Islamic Business and Finance Series

HALAL LOGISTICS AND SUPPLY CHAIN MANAGEMENT IN SOUTHEAST ASIA

Edited by
Nor Aida Abdul Rahman,
Azizul Hassan and Mohammad FakhrulNizam Mohammad

ROUTLEDGE

Halal Logistics and Supply Chain Management in Southeast Asia

The concept of Halal defines what adheres to Islamic law and is so comprehensive that it goes beyond food to include processes. The Halal industry has allowed many business firms a competitive advantage and is integral in its support for industries from food, tourism, banking and hospitality to medical. This book gives an overview of what Halal is in logistics and supply chain management, and discusses related issues and challenges in Southeast Asia.

The book also examines Halal logistics and supply chain in reference to global trends and practices. It attempts to integrate theoretical and methodological aspects of Halal logistics and supply chain study in different geographical areas across industries.

This will be a useful reference for those who wish to understand the Halal ecosystem and Halal logistics supply chain development.

Nor Aida Abdul Rahman is an Associate Professor at Universiti Kuala Lumpur, Malaysia, and currently serves as a Head of Aviation Management. She has worked as an internal and external trainer in management, supply chain, Halal logistics and postgraduate research. She has written three books on postgraduate research. Her work has appeared in several reputable academic journals, book chapters and refereed conference proceedings.

Azizul Hassan is a member of the Tourism Consultants Network of the UK Tourism Society. His main areas of research are technology-supported marketing in tourism, innovative marketing dynamics, destination branding in tourism, cultural heritage tourism, heritage interpretation and sustainable management/marketing alternatives. He has authored over 100 articles and book chapters in leading tourism outlets.

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Introduction

Nor Aida Abdul Rahman, Azizul Hassan and Mohammad FakhrulNizam Mohammad

The growing interest in the subject of Halal logistics and supply chain in recent years among academics and practitioners lies in the belief that a business operating in a competitive market gains reputational value from a strong Halal practice. It also influences Halal users, (business and end consumer) decision-making, and successfully maintaining Halal status strategy provides an opportunity for generating a significant future income stream, which, in turn, creates a new market of Halal products and services. In fact, there are only limited empirical studies on understanding what the Halal logistics and supply chain concept means; how it is operationalised; and the type of research designs, theory and methods used. The research examples of how it works in different countries are issues still unanswered. Existing books primarily focus on the Halal food and Halal financial and conceptual ideas, with some practice examples.

Yet understanding the Halal logistics and supply chain area is vital because maintaining Halal status throughout logistics activities is key to ensuring that there is no contamination happening during transport or storage. Furthermore, this understanding is vital not only to Halal product users and providers but also to marketers because favourable Halal brand images of a company may influence consumer patronage and consumer decision-making, while unfavourable Halal images adversely influence such decisions and behaviours. Moreover, Halal branding and image are valued by stakeholders, and will help companies to achieve a sustainable competitive advantage and hence contribute to a higher propensity to buy from a particular source, consequently leading to higher levels of profitability and business sustainability.

This book is unique in its layout and reveals the multifarious overview of the industry through rigorous research. That is, it combines theoretical and methodological aspects of Halal logistics and supply chain study in different geographical areas across industries. Students, scholars and practitioners can, therefore, access information on trends, theory and practices in Halal logistics and supply chain in the international arena. This book has 16 chapters, as outlined below.

The **first chapter** addresses the awareness and demand of Malaysian consumers towards Halal logistics of meat products. In this chapter, Nee, Yacob and Senadjki review the consumer perceptions of Halal logistics, including their awareness and demand on Halal

logistics of meat products and the effect on the development of the transport and logistics industry. An extensive and comprehensive review of Halal logistics in Malaysia is presented through the six subtopics in this chapter.

In the **second chapter**, Mulyaningsih, Arifin, Nu'man, Rachmawati and Rahmawati discuss Halal supply chain and the logistics of cold chain in the milk industry in Indonesia. This qualitative case study research focusses on dairy products that have been supplied from one of the biggest milk suppliers in Indonesia, with aims to investigate the efficiency of the milk cooperative in maintaining the quality of milk from the cold chain process and from a Halal supply chain and logistics perspective.

The **third chapter** addresses the issue of knowledge management strategy towards the development of the Halal logistics industry in Vietnam. In this chapter, Mohammad and Rahman discuss Halal economic activities and its growth in Vietnam.

The **fourth chapter** deliberates the issue of barriers in cold chain management for Halal food products in South-East Asian countries. In this chapter, Maifiah, Ahmad and Iskandar provide a conceptual framework as well as a comprehensive list of limiting factors of cold chain management, specifically on infrastructure, resources, knowledge and awareness, financial constraints, integration, standardization and regulation.

In the **fifth chapter**, Mahalle, Aghwan and Talib discuss the premier Halal logistics in Brunei Darussalam. This chapter aims to present and confer the development of Halal logistics in Brunei Darussalam. It also explains the country's Halal industry background, unveils several public and private Halal logistics initiatives, and elaborates on the enactment of laws and standards concerning Halal logistics.

The **sixth chapter** explains Halal logistics policy development in Indonesia. Lestari and Saidah provide a description on the regulations and technical guidelines related to Halal logistics, which can provide guarantees for consumers and become a reference for Halal institutions globally.

In the **seventh chapter**, Rahman, Ghafar, Yuliana, Moin, Nur and Zuhudi describe the evolution of Halal logistics in Malaysia, Thailand, Indonesia, the Philippines and Vietnam. These countries have been chosen in this study as there is a great potential to further develop the Halal industry in them. Building on this, the authors offer four perspectives: namely total Muslim population, the potential demand and movement of the Halal product, the Halal certification body and the Halal logistics service provider in these five countries.

In the **eighth chapter**, Rahman, Hassan, Ahmad, Harun, Romeli and Noh explore the growth or progress of Halal industry development in Singapore, with a focus on opportunities for Halal logistics expansion as a new focus. This chapter provides a detailed explanation on the three stages of Halal development in Singapore, with a focus on Halal logistics hub development in Singapore.

In the **ninth chapter**, Kadir provides an overview of Halal logistics development in Thailand. Halal products and services are increasingly recognised globally, including in Thailand. Manufacturers in Thailand are more aware of the increasing consumer interest in the Halal goods, and there are opportunities for growth in the existing Halal industry. Thailand is also known as the first country to own the Halal Science Centre with the intention

to become a leader in the Halal industry. This chapter argues that many adjustments and improvements would be required for the Halal supply operation, in spite of the fact that more logistics industrialists recently became involved in this market, as the main core of the successful Halal logistics management is the separation of Halal products from non-Halal products.

In the **tenth chapter**, Ustadi, Sentosa and Rasi provide explanations on developing an Integrative Model for Halal Transportation in Malaysia. This chapter intends to investigate the drivers of Halal transportation based on the integration of the theory of reasoned action (TRA) and the theory of planned behaviour (TPB). By integrating TRA and TPB, this study examines the causal effect relationships between attitude towards behaviour, subjective norm and perceived behaviour control, and towards intention for choosing Halal transportation behaviour. This study also examines behavioural, normative and control beliefs as a series of antecedents on the exogenous latent constructs. Data were collected from 615 manufacturers and logistics providers in Malaysia. Structural Equation Modelling (SEM) using Analysis of Moment Structure (AMOS) was employed and succeeded in configuring an integrative model for Halal transportation in Malaysia. The present study has produced five structural models: hypothesised, measurement, generated, re-specified, TPB and TRA competing models. Attitude, subjective norms and perceived behavioural control as exogenous variables are discussed as significant predictors of the intention to use Halal transportation. The Re-specified model also arises as a fundamental model on the Halal transportation guidelines in Malaysia.

The **eleventh chapter** explores Halal logistics standards development in SouthEast Asia. Additionally, the authors use MS2400 Halal supply chain standards (Malaysian standards) as the main reference to establish a discussion on standards development in neighbouring countries. The discussion is focussed on the core content of Halal logistics standards. By using Malaysian standards on Halal supply chain as a key reference, Rahman, Majid, Mohammad, Ahmad, Rahim and Mokhtar also highlight both the existing and the newly revised MS2400 standards for further research activity.

The **twelfth chapter** provides a discussion Halal integrity issue among the the Halal Logistics Service Provider (LSP). Majid and Shamsudin explore Halal integrity from many perspectives, such as individual integrity, organizational integrity, Halal logistics integrity and Halal supply chain integrity. This chapter also covers the issues and challenges of LSP in ensuring Halal integrity.

In the **thirteenth chapter**, the authors discuss on the training essentials in the Halal industry, including Halal logistics training. Mohamed, Noor, Rahman and Sarip discuss the training essentials for capacity building. This chapter aims to introduce a relevant training package for all levels of knowledge and skills as a requirement for capacity building on Halal quality management. This capacity building is focussed on certification in food products/beverages/food supplements, food premises/hotels, consumer goods, cosmetics and personal care items, slaughterhouses, pharmaceuticals and logistics. In this chapter, the authors highlight the importance of embedding Halal logistics information and knowledge in all Halal-type courses.

The **fourteenth chapter** studies the Halal compliance factors for air cargo warehouses. This qualitative research highlights their empirical findings on successful Halal compliance factors for air cargo warehouses in the aviation sector. Through this chapter, Khairuddin and Rahman discuss the factors which imbed the warehouse operator in implementing Halal standards at their warehouse from the warehouse operator perspective.

In the **fifteenth chapter**, Mohammad, Abdullah and Rahman argue for the importance of technology in Halal logistics and supply chain activity. This chapter discusses the role of the Halal Knowledge Integrity Model (HaKIM) in intensifying the integrity of the Halal industry. This chapter offers a brief overview on the importance of ensuring the integrity of Halal, ranging from obtaining information from the sources to understanding the major issues on the variances of knowledge among practitioners, leading towards the conceptual development of the integrity model in facilitating the whole process.

In the **sixteenth chapter**, Illyas and Husny describe the importance of technology in the Halal industry, including Halal logistics technology. The authors provide a discussion on Digital Innovation and Fourth Industrial Revolution in Halal logistics and supply chain.

The chapters are selected purposely to cast the book as an exclusive outline for both general and expert readerships.

1 Awareness and demand of Malaysian consumers towards Halal logistics of meat products

Issues and opportunities for the transport and logistics industry

Au Yong Hui Nee, Peter Yacob and Abdelhak Senadjki

Introduction

Islam is the world's second-largest, as well as the fastest-growing, religion. It is projected that the global Muslim population will grow to 2.2 billion by 2030. Thomson Reuters (2018) estimated the global Islamic economy to have an annual growth rate of 1.5%. In particular, Muslims are increasing at almost ten times the rate of non-Muslims, and their rapid growth over the past couple of decades has a direct impact on the global demand for the Halal market, which is obviously a leading model for business opportunities.

In relation to the above, the Global Islamic Economy Indicator (GIEI) provides a complete picture of which countries are best placed to address the global opportunity for multi-trillions of dollars. In its fifth year, the GIEI evaluated major national ecosystems to support businesses of the Islamic economy and play a key role in addressing Muslim consumer needs in driving economic growth and development. The indicator is a weighted combination of 49 important metrics, and it calculates the strength of the Islamic economy through supply and demand factors and governance, awareness and social considerations for 73 countries. Malaysia and the UAE are once again leading, but major developments in the leader board are expected, provided that more countries give the Islamic economy strategic importance (Thomson Reuters, 2018).

