chain management on halal integrity assurance for the food industry in Malaysia. *Journal of Islamic Marketing*. https://doi.org/10.1108/JIMA-12-2018-0240
48. Murphy, P. R., & Daley, J. M. (1996). International freight forwarder perspectives on electronic data interchange and information management issues. *Journal of Business Logistics*, *17*(1), 63–84. http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)2158-1592
49. Mylan, J., Geels, F. W., Gee, S., McMeekin, A., & Foster, C. (2015). Eco-innovation and retailers in milk, beef and bread chains: Enriching environmental supply chain management with insights from innovation studies. *Journal of Cleaner Production*, *107*, 20–30. https://doi.org/10.1016/j.jclepro.2014.09.065
50. Nasir, V. A., & Karakaya, F. (2014). Consumer segments in organic foods market. *Journal of Consumer Marketing*, *31*(4), 263–277. https://doi.org/10.1108/JCM-01-2014-0845
51. Naumov, V. S., & Kholeva, O. G. (2017). Forming the strategies of sustainable development of freight forwarders at transportation market. *Naukovyi Visnyk Natsionalnoho Hirnychoho Universytetu*, *3*, 129–134.
52. Ngah, A. H., Zainuddin, Y., & Thurasamy, R. (2014). Adoption of alal supply chain among Malaysian Halal manufacturers: An exploratory study. *Procedia – Social and Behavioral Sciences*, *129*, 388–395. https://doi.org/10.1016/j.sbspro.2014.03.692
53. Nieuwenhuis, P., & Katsifou, E. (2015). More sustainable automotive production through understanding decoupling points in leagile manufacturing. *Journal of Cleaner Production, 95*, 232–241. https://doi.org/10.1016/j.jclepro.2015.02.084
54. Nikoličić, S., Kilibarda, M., Atanasković, P., Duđak, L., & Ivanišević, A. (2015). Impact of RFID technology on logistic process efficiency in retail supply chains. *PROMET – Traffic & Transportation* , *27*(2), 137–146. https://doi.org/10.7307/ptt.v27i2.1539
55. Popovych, P., Shyriaieva, S., & Selivanova, N. (2016). Analysis of the interaction of participants freight forwarding system. *Journal of Sustainable Development of Transport and Logistics*, *1*(1), 16–22. https://doi.org/10.14254/jsdtl.2016.1-1.3
56. Pringle, D. P., & Kroll, M. J. (1997). Why Trafalgar was won before it was fought: Lessons from resource-based theory. *Academy of Management Perspectives*, *11*(4). https://doi.org/https://doi.org/10.5465/ame.1997.9712024840

57. Pullman, M., & Wu, Z. (2012). *Food Supply Chain Management: Economic, Social and Environmental Perspectives*. Taylor & Francis. http://www.scopus.com/inward/record.url?eid=2-s2.0-84899869578&partnerID=40&md5=645d34ac2b41bf0164d8e6fd3121c3b5
58. Puri-Mirza, A. (2024). *Global halal market – Statistics & Facts*. Statista. https://www.statista.com/topics/4428/global-halal-market/#editorsPicks
59. Rafele, C. (2004). Logistic service measurement: A reference framework. *Journal of Manufacturing Technology Management*, *15*(3), 280–290. https://doi.org/10.1108/17410380410523506
60. Rafiq, M., & Jaafar, H. S. (2007). Measuring customers' perceptions of logistics service quality of 3PL service providers. *Journal of Business Logistics*, *28*(2), 159–175. https://doi.org/10.1002/j.2158-1592.2007.tb00062.x
61. Rahman, R. A., Zahari, M. S. M., Hanafiah, M. H., & Mamat, M. N. (2021). The influence of knowledge on wholesomeness, labelling and trust toward Muslim consumers purchase behaviour of Syubhah semi-processed food products. *Journal of Islamic Marketing*, *June*. https://doi.org/10.1108/JIMA-05-2020-0133
62. Riaz, M. N., & Chaudry, M. M. (2004). *Halal Food Production*. CRC Press LLC. https://books.google.com.my/books?hl=en&lr=&id=wsp-BA0cKZoC&oi=fnd&pg=PP1&dq=Halal+Food+Production&ots=EupgzfI-RU&sig=l-DunHny-m06MSK6dy0Fmj9nUU0#v=onepage&q=Halal Food Production&f=false
63. Rutten, M., Van Dijk, M., Van Rooij, W., & Hilderink, H. (2014). Land use dynamics, climate change, and food security in Vietnam: A global-to-local modeling approach. *World Development*, *59*, 29–46. https://doi.org/10.1016/j.worlddev.2014.01.020
64. Samsi, S. Z. M., Tasnim, R., & Ibrahim, O. (2011). Stakeholders' role for an efficient traceability system in Halal industry supply chain. *Annual International Conference on Enterprise Resource Planning & Supply Chain Management*, *March*. https://doi.org/10.5176/978-981-08-8227-3_ERP-SCM16
65. Saranga, H., George, R., Beine, J., & Arnold, U. (2018). Resource configurations, product development capability, and competitive advantage: An empirical analysis of their evolution. *Journal of Business Research*, *85*(November 2017), 32–50. https://doi.org/10.1016/j.jbusres.2017.11.045