Set against the global context, Malaysia has had the leading ecosystem in the Islamic economy five years running. It has long taken important steps towards the growth of a world-leading Islamic economy, backed by its clear and wide "halalan" standards, Halal free zones or "Halal hubs", well-developed manufacturers of Halal goods, strong Islamic finance industry with a private equity investor ecosystem and venture capital. It is important to realise that Malaysia has maintained its place as the leading figure by implementing the International Halal Accreditation Board, which aims to deal with long-term profit among

certifiers, with important actions taken towards reinforcing its role in the global regulation of Halal products (Zailani et al., 2015).

Global Halal trade

Currently, the global food market is valued at $8.1 billion, with 52.6% of the total volume being fresh food and agricultural products, and the remaining amount of food being processed. The Halal food industry has a projected annual growth of $1.2 trillion; by 2021, it is projected to reach 8.5%, and by 2023, it will reach $1.9 trillion (Armanios and Ergene, 2018). This, in part, is due to population size and growth rate, with Muslims accounting for 1.8 billion people or 24% of the world population. This is increasing more rapidly than the global average and estimated to reach 2.8 billion or 29.7% of the global population by 2050 (Pew Research Center, 2017). Improving the socio-economic status of Muslim households in certain areas, especially the Arab Gulf States, Asian countries and Muslim-minority countries in the West, leads to higher disposable incomes and higher purchasing power for Halal products. Muslim spending on food and beverage (F&B) is increasing at a rate of 6.1%, consumer awareness of Halal food is also rising significantly and there have been significant investment opportunities and development in the global Halal food industry (Talib et al., 2017).

Nonetheless, the Halal food trade opportunities are enticing as there is a lot of progress within the leading export board, with China, the Philippines and Canada taking important steps. In addition, the Halal food export attracts new rivals, with China leading the charge, in the sense of $191.5 billion of imported F&B from Organisation of the Islamic Conference (OIC) countries in 2017, which can take a strong position as export leaders. Nonetheless, Malaysia, in an attempt to strengthen its central role in the Halal food industry, has started working for a Halal corridor and attempted to allocate US$ 4.5 billion to its Halal Development Fund. Moreover, it is expanding its Halal Certification Services to China, where 5,000 companies are said to have developed Halal local companies, including in Xinjiang, Gansu, Xian and Lanzhou (Dubé et al., 2016). Additionally, the Halal Export Control System, consisting of national certificates and Halal logos enabling exports of goods as well as the 60 countries that support the Malaysia certification system, has officially been recognised by OIC.

Transport and logistics industry

Halal food market growth represents significant potential for international businesses, not only in Muslim countries but also in Western markets with large and rising Muslim populations, among whom Halal observance is increasing. As the international Halal trade continues to grow, several countries are taking steps to capitalise on growth potential. The idea of Halal catalysed developments in Halal markets, creating new business momentum within the supply chain. The movement of goods and services from suppliers to customers is

perceived to be highly susceptible to food safety contamination or cross-contamination with non-Halal materials or products. In facilitating its potential, the Economic Planning Unit (EPU) has established the Logistics and Trade Facilitation Masterplan 2015–2020 to provide the strategic direction needed for the logistics industry to further boost its efficiency and competitiveness. In designing the Masterplan, comprehensive stakeholder meetings are conducted with industry players, government agencies, non-governmental organisations and academics. The Masterplan envisages Malaysia as "Asia's chosen logistics gateway". To ensure that this goal is acheived, 5 tactical changes and 21 acts have been illustrated. The recommendations encapsulated in this Masterplan will be integrated into Malaysia's 11th Plan (Ministry of Transport Malaysia, 2019). Figure 1.1 outlines the Logistics and Trade Facilitation Masterplan 2015–2020 Strategic Shift, which was introduced to improve the overall competitiveness and better link businesses to their markets locally and internationally.

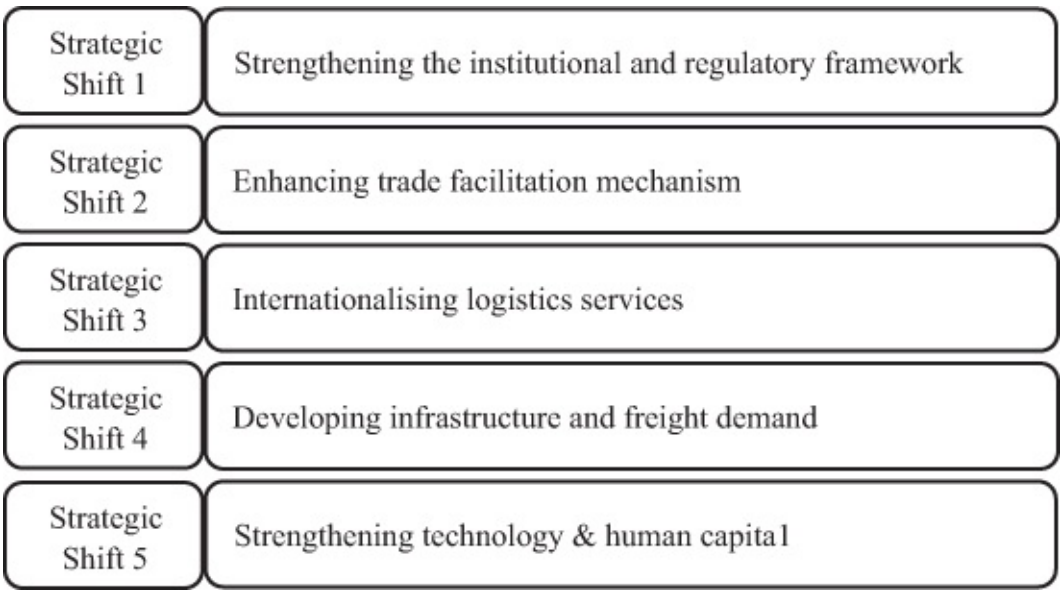

Figure 1.1 Logistics and Trade Facilitation Masterplan 2015–2020 strategic shift.
Source: Adapted from Ministry of Transport (2019).

Furthermore, international standardisation in the certification process for Halal goods now includes stringent criteria throughout the supply chain process. The transportation and logistics industry players need to be well versed in order to maintain the Halal credibility of a consumer movement, especially for meat products. The industry now needs more advanced Halal-compliant solutions for its entire supply chain system. Together with the rapid growth of the Halal industry worldwide, with total Halal economy spending hitting US$ 2.1 trillion in 2017 and expected to rise to US$ 3 trillion in 2023 (Thomson Reuter, 2018), Malaysia undertook significant regulatory, trade and industry initiatives to further develop the Halal logistics industry and become the world's chosen one-stop shop for Halal business solutions.

Another exciting development that began in the fourth quarter of 2018 is Malaysia's strategic partnership on the "Halal Silk Route", intended to shift the logistics landscape between Malaysia and China. The "Halal Silk Route" promises end-to-end logistics services with integrated Halal value-added services, hassle-free documentation processes and competitive transportation cost. This project connects the 2.1 billion Muslims globally

through trade-in Halal goods and is considered the missing link that completes the international Halal market value chain (MIHAS, 2019).

Halal industry and Halal logistics

Halal is a Quranic word meaning allowed, permitted, permissible and legitimate. The opposite is haram (forbidden, unlawful or illegal). In Islam and according to “Shariah” (Islamic law), all questions concerning Halal or haram, and even all conflicts, should be addressed to the “Quran” or “Sunna” (prophetic tradition), and its validity is important for Muslim consumers (Aziz and Chok, 2013).

Halal certification is one of the pre-requisites for global market entry, recognizing a product as “halalan toyyiban” for the entire supply chain, from farm to fork. In the Halal meat industry, the programme ranges from permissable animal farming to post-slaughter management in order to preserve Halal status. The animal welfare factor and antemortem inspection were also highlighted, which exist to reduce the chance of slaughtering wounded or diseased animals, which may not only affect meat quality but also lead to unhealthy consumption. Due to the principle of “toyyiban” (wholesomeness) food must be free from microbiological, physical and chemical hazards (Tieman and Che Ghazali, 2013).

In Malaysia, the Department of Islamic Development Malaysia or “Jabatan Kemajuan Islam Malaysia (JAKIM)”, a government agency, has jurisdiction and authority over all Halal matters. This department is not only responsible for the implementation of relevant acts, laws and regulations pertaining to local Halal requirements but also plays a significant role in the international scene through its Halal standards.

In producing Halal certification in Malaysia, four main entities need to collaborate extensively. Figure 1.2 shows that JAKIM and an accredited Halal laboratory must track Halal composition. Meanwhile, the manufacturing process must be supervised by the Standard and Industrial Research Institute of Malaysia (SIRIM) and Ministry of International Trade and Industry (MITI). The incorporation of Halal composition into a manufacturing process could establish a good Halal manufacturing process (Badruldin et al., 2012).

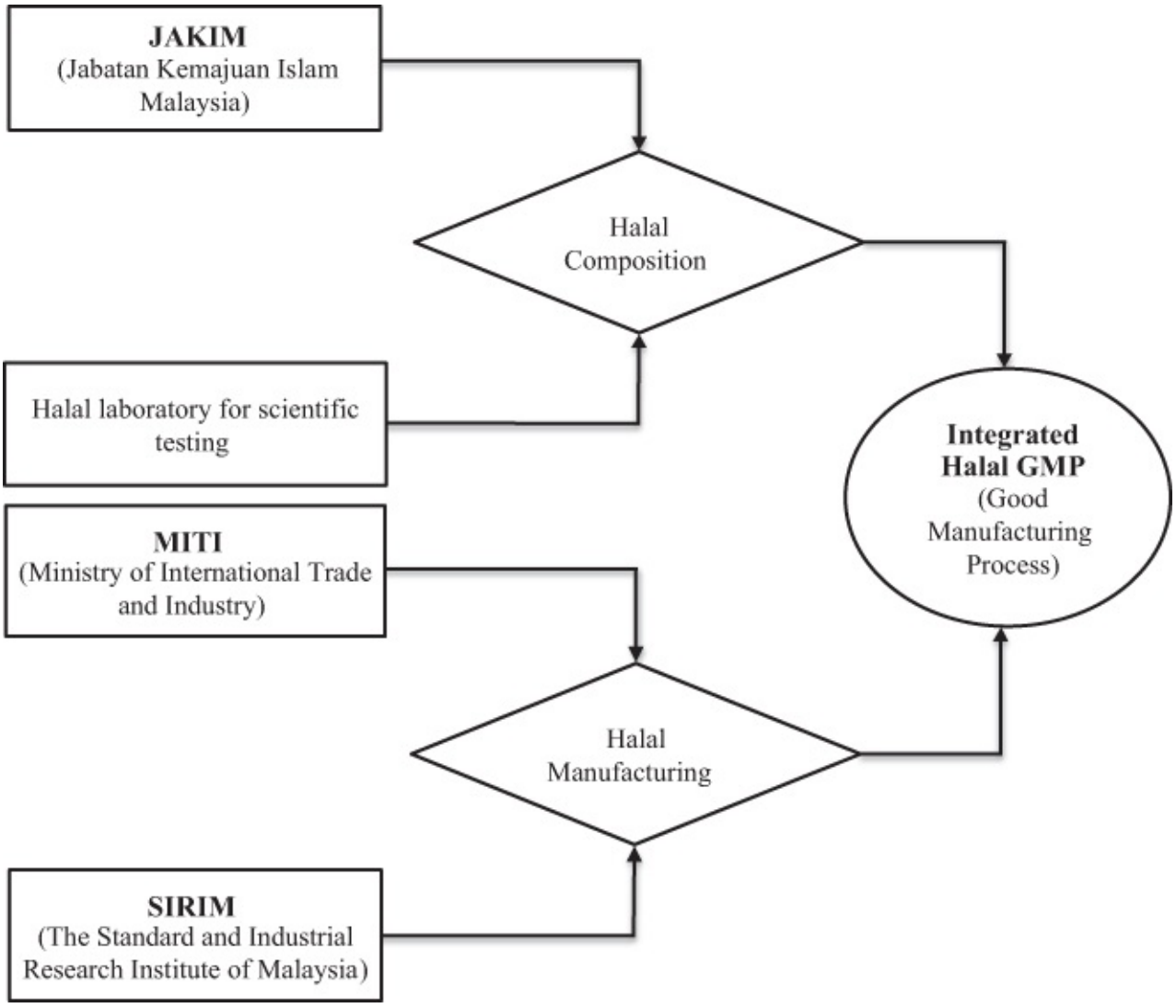

Figure 1.2 Framework of integrated Halal GMP.
Source: Adapted from Bakar and Rosbi (2019).