66. Schwartz, M. (1998). Extending the supply chain. *Software Megazine*, *18*(15), 44–48.
67. Selim, N. I. I. B., Zailani, S. H. B. D. M., & Aziz, A. A. B. (2018). Halal Logistics Service Quality (HLSQ) by Third-Party Providers (3PL) in Malaysia: A Conceptual Paper. *Proceedings of the 3rd International Halal Conference (INHAC 2016)*, 223–234. https://doi.org/10.1007/978-981-10-7257-4_21
68. Shanova, S., Popova, A., & Gorev, A. (2011). *Freight forwarding maintenance*. Publishing Centre Academy.
69. Shyriaieva, S., & Selivanova, N. (2014). Research the current state of the transport services market in Ukraine. *Herald of National Transport University*, *29*(1), 354–361.
70. Talib, H. @ H. A., Ali, K. A. M., & Jamaludin, K. R. (2008). Quality assurance in Halal food manufacturing in Malaysia: A preliminary study. *Proceedings of International Conference on Mechanical & Manufacturing Engineering (ICME2008)*, 1–5.
71. Talib, M. S. A. (2021). Identifying halal logistics constraints in Brunei Darussalam. *Journal of Islamic Marketing*, *12*(6), 1145–1158. https://doi.org/10.1108/JIMA-09-2019-0189
72. Thompson, A. A., & Strickland, A. J. (2003). *Strategic Management: Concepts and Cases* (13th ed.). McGraw Hill.
73. Tieman, M., Darun, M. R., Fernando, Y., & Ngah, A. B. (2019). Utilizing blockchain technology to enhance halal integrity: The perspectives of halal certification bodies. In *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics): Vol. 11517 LNCS*. Springer International Publishing. https://doi.org/10.1007/978-3-030-23381-5_9
74. van Hoek, R. I. (1999). From reversed logistics to green supply chains. *Supply Chain Management*, *4* (3), 129–134. https://doi.org/10.1108/13598549910279576

75. Wang, M., Liu, J., Chan, H. L., Choi, T. M., & Yue, X. (2016). Effects of carbon tariffs trading policy on duopoly market entry decisions and price competition: Insights from textile firms of developing countries. *International Journal of Production Economics*, *181*(July 2010), 470–484. https://doi.org/10.1016/j.ijpe.2015.07.025
76. Wu, K. J., Liao, C. J., Chen, C. C., Lin, Y., & Tsai, C. F. M. (2016). Exploring eco-innovation in dynamic organisational capability under incomplete information in the Taiwanese lighting industry. *International Journal of Production Economics*, *181*, 419–440. https://doi.org/10.1016/j.ijpe.2015.10.007
77. Wu, K. J., Liao, C. J., Tseng, M. L., & Chiu, A. S. F. (2015). Exploring decisive factors in green supply chain practices under uncertainty. *International Journal of Production Economics*, *159*, 147–157. https://doi.org/10.1016/j.ijpe.2014.09.030
78. Yang, C. C., & Chao, C. C. (2017). How relationship marketing, switching costs, and service quality impact customer satisfaction and loyalty in Taiwan's airfreight forwarding industry? *Transportmetrica A: Transport Science*, *13*(8), 679–707. https://doi.org/10.1080/23249935.2017.1321696
79. Yeo, G. T., Thai, V. V., & Roh, S. Y. (2015). An analysis of port service quality and customer satisfaction: The case of Korean container ports. *Asian Journal of Shipping and Logistics*, *31*(4), 437–447. https://doi.org/10.1016/j.ajsl.2016.01.002
80. Youndt, M. A., Snell, S. A., Dean, J. W., & Lepak, D. P. (1996). Human resource management manufacturing strategy. *Academy of Management Journal*, *39*(4), 836–866. 10.2307/256714
81. Yunan, Y. S. M., Ali, M. H., & Alam, S. S. (2020). Safeguarding Halal integrity through Halal logistics adoption: A case of food manufacturers. *Institutions and Economies*, *12*(3), 19–41.
82. Zhu, Q. (2016). Institutional pressures and support from industrial zones for motivating sustainable production among Chinese manufacturers. *International Journal of Production Economics*, *181*, 402–409. https://doi.org/10.1016/j.ijpe.2015.11.009
83. Zulfakar, M. H., Talib, M. S. A., & Anuar, M. M. (2014). Ensuring Halal food supply chain integrity in Malaysia: Establishing stakeholders' responsibilities. *Halal Global 2014*, *May 2014*. https://doi.org/10.13140/RG.2.1.3136.6567