During the implementation phase of Halal in Malaysia, the Halal definition specifically refers to the definition used in Malaysia's Halal certification by the "competent authority" JAKIM and Islamic Religious Council of the States. Therefore, Halal, as prescribed by Malaysia Manual Procedure for Halal Certification, includes Trade Description Act 2011, Trade Description (Definition of Halal) Order 2011 and Trade Description (Definition of Halal) (Amendment) Order 2012.

Halal certification and procedure

From the perspective of Halal certification, Malaysia Halal Certificate Manual Procedure 2014 is, first, a system aimed at assisting and protecting the interests and welfare of consumers. The use of the Halal logo on products acts as a control mechanism to ensure that the food is approved by the government. Parallel to Halal certification, Halal safety protection, inspection and compliance are conducted to discourage abuse of Halal labelling

of goods. Hence, Manual Procedure for Malaysia Halal Certification 2014 is a guide that contains the procedures employers should follow for obtaining JAKIM Halal certification (Shahidan and Nor Othman, 2006). This manual aims to promote awareness and clarify to operators and the public Halal aspects under Islamic and Malaysian laws; it also includes procedures of application, inspection, monitoring and enforcement.

Second is the Malaysia MS1500 standard: 2009 Halal Food-Production, Preparation, Handling and Storage-General Guidelines. In cooperation with the Department of Standards, Malaysia has provided general guidance for manufacturers on the registration, preparation, handling and processing of Halal food, Halal slaughter and related conditions. Any Halal certificate owner must have this checklist in order not to violate JAKIM's Halal rules and regulations.

Third is the Halal Assurance System. The Malaysian Government made an effort to implement and release the 2013 General Guidelines on the Halal Assurance Management System (GGHAMS) as the industry guideline to meet legal requirements. A Halal assurance programme is an approach that focusses on enhancing or improving the mechanism used to produce Halal products in order to mitigate or eradicate non-compliance with Halal requirements. It is compatible with the GGHAMS elements of Control Points, Product Development and Flow Chart Verification, Implementation of Control Measures, Development of Corrective Action, Report and Record Management System, Process Verification, Halal Database and Traceability.

Fourth is the Trade Descriptions Act 2011. Implementation of Halal certification in Malaysia has undergone various changes. Earlier, Halal certificates and logos for domestic products could be applied by the Department of Islamic Development Malaysia, the State Islamic Religious Department or private companies. There are several different types of Halal logo, depending on who is issuing it. The inexistence of special laws monitoring and taking action against certificate issuers can result in confusion among consumers. This is particularly in relation to the reliability and credibility of the parties issuing the Halal logo (Information Paper on Trade Descriptions Act 2011 and Implementation). Most previous studies related to Halal food have focussed on the user's perspective, model for food chain policy and the concept of "halalan toyyiban" (lawful and goodness).

In summary, the debate about "halalan toyyiban" concept refers to the verses in the Quran. Thus, they became the starting point in determining Halal and haram, as described by Allah in Surah al-An'am: 145 and al-'Araf: 157. Based on the verses, it is clear that the foods encouraged by Islam are "tayyibah" foods, which do not contain elements harmful to our health, life and mind (Khan and Haleem, 2016).

Perception of Malaysian consumers towards Halal logistics

The Holy Quran commands Muslims to consume Halal food, thus avoiding haram and doubtful things (Al-Baqarah: 172), so Muslims around the world, without the exception of Malaysian Muslims, must adhere to such practices religiously. Several findings in relation to Halal consumption have indicated that despite the indication of "Halal service and product"

in many restaurants and shopping centres, Muslim consumers want to be assured that the Halal logistics, including those of food and other items, are actually a true manifestation of Islamic principles (Wilson and Liu, 2011; Zailani et al., 2017). Despite the productivity measures taken by some Islamic organisations to ensure that the Muslim consumer's rights to Halal foods and products are protected, there is still fragment of concern from such Muslim consumers with regard to the genuineness of Halal logistics specifications (Dali et al., 2007; Wilson, 2014).

Zailani, Iranmanesh, Aziz and Kanapathy (2017) emphasise that, contrary to popular knowledge, Halal is not only for foods but also applies to the specification of other consumer products, such as pharmaceuticals and cosmetics. Hence, in many instances, some Muslim consumers disregard the substantiation of Halal and non-Halal pharmaceutical and cosmetic products due to lack of knowledge about the products. Other studies have stated that Muslim consumers are obliged to avoid any products which they doubt were manufactured without proper regard for Halal laws, as clearly mentioned by Prophet Muhammad (PBUH), as narrated by Al-Nu'man ibn Bashir in Jami at-tirmidhi (12: 1205). Similarly, all Malaysian Muslim consumers must leave any product that has any element of doubtfulness in the Halal specification (Pahim et al., 2012; Zailani et al., 2015). Religiously, Muslims not only practice but also strictly believe that Halal logistics do not stop once a product has been manufactured as a Halal product, and the product could lose its Halal status if it is contaminated during transport and storage prior to sale (Ngah et al., 2014; Zailani et al., 2015). As part of their religious beliefs, Muslims are particularly sensitive to whether or not products or services offered in the markets are Halal. This is because Muslim consumers have a greater understanding of Halal specifications and possess greater knowledge of Halal food consumption which they utilise in purchasing any products, especially food (Shafie and Othman, 2006).

Halal and cold chain logistics

Halal supply chain management is different from conventional supply chain management. That is, Halal supply chain requires a Halal policy and specific design parameters for distinctive supply chain objectives (Tieman et al., 2012). Findings have shown that product characteristics and market requirements (for Muslims and non-Muslims) determine the supply chain logistics for Halal products and services (Assen, 2010; Zailani et al., 2010a). When consumers' demands for Halal products increase, the supply chain logistics increase simultaneously. Similarly, the level of logistics services provided by suppliers predetermines consumer satisfaction. In the logistics industry, consumers' satisfaction is significant to the processing nature of the logistics service. Hence, when consumers' satisfaction is low, the product's logistics process slows down accordingly (Tieman, 2013). In Malaysia and other Muslim nations, the Halal logistics industry plays a significant role in the Halal supply chain approach to successfully fulfilling the increasing demands of Halal consumers (Zailani et al., 2010a). The sole integrity of the Halal logistics supply chain is becoming an growing concern as Halal consumers expect that all supply chains will meet Halal principles.

Consequently, with a rising demand, consumers are concerned with Halal supply chain logistics' being properly approved. Specifically, Halal needs a supply chain approach, in which the value or principle chain and its supply chain is fully aligned (Fathi et al., 2016).

In maintaining Halal integrity throughout the supply chain, Bahrudin, Illyasa and Desa (2011) argued, there will always be challenges. It is vulnerable to mistakes in maintaining Halal norms, though it is of the essence to avoid doubt in Halal products throughout the supply chain procedures. Its vulnerability makes the Halal supply chains structure more complex to design and manage (Zailani et al., 2010a; Tieman, 2011). In spite of the required Halal policy in the conventional supply chain, these vulnerabilities cannot be truncated through a conventional supply chain approach. A conventional approach concedes the significance of efficiency, but it is inadequate for ensuring that ethics, sustainability and human values that are critical for Halal supply chains are well enforced (Milestad et al., 2010; Tieman et al., 2012). For this reason, Muslim consumers are religiously bound to avoid any products about whose production they have any doubt (Zailani et al., 2015; Zailani et al., 2017).

Intention towards Halal logistics

A few decades ago, non-Muslims viewed "Halal" as a religious term without understanding its implications. Even though the word "Halal" is without a doubt a religious "Act" (Quantaniah et al., 2013), non-Muslim consumers should understand that products, such as food items, carrying the "Halal" logo have been prepared in the most ethical and hygienic way, and are acceptable to the Halal logistics forum for purchase and consumption (Mathew, 2014). According to Tieman et al. (2013) and Zailani et al. (2017), the market acceptance of Halal logistics depends on several factors, including the intention to use the product and whether or not the product has been used and will continue to be used. Consequently, it is the customer's opinion of how they evaluate the product that influences the purchase of the product. Interestingly, consumers respond positively to Halal products' presence in markets, even though some non-Muslim consumers do not understand the specifications of Halal logistics. Today, Halal has huge potential to capture non-Muslims as a target market. The Halal concept on food extends beyond religious values alone. It represents the hygiene, cleanliness and quality of the food consumed, the services rendered, product manufacturing, etc. (Zailani, et al., 2018; Ahmed et al., 2019). Hence, the intention to accept and purchase Halal products has significantly seen a gradual increase over the years (Mathew, 2014).

Studies have proven that there is a significant relationship between the behavioural intention of people and their chosen actions. Thus, the acceptance intention of an individual predetermines their next line of actions (Hassan et al., 2009; Arshad et al., 2018). Recently, more consumers (Muslims and non-Muslims) have displayed increased concern for human values, ethics and health. This promotes the acceptance of Halal products as Halal covers not only the consumption of clean and hygienic food but also being acquainted with generally acceptable logistical products through ethical means (Zailani et al., 2010a; Mathew, 2014). Consumers today are more aware of the significance of Halal logistics, thus influencing their

behavioural intention towards the purchase of Halal logistics (Arshad et al., 2018; Ahmed et al., 2019).

Halal logistics implementation in Malaysia

According to the Halal Industry Development Corporation (HDC), it is necessary to design specific Halal clusters. The introduction of more Halal clusters will without a doubt serve as the global hub for the Halal industry. The Halal cluster would successfully enable industry players (such as traders, manufacturers, suppliers and logistics services) to trade with each other more effectively and lawfully (Halal) in the country (Tieman, 2015; Arshad et al., 2018). According to Zailani, Iranmanesh, Aziz and Kanapathy (2017), since its genesis, Malaysia has ensured that Halal integrity in the country remains intact along with the Halal chain. As part of the significant features of a consistent production of Halal products, Halal logistics play an integral part in maintaining the Halal status of products during their distribution. According to Soltanian et al. (2016) and Zailani et al. (2017), the Halal market in Malaysia still faces some challenges in the logistics services. Thus, in spite of having a vast Halal market, the number of Halal-certified third-party logistics service providers (LSPs) in the country is still limited.

Since a significant portion of the food supply chain, from farms to food manufacturing to logistics to retail, worldwide is dominated by non-Muslims, several Muslim food corporations are still working hard to standardise Halal food production (Soltanian et al., 2016). Malaysia, for instance, is working towards establishing a Halal standard for non-Muslims to follow to better assure that food production in the country is Halal. Nonetheless, in order to ensure a proper Halal logistics process, Halal certification bodies basically examine all Halal food production elements, which include slaughtering, ingredients used, cleaning, handling and processing, transportation and distribution, and ensure that the food products meet Halal standards, as required by Muslim consumers (Quantaniah et al., 2013; Zailani et al., 2017). Studies have shown that Halal principles have now become a worldwide concept that encompasses products and services of the highest quality, and that subsequently meet the demand of not only Muslims but also non-Muslim consumers. Consequently, some non-Muslim consumers are comfortable with Halal products, despite the fact that they are not religiously required to consume them. (Rezai et al., 2012; Quantaniah et al., 2013; Zailani et al., 2017).

Issues and opportunities of Halal logistics in Malaysia

Halal logistics operations pertaining to transportation, warehousing and storage have to comply to “syariah” requirements, especially in preventing incidents, e.g. mixed storages and cross-contamination (Zailani et al., 2010b). In order to sustain the market share of products targeting Muslim consumers, the risk (Mahidin et al., 2017) perceived by Muslim consumers has to be given high priority. The risk of Halal integrity is much emphasised by these

consumers. In the food supply chain, there are six dimensions of Halal integrity risk. According to Ali, Tan, Pawar and Makhbul (2014), these are (a) production, (b) raw materials, (c) food security, (d) outsourcing practices, (e) service and (f) logistics. This chapter focusses on the logistics aspect of Halal integrity risk. When there is a risk of perception, the trust (Mahidin et al., 2017) of the consumers will be affected.

According to Muslim customers, Halal and non-Halal food products should be segregated. However, many Halal and non-Halal products are transported in the same refrigerated/non-refrigerated vehicle or kept in the same warehouse (Talib et al., 2015). In addition to transportation and warehousing, availability of infrastructure in terms of suitable terminals (Mahidin et al., 2017) is also an essential issue in Halal logistics, especially when it involves cross-boundary trades.

Issues

LSPs are facing some issues in transforming Halal logistics. In implementing Halal logistics, LSPs have to deal with various stakeholders who are subject to their firm-specific internal environment as well as interaction with external environment. According to Talib, Hamid, Zulfakar and Thoo (2015), the barriers to the Halal logistics operation are of the nature of (1) Internal, (2) Inter-firm, (3) Firm-government and (4) Firm-authority. They further elaborate that the main reason for these barriers is a scarcity of Halal experts, which also affects the resistance to adopting Halal logistics by the firm and lack of Halal logistics champions to deal with the government, on top of the transition complication between the government and Halal authority. This is illustrated in Figure 1.3.

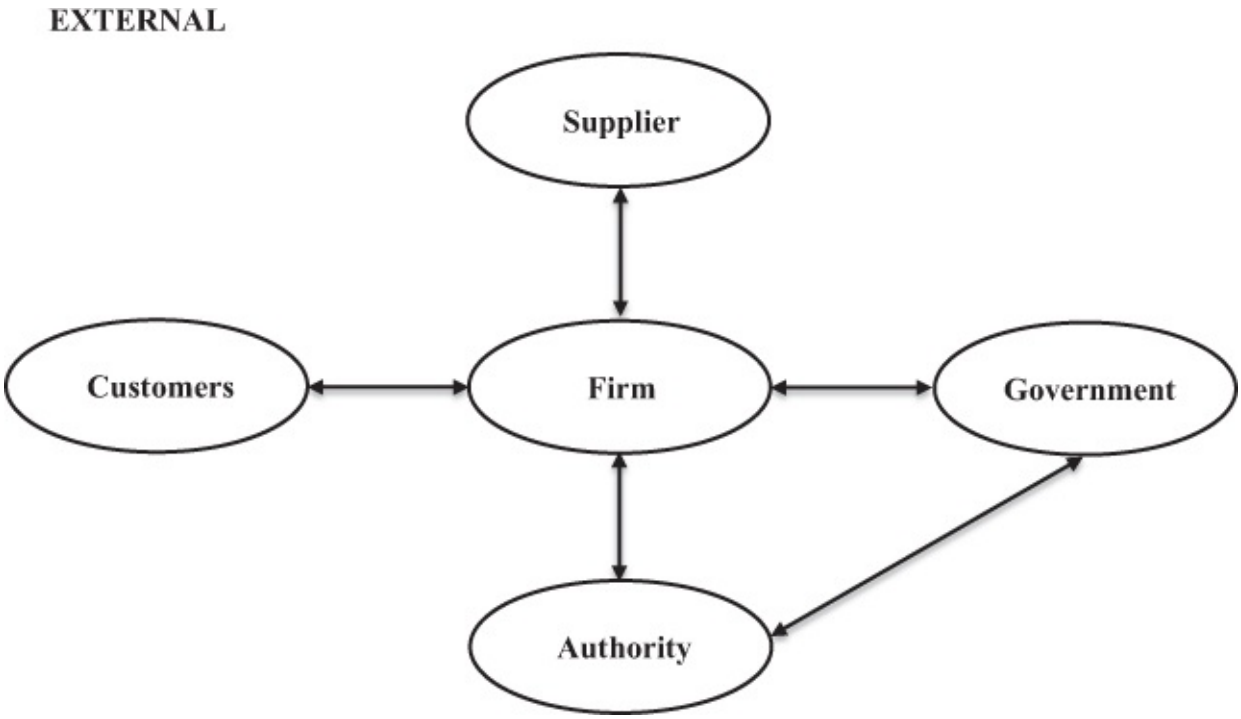

Figure 1.3 Business environment and stakeholders.

Source: Developed by the authors (2019).

Firm internal issues

There are internal issues within LSPs that affect the implementation of Halal logistics. Many firms do not invest in practising Halal logistics due to the additional cost in the logistics (Jaafar et al., 2013; RadzmanShah et al., 2016; Mahidin et al., 2017; Wan, 2018) when the demand from the industry and consumers is not significant (Wan, 2018) enough at this time. Especially these firms face internal issues in adopting Halal logistics. In the labour market, there is a shortage of technical experts, Halal executives or Halal auditors who can pass on advice/knowledge (Mahidin et al., 2016; RadzmanShah, et al., 2016; Wan, 2018) related to Halal logistics. Lack of knowledge on "Shariah" principle may curb the implementation of Halal logistics among those who have been newly exposed to these logistics (e.g. the requirement to do "samak" or ritual cleansing) (Talib and Hamid, 2014).

Inter-firm issues

Implementation of Halal logistics is also related to the readiness of logistics infrastructure and its ecosystem. LSPs face difficulties in implementing Halal logistics because of the lack of information-sharing among suppliers and community (Jaafar et al., 2011). Without supplier partnership, it is difficult for an LSP to comply with the "Shariah" requirements of Halal logistics.

Firm-government issues

From the government's viewpoint, transformation of conventional LSPs to Halal logistics is encouraged as this will widen the scope of services provided to the customer. In terms of government-authority in Halal logistics, the issues are related to the government's support and promotion (Ab Talib et al., 2013). The government's support in areas such as certification, incentives and promotion of the Halal logistics to the worldwide customers is well accepted as the competitiveness of the logistics industry as a whole is elevated, especially among OIC countries.

Firm-authority issues

The interaction between logistics services providers and Halal authority is not always positive. According to Jaafar, Omar, Osman and Faisol (2013), 90% of Halal products are manufactured in non-Muslim countries; hence, the Halal products, the Halal status and the Halal logistics are often in doubt (Jaafar et al., 2013). The consumers face the issue of lack of enforcement (Sham et al., 2017), especially when there are technologies available to produce fake Halal certificates or labels (Wan, 2018). Halal products' traceability is essential in maintaining their status during the transfer in Halal logistics (Jaafar et al., 2013). The low degree of cooperation between Halal certification authority and LSPs is another area of concern (Talib and Hamid, 2014).

Government-authority issues

Issues of the legal status of Halal and the protection of Halal status are at times unclear in the logistics activities (Jaafar et al., 2013). Globally, there are some countries that refuse to accept some certification bodies (Wan, 2018). There is room for improvement to enhance familiarity and awareness of the Halal logos from various countries, particularly in regard to logos with the certification body (CB) of JAKIM. In other words, there is a lack of synergy by Halal authority's agency in enforcing Halal logistics (i.e. the inadequacy of Halal enforcement officers in fulfilling their responsibilities in monitoring the wholesomeness of Halal logistics activities) (Shafie and Othman, 2006).

Opportunities

Despite the above-mentioned issues and challenges faced by industry players, the readiness towards Halal logistics can escalate due to the existence of related factors: (1) vision to change, (2) Halal assurance system and (3) environments (Tarmizi et al., 2014). It depends largely on the market forces for any vision of the customer to look forward to the industry for change. Trusted and cost-effective a Halal assurance system is required for its further proliferation to wider markets. There is also a need to create user-friendly and suitable environments for sustainable Halal business development. Halal logistics is important within the supply chain to embrace the opportunity to take part in the growing international Halal market.

In order to mitigate the issue of technical expert shortage, an increasing number of Halal training courses are offered in the market. Halal logistics training is essential to those that are involved in handling Halal products. The three dimensions that have been highlighted by Pahim, Jemali and Mohamad (2012) as important in the need for training in Halal logistics are people, demand and level of awareness (Jaafar et al., 2013). Nevertheless, there is still room for improvement as these courses are not structured and vary in terms of durations, contents and coverage (Jamaludin et al., 2015).

On the other hand, there has been a market trend of merger and acquisition (MandA) among LSPs in Malaysia as well as pressure to transform into Halal LSPs. Local and foreign LSPs that offer Halal logistics services are listed in Table 1.1.

Table 1.1 Examples of Halal logistics companies

Companies	*Ownership (Local or Foreign)*
A-Transglobal Logistics Sdn Bhd	Local
Cargomind Sdn Bhd	Local
FTS Logistics	Local
Kontena Nasional Berhad	Local
Logistics Worldwide Express	Local
MASkargo	Local
MILS Sdn Bhd	Local
NL Cold Chain Network (M) Sdn. Bhd. (NLCCN)	Local

Northport	Local
PKT every24 Logistics Sdn Bhd	Local
DB Schenker	Foreign
Nippon Express (Malaysia)	Foreign
Sankyu Malaysia Sdn. Bhd.	Foreign
Yusen logistics	Foreign

Source: Developed by the authors, 2019

Conclusion

The increasing size of the worldwide Muslim population, currently at over 1.8 billion, has stimulated strong business opportunities for companies in Malaysia. Among the most prominent opportunities the Halal food products. With the globally well-respected and recognised Halal certification, Malaysia possesses an important position in a Halal supply chain system that supports its international credibility. Looking into the global trend, Japan, which is an oriental non-Muslim majority country set to host the Tokyo Olympics 2021, has also been actively promoting Halal products in order to get ready to receive and serve Muslim athletes and travellers. Beyond the acquisition of Halal certification, a market trend of merger and acquisition (MandA) has been observed among LSPs in Malaysia towards the expansion of Malaysian companies to Japan involved in terms of Halal products and Halal supply chain.

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2 Halal supply chain and Halal logistics of the cold chain model in the milk industry

Evidence from milk cooperatives in Indonesia

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Introduction

Halal products are goods or services that are produced through a process based on Islamic law. According to Thomson Reuters in the report of the State of Global Islamic Economy (2014–2015), Halal products include not just food industries but also cosmetics and pharmaceutical industries, Islamic-based financial systems, fashion, media and recreation, and the concept of Halal tourism.

However, it is critical to Muslim society members that their Halal food strictly complies with a diet based on sharia law and principles. The Halal food market has grown significantly over the past five years as this type of food is now being consumed by both Muslim and non-Muslim consumers in the face of virtually the same pattern of increased demand. Reuters and Standards predicted that the Halal food market would grow to US$ 1,914 billion by 2021, about 18.3% of global food consumption and the Halal food supply chain is projected to represent 16% of the global food industry (Wahyuni et al., 2019).

From the perspective of Halal logistics and the Halal supply chain, all operations from "farm to fork" must comply with sharia law and principles requirements to uphold their Halal integrity (Soon et al., 2016; Aida et al., 2017). Tieman (2012), in his concept, mentions Halal in the supply chain, which means that the overall activities of the entities involved along the supply chain from upstream to downstream apply the concept according to Islamic law, from the selection of suppliers, production processes, and storage to distribution (separating product storage and shipping lawfully in order to avoid contamination).

Indonesia, which has the biggest Muslim population in the is also strict with regards to the Halal supply chain and logistics in each Halal product. Hence, the market in the Halal industry will grow rapidly with the emergence of the need for Halal products in Indonesia. Furthermore, this study is focussed on the Halal supply chain and logistics in the cold chain of dairy products, especially some small-scale dairy producers and milk producers' cooperatives in Indonesia.

In 2016, the milk consumption of Indonesia per capita was much lower than it was in other ASEAN countries (Indonesia: 14.3 litres; the Philippines: 22.1 litres; Malaysia: 50.9 litres; and Thailand: 33.7 litres). However, the consumption was sturdy, growing 15% in some product categories, which was supported by the growth of the middle class. In the production sector, dairy production has been growing actively. The dairies who have fully integrated into producing and marketing are at the forefront. Even though they produce 30 litres per animal per day, they still need support from the cooperative. However, the dairy farmers who become members of the cooperative only produce 10 litres per animal per day.

Indonesia's number of small-scale dairy producers declined following a massive herd sell-off in 2013 due to high beef prices, which drove down co-op milk production by about 20%. The cooperative struggled to produce more cattle and estimated to grow the cattle population only 3% annually. However, the demand is still high and cannot be fulfilled by the milk cooperatives. In the case of milk cooperatives, there are some issues regarding the development of the product which has not significantly increased. This situation emerged as a result of several factors; the first one is poor brand image. Milk that has been produced by the cooperative is not as popular as that of the other big corporation brands due to lack of promotion budget. The second factor is that the cooperative focussed on its marketing strategy at the expense of its commercial strategy: for example, the packaging of the product was not attractive. The third factor is that they are obligated to continue innovating their product list (for example, they do not do product development and diversification). For many years, they were only producing yogurt and pasteurised milk, but, just several years later they are trying to use the waste of the milking process to make milk powder and cream cheese; this is also the result of demands from the distributor. The fourth factor is their distribution system since dairy products, in particular, have one of the highest rates of waste, with current estimates reaching 19% of product lost in retail, food service and households (Gunders, 2012); most of the cooperatives have not improved their cold chain distribution by inventing new technology in collecting points.

Considering that the dairy product is included in a perishable product, the temperature of which needs to be controlled, Sahin, BabaiZied, Dallery, and Vaillant (2007) define cold chain as a supply chain that requires a controlled temperature. The cold chain is vital for reducing food waste and ensuring food safety (James and James, 2010; Alder et al., 2012; Mercier et al., 2017), which, in turn, influences the environment, water, and land resources (Stephen and Christian, 2010; Liu et al., 2013; Coulomb, 2016). Hence, this research aims to investigate the efficiency of the milk cooperative the maintaining the quality of milk from the cold chain process perspective and the Halal supply chain and logistics perspective.

Literature review on Halal perspective in logistics and food supply chain

Research on Halal supply chain and logistics is still rare and in the early stages of research into the supply chain. Based on the literature study on Halal food in Scopus-indexed journals

from 2000 to 2017, during this time, there were only 33 papers on Halal food in terms of the supply chain from 24 journals (Wahyuni et al., 2019). Meanwhile, the first paper about Halal food was published in 2008. Moreover, there are only seven journals that published articles about Halal food in the supply chain perspective. Based on the country of origin of the author, the authors studying Halal supply chain mostly come from Malaysia and the United Kingdom, and the author has identified an opportunity for further research on Halal supply chain and logistic contextually from Indonesia, which has the biggest Muslim population in the world. Therefore, this research will contribute a conceptual model of cold chain in the milk industry to the research on Halal supply chain and logistics.

The Halal supply chain study by Tieman (2011), with 62 citations, followed by a paper by Tieman, Vorst, and Ghazali (2012), with 44 citations, is the most frequently cited article on Halal supply chain. Tieman (2011) examined the basic requirements for Halal supply chains to ensure Halal food integrity. In another study, Tieman, Vorst, and Ghazali (2012) introduced the Halal supply chain model, in which the model is a prominent instrument to research on a Halal food supply chain. Their study also determined the differences between a Halal supply chain and a conventional one. However, their study still focussed on the Halal perspective in the context of the supply chain rather than in a Halal food context. In another study Ali, Tan, and Ismail (2016) focussed on the supply chain in the context of Halal food. Their study mentioned the importance of food supply chain integrity in dealing with religion. Halal integrity in the supply chain has also been studied by Soon, Chandia, and Regenstein (2016). Their study argued that Halal food supply chain ranges from farm to fork and explained that nothing, from the source of raw product to the processing product (with the proper Halal integrity) to the finished product should be cross-contaminated with a haram product (Ali et al, 2016; Zailani et al, 2016).

Nevertheless, Halal specifications are not well enforced or understood in non-Muslim countries, where in understanding of the meaning of “Halal Toyyiban” is crucial throughout the supply chain system (Aida et al., 2017). From the perspective of Islam, two prominent criteria have been mentioned in Al-Qur’an and al-Hadits regarding the food that could be consumed by Muslims. They are “Halal” and “Thayyib”. The term “Halal” in the Koran means “permitted, or valid” (Wilson and Liu, 2010; Wilson, 2014). The opposite is “haram” (Muhammad et al., 2009; Rosly, 2010). “Halal” is not only for food but also for other consumer products, such as pharmaceuticals and cosmetics (Ngah et al., 2014), while “thayyib” means “quality and does not endanger health”.

Various verses of the Qur’an (Qur’an 2: 168; Qur’an 5: 3; Qur’an 5: 4; Qur’an 5: 88; Qur’an 8: 69; Qur’an 16: 114; Qur’an 2: 51) explain that the understanding of Halal and haram is not limited to the problem of food and drink but also concerns the substance, process, and how it is obtained. So, there are actions that are permitted; there are also actions that are forbidden. A Muslim must make sure only to consume good food or drinks. This belief follows the word of Allah SWT:

يَا أَيُّهَا النَّاسُ كُلُوا مِمَّا فِي الْأَرْضِ حَلَالًا طَيِّبًا

“O people, eat Halal again both of what is on earth” (Qur’an, Al-Baqarah [2]: 168).

حرمت عليكم الميتة والدم ولحم الخنزير وما أهلفلا تخشوهم واخشون اليوم أكملت لكم دينكم وأتممتي مخمصة غير متجانف
لإثم فإن الله غفور

Forbidden to you (takes) carrion, blood, pork (meat animals) are slaughtered in the name of other than Allah, the strangled, which was hit, which fell, headlong, and torn to pieces by wild beasts, except those that you slaughtered, and (forbidden to you) who were slain for idols. And (forbidden too) to draw fate with arrows (drawing fate with arrows) is wickedness. On this day, the disbelievers have been desperate to (defeat) your religion, so do not be afraid of them and fear me. On this day, I have perfected for you your religion, and I have fulfilled to you my favours, and I have blessed Islam to be a religion for you. So whoever is forced by starvation without intentionally sinning, surely Allah is Forgiving, Merciful (QS Al-Maidah [5]: 3).

يَسْأَلُونَكَ مَاذَا أُحِلَّ لَهُمْ قُلْ أُحِلَّ لَكُمُ الطَّيِّبَاتُ

“They ask you: “What is lawful for them?”. Say, “Permitted to you the good things” (QS. Al-Maidah [5]: 4).

وكلوا مما رزقكم الله حلالا طيبا واتقوا الله

“And eat food lawful and good of what God has been bestowed unto and fear Allah that you believe in Him” (QS.Al-Maidah [5]: 88).

فكلوا مما غنمتم حلالا طيبا واتقوا الله إن

“So eat of the most booty Have you grab it, as food lawful and good, and fear Allah; Allah is Forgiving, Merciful” (QS.Al-Anfal [8]: 69).

فكلوا مما رزقكم الله حلالا طيبا واشكروا نعمةإن كنتم إياه تعبدون

“So eat of the lawful and good on the provision that has been given by God to you; and give thanks favours of Allah, if ye in Him alone worship” (QS. Al-Nahl [16]: 114).

يا أيها الرسل كلوا مِنَ الطَّيِّبَاتِ وَاعْمَلُوا صَالِحًا

“O apostles, eat from good food, and do righteous deeds” (QS. Al-Mukminun [23]: 51).

Word of the Prophet SAW:

الحلال ماأحل الله في كتابه, والحرام ماحرم الله في كتابه, عنه فهو مما عفا عنه وماسكت

“Halal is what Allaah in His book. Haram is what God forbids in His book. And what He hushed is something that is allowed” (Narrated by Ibn Majah, al-Baihaqi, at-Thabrani, at-Tirmidhi, and al-Hakim).

The meaning of “good (thayyib)”, as stated in the above paragraph, is a threshold for safe consumption of goods for health. Ibn Kathir stated that “Thayyib” is:

أي: مستطابًا في نفسه غير ضار للأبدان ولا للعقول[1]

“Good for him, does not endanger the body and mind”.
Meanwhile, according to ar-Razi, “thayyib” is:

والطيب في الأصل هو ما يستلذ به ويستطاب[2]

“The purpose of ‘thayyib’ is good and nutritious food”.

From the aforementioned explanation, it can be understood that Islam does not only require its adherents to consume Halal food and drinks but also requires them to pay attention to the delicacy and especially its “thayyib” (food safety). The virtues of Halal are also explained in other propositions.

عن أبي هريرة رضي الله عنه قال: قال رسول الله صلى الله عليه وسلم: «أيها الناس إن الله طيب لا يقبل إلا, وإن الله أمر
المؤمنين بما أمر به المرسلين, فقال: {يا أيها الرسل كلوا من الطيبات واعملوا صالحاعَلِيمٌ} ، وَقَالَ: {يَا أَيُّهَا الَّذِينَ آمَنُوا كُلُوا مِنْ
طَيِّبَاتِ مَا رَزَقْنَاكُمْ}. ثم ذكر الرجل يطيل السفر أشعث أغبر يمد»(رواه مسلم)

From Abu Hurairah (may Allah be pleased with him), he said: Rasulullah SAW said: “O mankind! indeed Allah is the Essence of the Most Clean, perfect, does not accept except the clean (good). And verily, Allah commands Muslims things that are ordered to His messengers. Then He reads verse {“O apostles, eat of good food, and do righteous deeds Verily I know what you do”} and verse {O you who believe, eat between good fortune - Well we gave you}. Then the Apostle mentions a traveling away to practice their religion, he prayed to stretch out your hands to the sky, Lord, Lord, and the food is haram, his drink unlawful, his clothing unlawful, and all of it was obtained from the unlawful, then it will become unanswered prayers unanswered prayers” (HR. Muslim).

عن ابن عباس قال: تليت هذه الآية عند النبي صلى الله عليه: {يا أيها الناس كلوا مما في الأرض حلالا} فقام سعد بن أبي
وقاص, فقال: يا رسول الله, ادع الله أن يجعلني مستجاب الدعوة, فقال . «ياسعد, أطب مطعمك تكن مستجاب الدعوة, والذي نفس
محمد بيده, إن الرجل ليقذف اللقمة الحرام في جوفه ما, وأيما عبد نبت لحمه من السحت والربا فالنار». (أخرجه الطبراني)

From Ibn Abbas, he said: read before the prophet verse {O people, eat Halal well from what is on earth}, then stand Sa’d bin Abi Waqqash. He said: “O Messenger of Allah, please pray to Allah that I will be among those who have been answered”. Then Rasulullah SAW said: “O Sa’d, pay attention to the Halal and indulgence of your food then your prayers will be obligatory. For the sake of the Essence of which Muhammad’s

life was in His grasp, the person who put unlawful things in his stomach would not be received (his deeds) forty days. Anybody servant whose flesh grows out of haram and usury, then hell more important for him" (HR.At-Thabrani).

عن أبي بكر الصديق, رضي الله عنه عن النبي صلى الله عليه:« من نبت لحمه من السحت فالنار أولى به »رواهالحاكم وقال
حديث صحيح

From Abu Bakr as-Siddiq (may Allah be pleased with her), the Prophet Muhammad: "whoever flesh grows out of haram, then hell more important for him" (HR. al-Hakim, and he said this tradition is authentic).

عن كعب رضي الله عنه قال: قال رسول الله صلى الله عليه وسلم: « كل لحم نبت من حرام) فالنار أولى به » (أخرجه الرذم

"From the flesh, said: "Who is the one who grew up: Allah said: "Who is the one who grew up: Allah said:" Who is the one who grew up: Allah said: forbidden, then hell is more important to him" (HR. at-Tirmidhi).

Halal food according to its substance

Allah is the most gracious, most compassionate. Almost all types of food are Halal and can be consumed. Through their obedience of rules regarding food, drink, and so on, people show their spiritual gratitude. The goodness of the existence of the prohibition is clearly for the benefit and goodness of humanity itself. Carrion, blood, and pigs are strictly forbidden by Allah, according to the aforementioned verse. Furthermore, all animals that die without going through the process of slaughtering are "haram", equated with the carcass. Animals that die during transportation, even if only shortly before they would have been slaughtered, may not be slaughtered and consumed by humans.

Halal food, according to the way it is processed

"Halal" food can become "haram" if it is processed in a non-Halal way.

Unlawful processing includes:

1. Slaughtering of an animal that is not performed by a Muslim, does not mention the name of Allah, and does not use a sharp knife.
2. Slaughtering of animals that are not clearly designated because the blood is forbidden; in slaughter, the blood of the slaughtered animal must come out completely, and the blood vessels must be broken; this must be done politely, using a sharp knife.
3. Halal animal flesh is contaminated by illicit substances or contaminated by non-Halal products or substances. The definition of tainted here can refer to Halal materials mixed

with non-Halal materials in the form of raw materials, herbs, or other supporting materials. Contamination might also occur when separate places and equipment are not used for Halal and non-Halal products, respectivel.

Halal: how to get it?

A devout Muslim is very careful about the food he consumes. Islam states that Muslims must only eat and drink “Halal” and “thayyib” food, meaning food that is spiritually healthy and hygienic. Consuming food which is obtained in a “haram” way means that it is not spiritually Halal and that will have a very negative effect on one’s spiritual life. The blood that flows in the Muslim’s body becomes frightening; it is difficult to find calm, his life becomes violent, he never knows satisfaction, he never knows gratitude, and it becomes hard for God to accept his worships and prayers.

Non-Halal drinks

All types of intoxicating drinks are haram. This includes drinks that are contaminated with intoxicants or non-Halal ingredients, which are widely circulated now in the form of alcoholic drinks.

Halal practice does not stop after goods are produced because Halal products can quickly lose their legal status if contaminated during transportation and storage before sale (Zailani et al., 2015). Therefore, given that logistics bridges the gap between the point of production (where Halal is certified) and the point of purchase of consumers (where Halal products are sold), the logistics of Halal products is significant to ensure the integrity of these products at the point of consumption (Tieman, 2011). Halal logistics is the process of managing the purchase, transfer, storage, and control of material, livestock, and inventory parts that are partially or completely finished from consumable and non-consumable inventories. Halal logistics products and data flow and related certifications through business and supply chains follow general Sharia doctrine.

Research methodology and content analysis

This research uses a qualitative case study method. The case selection is based on the biggest and nearest location of milk production to the researchers (Lembang and Pangalengan). We chose these two regions as our case study because the milk cooperative in Lembang is one of the best and biggest integrated milk cooperatives in Indonesia, and the milk cooperative in Pangalengan is more advanced in technology development.

Semi-structured interviews were conducted over three days. As shown in Table 2.1, the first day of interviews included with the expert in stockbreeding, and it took two hours. On the second day, the researchers went to the Pangalengan region to observe the dairy process

and interview the head of the collecting point, the member of the cooperative, quality staff in Milk Treatment 1, and quality staff in Milk Treatment 2. On the third day, the researchers went to Lembang region to observe and conduct an interview with the top management of the cooperative.

Table 2.1 List of the interviewees

Initial	*Interviewee*	*Purpose of the interview*
Interviewee 1	Expert in stockbreeding	To understand the history of the cooperative
Interviewee 2	Top management in the cooperative	Seeking the point of view of the management regards on the competition of dairy industries
Interviewee 3	Head of the collecting point	To understand the actual process and difficulties on the site
Interviewee 4	Quality staff	To understand the actual process and difficulties on the site
Interviewee 5	Member of the cooperative	To understand the actual process and difficulties as the member

Interviews were carried out based on the topic guide, as shown in Table 2.1. The guides begin with relevant literature and an initial question. There are some techniques for each interview, based on the interviewee.

1. The interview with the expert: the questions were more focussed on their experience or their tacit knowledge regarding the challenge of their cooperative in the past and present.
2. The interview with the top management: the questions were more focussed on barriers to distribution and competition within the dairy industry.

Observation was conducted while interviewing the head of the collecting point, quality staff, and the member. By using the content analysis method, all the interviews were recorded and transformed into the transcript. As shown in Figure 2.1, the cold chain distribution system is the cause of raw material behaviour, price, and specification. Moreover, the supplier payment term, agreement, capacity, and characteristic were only caused by the cold chain equipment and process.

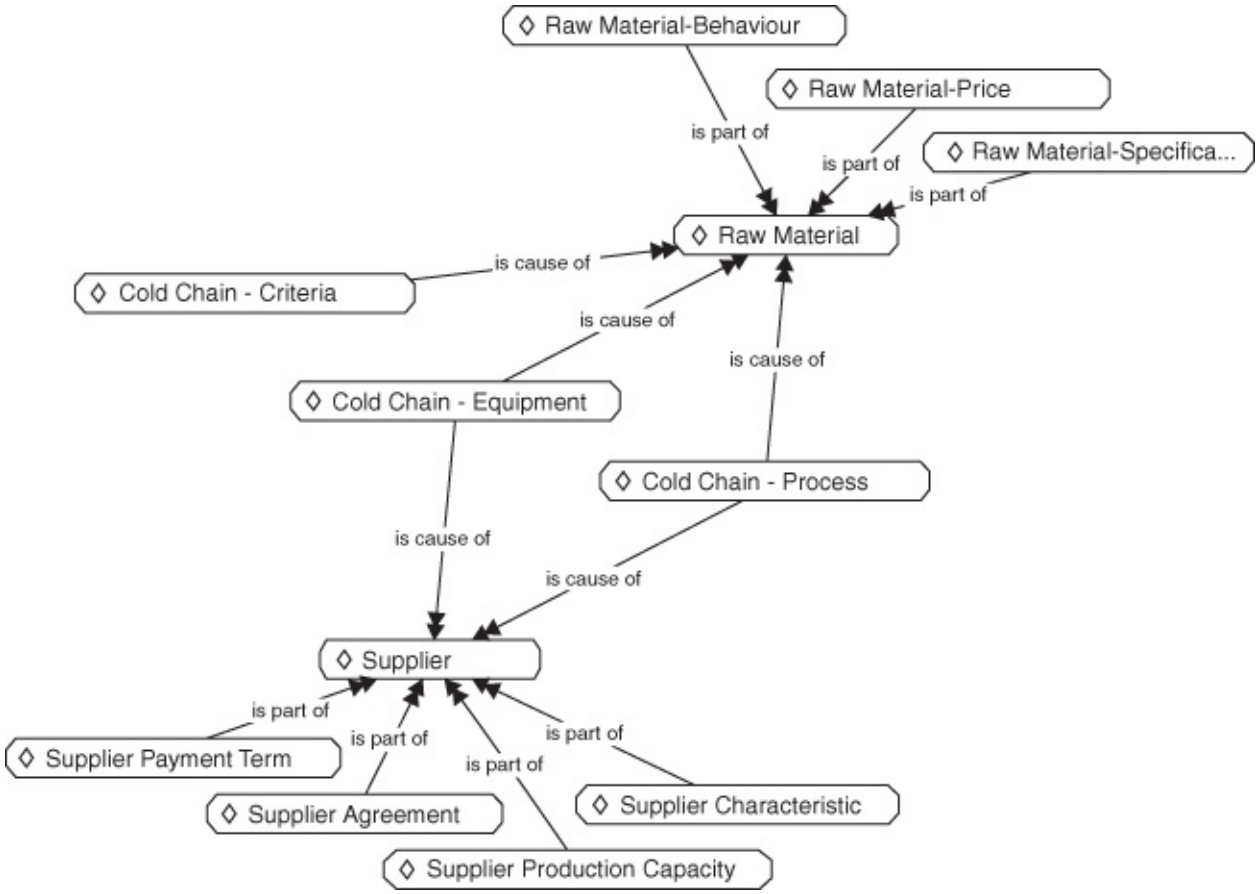

Figure 2.1 The relation of the cold chain distribution system.

Source: Developed by the authors (2019).

There are three types of Dairy Farmers Cooperatives (DFCs): the loose-type DFC, semi-tight-type DFC, and tight-type DFC. The differences between the three are their relationships with upstream and downstream parties. Loose-type DFC has a loose/transactional relationship with both upstream and downstream partners, and acts as a sales agent on behalf of the farmer members, with fragmented production, a low level of technical assistance, and a low level of quality requirements (Zhong et al., 2018).

Semi-tight-type DFC works closely with the players in the upstream of the dairy chain with a medium or high level of technical assistance provided and a medium or high level of the quality requirements imposed but does not work with the downstream supply chain (Zhong et al., 2017).

Tight-type DFC boasts a high degree of vertical coordination with both upstream and downstream players of the dairy chain, highly unified production, the greatest extent of technical assistance, and the highest strictness of the quality requirements (Zhong et al., 2017).

This literature confirmed Interviewee 1's explanation for the cooperatives Lembang and Pangalengan.

> So, I see two different cultures, which make farmers in Lembang can more advance. Nevertheless, probably (Lembang) is looser with cooperative because there is more market that (the dairy farmers) can sell individually. The important for cooperative that

> the fidelity (of the dairy farmers) to their right and the obedience. They may sell into the market more expensive as long as they manage their right to the cooperative.

Cold chain model

Raw milk

Specific measures are required to ensure that raw milk is safe to consume. Once dairy milk is taken out, dairy farmers only have two hours before bacteria start to grow. The second interviewee explained the perishable characteristic of raw milk.

> Within two hours, perhaps God has created safety? There is an enzyme that works but only two hours. After two hours, the enzyme is gone. And, the bacteria become multiple, two, four, and eight.

It is recommended that after milking, the milk is cooled to 7°C or below as quickly as possible (Carson and East, 2017). The cooperative at one milk-collecting point rates each dairy farmer's milk upon delivery, using this as the basis for its sale price; another milk-collecting point conducts its rating once every two weeks.

> Now, the highest price is Rp 5,560. - Per kg and the lowest Rp. 4,039. - Per kg. So everyone (members) are competing.

The fourth interviewee explained that the milk which is produced in the morning is of a different quality than afternoon milk. This is confirmed by the literature; the interval between milking can affect milk composition, influencing the TS content of milk collected during the morning and afternoon (Ayadi et al., 2004).

Supplier of raw milk

The average number of cattle belonging to each member is three to four. This number is based on the type of membership, as the first interviewee explained.

> So at the cooperative, there are many cattle. That dominates. There is one single dairy farmers. Well, this is good to be analysed. Why do farmers find it hard to raise the average cattle ownership? In (among the dairy farmers), there is a system of heirs. If the son has become an adult, the cattle will be an inheritance. So the average will be stagnant. Like one of our members, he has ten cattle, but he has three children, so the average is also three.

The members of the cooperative must supply their raw milk to the cooperative, as per arrangement. The amount of milk each member delivers is based on their capability. The second interviewee describes it. The cooperative will pay the supplier every two weeks.

> So, for example, each cattle can produce milk 20 kg, he (the dairy farmer) must deliver 5 kg or 10 kg.

Cold chain distribution

Figure 2.2 shows the harvesting operations that are typically carried out in the field; refrigeration and environmental temperature control is generally enforced at the first warehouse, which is considered the starting point of the cold chain (Aiello et al., 2012).

Figure 2.2 Cold chain model 1.
Source: Developed by the authors (2019).

According to the International Dictionary of Refrigeration, the cold chain is "a term symbolizing the continuity of means successively employed to provide the refrigerated preservation of perishable foodstuffs from the production to the consumption stage" (IIF-IIR). The cold chain includes chilling and freezing foods, and the subsequent refrigeration, during post-harvest, transportation, retail distribution, and home storage to maintain safety, quality, and shelf life for consumers (James and James, 2010) (Figures 2.3 and 2.4).

Figure 2.3 Cold chain model 2.
Source: Developed by the authors (2019).

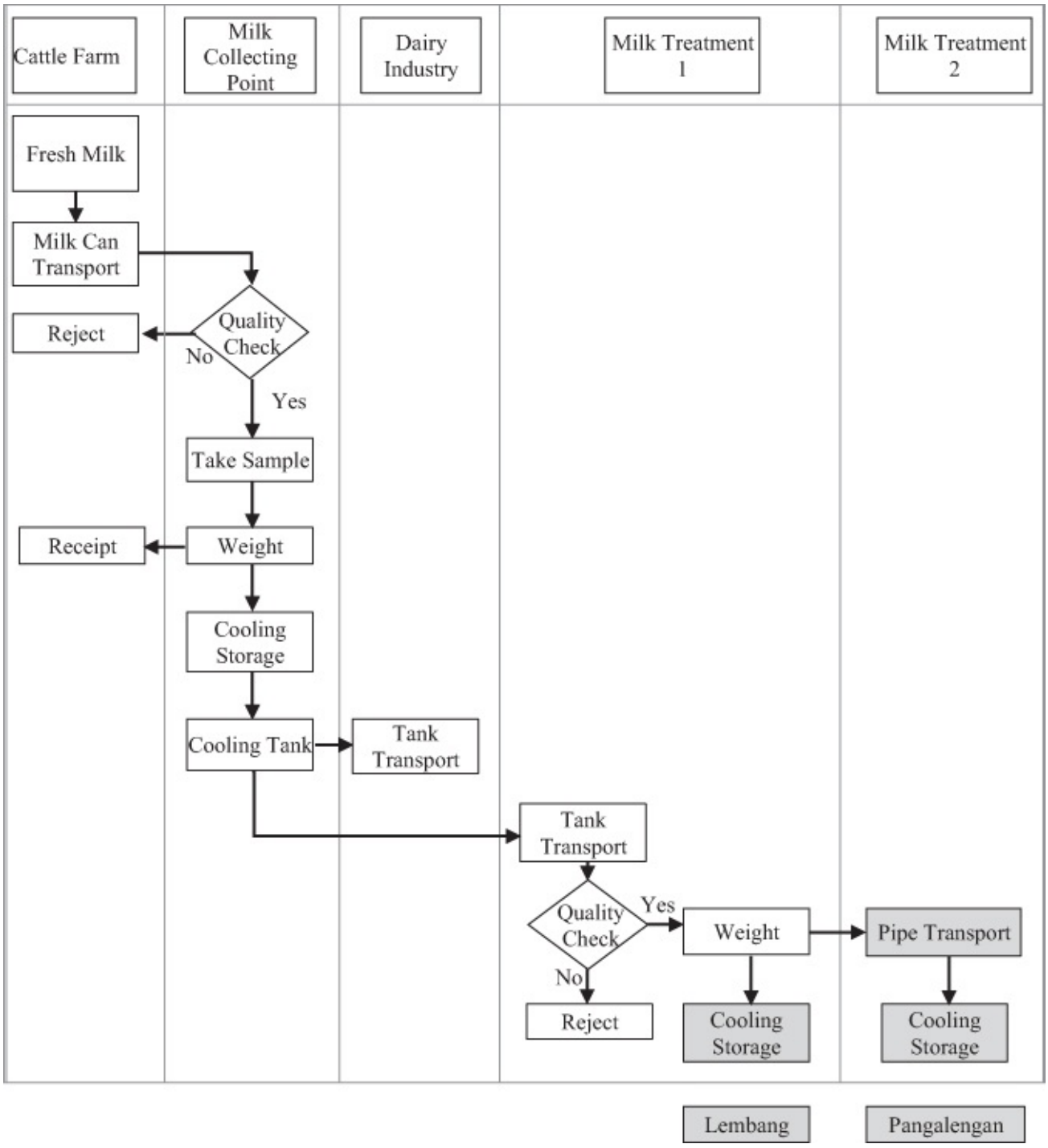

Figure 2.4 Flowchart of the cold chain process.

Source: Developed by the authors (2019).

The cooperative delivers the raw milk to its destination, which takes around four to five hours. This occurs in two types of tank: a cooling tank and a chilling tank. Ninety per cent of the distribution uses the chilling tank. The cooling tank is only able to maintain the raw milk temperature to 3°C. It was confirmed that the necessary temperature for the highest quality of raw milk was below 6°C (Andrus et al., 2015).

Challenge

Milk supply policy

The first interviewee said that dairy farmers should know the rules of supplying their milk. The milk should be free of antibiotics and of good quality. Any milk that contains antibiotics will be rejected by the cooperative, and the dairy farmers will receive a penalty from the cooperative for supplying milk that contained antibiotics.

> (Rejected milk) It can happen at the collecting point. The condition, if the cattle were ill and injected by the antibiotic, the milk cannot be consumed by us.

The third interviewee described a situation in which antibiotics were detected in the milk cooling tank after it was purchased from the dairy farmers. As a result, the cooperative had to pay the dairy farmers even though the supplied milk was rejected by the industry, and it became a huge loss.

Milk distribution failure

The second interviewee said that they have had bad experiences in distributing their product related to the behaviour of the small retailer. However, they only learned of a problem after receiving a returned product.

> So, it is a storage issue. Let say we sell (to the small retailer), inside (the refrigerator) their other drinks. At night, the electricity of the refrigerator will be cut by them (to save the electric bill). So, this is a problem.

Conclusion and discussion

According to the aforementioned analysis, milk farmers are moving forward by adopting new technology at milk-collecting points to improve the cold chain process. The temperatures of their cooling-storage and tanks is proof that they can maintain the high quality of the milk, which means that the cold chain process that they have in place is efficient.

From the Halal logistics perspective, there are some research issues regarding the supply for the raw milk. There is a chance that farmers or suppliers will be lax in ensuring the quality of their milk, and this can cause the product or milk to become not Halal and not “thayyib” (endangered). “Halal” products can lose their Halal status through direct contact with something illegitimate during transportation and warehousing (Tieman, 2011). Direct contact with something unclean is caused by mixing Halal and haram, which is better known as cross-contamination. Hence, dairy products managed by cooperatives need to pay

attention to the process chain throughout collection, treatment during storage and cooling, and tanks.

The industries and cooperative need to work together to avoid any damage to milk in the first Milk Treatment tank by creating a process and tools that are able to check the quality of milk when the farmer delivers it instead of in a laboratory. Even though the dairy farmer may know the policy of supplying good raw milk, the cooperative has to provide more training about “Halal and thayyiban” in order to ensure that He understands the importance of Halal integrity in his supply and dairy production. He should understand more about treating the cow properly so that he can maintain Halal integrity in every process from “farm to fork”, and avoid damaged raw milk that cannot be used as the supply for the industry.

According to the criteria for quality milk, any cow providing milk should be healthy and should not be healing from injury or illness, or contaminated with additive substances of antibiotics. Nevertheless, based on empirical study, do not follow these rules, and this could cause the milk cooperative to sustain a loss when its product is rejected by the consumer from the industry, and it will ruin the Halal integrity of its product. Muslim consumers are becoming more aware of threats to Halal food products (Fathi et al., 2016), paying attention to substances, how they are processed, and how to obtain them. Therefore, Halal logistics is needed to ensure the integrity of Halal food products.

Notes

1 Abi al-Fida Ismail bin Umar ibn Kathir al-Qurasyi ad-Dimasyqy, *Tafsir al-Quran al-Adhim (Tafsir Ibn Kathir).*

2 Fakhruddin Muhammad bin Umar bin al-Husain bin al-Hasan at-Tamimi al-Bakri ar-Razi, *at-Tafsir al-Kabir (Mafatih al-Ghaib, Tafsir ar-Razi).*

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3 Knowledge management strategy towards the development of the Halal logistics industry in Vietnam

Mohammad FakhrulNizam Mohammad and Nor Aida Abdul Rahman

Introduction

Vietnam is one of the countries within the South East Asia (SEA) region that has been economically aggressive in recent years, hereby acquiring greater potential to become one of the economic leaders within the region in the near future. Of late, Vietnam's economy has presented an interesting figure, based on various published reports and news. According to one of the Reuters reports, the growth of Vietnam's economy has been recorded as the highest in the year 2018 at 7.1%. Although the trend is also showing a slight decline from earlier growth to 6.5% in the year 2019, this trend is believed to be temporary (Reuters, 2019). Based on the same report, it is expected that the growth of the country's economy will increases in the year 2020. The country's geographic location, in the center of the circle of the SEA region, has given it some advantages in expanding its economic activities – at least within the region. Furthermore, the cost of staffing in Vietnam is still under a reasonable amount. Based on the average income per capita among SEA countries, Vietnam recorded the second-lowest average income per capita, as shown by the data gathered in Table 3.1.

Table 3.1 Average income for ASEAN 6

Country/region	*World ranking*	*Average annual income (USD)*	*Average monthly income (USD)*
Thailand	52	6,610.00	551.00
Indonesia	61	3,840.00	320.00
Malaysia	43	10,460.00	872.00
Philippines	62	3,830.00	319.00
Singapore	12	58,770.00	4,898.00
Vietnam	67	2,499.00	200.00

Source: World Data Info (2019)

In addition, referring to the Organization for Economic Co-operation and Development (OECD) report projecting the economic growth of countries within the SEA region, Vietnam showed a medium growth between 6.9% and 6.7% within the period between 2017 and 2019.

According to the same report, the major industry contributing to this aggressive figure for the growth of the country's economy comes from the export activities, which are backed up by a gradually increasing number of foreign direct investments (FDI) from other countries. On top of the growth of export industries in Vietnam, recent trends among large corporations to move businesses, especially manufacturing plants, to countries like India and Vietnam also contribute to the expansion of economic activities in Vietnam. It is reported that in the year 2018, large corporations such as Hewlett Packard (HP) and Dell started moving their manufacturing and production plants to countries within the SEA region, while the well-known game production corporation Nintendo has already moved their production from China to Vietnam (Li, 2019). As a result of the movement of large corporations to Vietnam, the country has shown an increase in export values, such as to the United States of America (USA), and has been estimated at an increase of US$ 1.1 billion, based on quarterly figures (Forbes, 2019).

Beyond the trend of large corporations' moving from other countries to Vietnam, the higher number of travellers from other countries visiting Vietnam for tourism purposes has also contributed to the growth of the country's economy. For instance, the number of international tourists arriving in the month of September 2019 (recorded 1,561,274 tourists) has shown an increase of 3.2% from the total number of tourist arrivals in the month of August 2019 (1,512,447 tourists). In fact, if comparing this with the same period in the previous year, the number of tourist arrivals in Vietnam has been upped to 28.8% within the same period at the same time showing an increasing trend to 10.8% over nine months, based on the 2018 figure (Table 3.2).

Table 3.2 International visitors to Vietnam from Asian countries

Asian countries	*September 2018*	*September 2019*
Thailand	23,991.00	34,350.00
Taiwan	58,399.00	78,117.00
Korea	277,249.00	339,560.00
Indonesia	8,020.00	9,040.00
Philippines	13,227.00	16,248.00
Japan	77,980.00	91,801.00
Malaysia	47,812.00	50,471.00
Singapore	22,690.00	25,371.00
China	407,087.00	604,922.00
Laos	10,288.00	12,836.00
Hong Kong	6,424.00	1,798.00
Cambodia	16,839.00	37,633.00
Others	24,445.00	25,667.00
Total international arrivals	994,451	1,327,814

Source: ("International Visitors to Vietnam," 2018)

From these statistics, it is also evident that Malaysia is the only Muslim country among countries in Asia that has recorded a higher number of Muslim citizens visiting. Although the total number of Muslim travellers from Malaysia or any other Asian country arriving in Vietnam is not available, in looking at the current development of tourism and economic

activities in Vietnam, it is worth noting that there is a demand among Muslims for travel to the country. In fact, the Global Muslim Travel Index (GMTI) 2018 reports have shown that Malaysia has been ranked as the first country chosen or selected as the most preferred for inbound Muslim travellers (Halal Media, 2018). Meanwhile, Vietnam has been ranked 87th among all countries in the world. As such, as one of the growing choices of destination among Muslim travellers and a Muslim country such as Malaysia, Vietnam should grab this opportunity.

The total number of Muslim travellers around the world positively increased from 121 million travellers in the year 2016 to 131 million in the year 2017. Additionally, from an expenditure perspective, the total amount of money spent or budgeted by Muslim travellers all over the world has shown a significant upward trend. The total amount is expected to be increased by the year 2026 to around USD 300 million. The forecasted figure has almost doubled from the expected amount of USD 158 million in the year 2020. This steady increase in amount spent by Muslim travellers indicates that there are huge growth opportunities for countries such as Vietnam in to welcome and accomodate Muslim travellers. Therefore, it is not impossible to mention that the landscape of tourism offered by a country such as Vietnam will be changing.

The report issued by Mastercard Crescent Rating has also outlined some patterns displayed by Muslims while travelling: first, Muslim travellers travel between two and five times a year; second, they spend between USD 500 and USD 2,000 per trip for the purpose of leisure; third, on average, they spend between five and six days per trip; fourth, they plan between one and six months prior to the trip; fifth, they book their travel-related facilities online; sixth, they look for unique experiences; and seventh, they place importance upon safety and security.

However, these patterns of spending and travelling may be beyond the scope of this study since some travel for reasons other than leisure, such as business. Nonetheless, regardless of whether they are travelling for business or non-business, some of their requirements, such as those for Halal food, Muslim- friendly facilities and tourism attraction places for Muslim travellers, are in demand.

The growth of the Halal industry

The concept of Halal originates from the terms and definitions related to providing foods that comply with the “Syariah” laws (Islamic rulings and guidelines). Currently, the concept of Halal is not only discussed within the context of Halal foods for consumption but has also expanded beyond its normal terms and definitions. Incorporating the term Halal as a co-branding of products and services, although a bit daring and bold, can be a good strategy (Wilson and Liu, 2010), especially for products and services that are entering countries that are requiring more Halal products and services. This requirement addresses issues on trust and confidence as well as expedites the time needed to market the products and services. In this context, the growth of the Halal industry can be expanded to other contexts, such as providing services related to supporting Halal industry needs, which include consultation on

Halal requirements; regulatory advice; as well as supporting the industry through marketing, transportation and logistics. Since the major principle and platform of the Halal industry is to ensure the integrity and sanctity of the products from origin to end user, activities and processes related to Halal assurance are of the utmost importance. Soon, the concept of the Halal industry will no longer be confined to the pretext of producing foods and beverages but will also include other contexts of industry, such as banking, manufacturing, logistics, transportation, education and many others.

The growth of the Muslim population

According to statistics issued by Pew Research Centre (an organization that emphasizes sharing information on issues and trends that shape the world), Islam is the fastest-growing religion in the world (Lipka and Hackett, 2017). Based on the centre's estimated percentage of population growth between 2015 and 2060, the Muslim population will grow at a rate surpassing that of the overall population: 70% and 32%, respectively. Meanwhile, in terms of people count, the total population size of Muslims will drastically increase between 2015 and 2060, with 1.8 billion people increasing to almost 3 billion people (see Figure 3.1). Furthermore, referring to the aforementioned statistics of the Muslim population as well as Muslim traveller expenditures, as shown in Figure 3.2, it is expected that the potential of Halal industry growth all over the world, and specifically in SEA, is realistic.

Figure 3.1 Muslim travellers expenditure (past and estimation).
Source: Halal Media (2018).

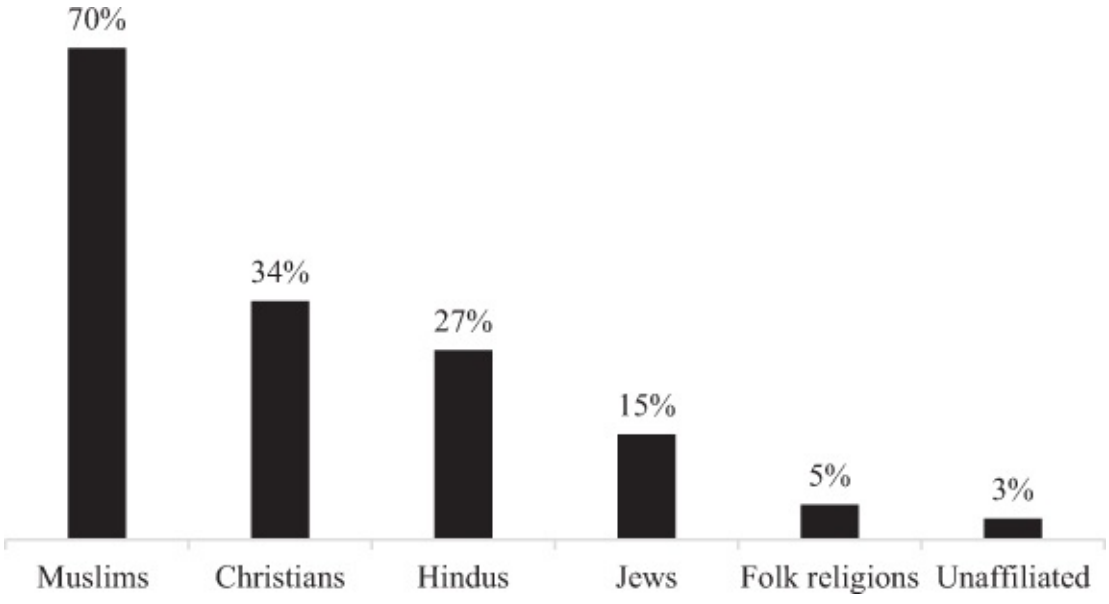

Figure 3.2 Estimation of Muslims growth percentage globally.
Source: Lipka and Hackett (2017).

The aforementioned discussion describes the aggressiveness of the Halal industry, due to the huge increase in the Muslim population all over the world, which makes it necessary to accommodate their requirements and needs. However, the aggressiveness of the Halal industry is meaningless if it does not receive support from the logistics industry. In fact, in view of strict requirements on the integrity of Halal foods, there is a need for the establishment of Halal logistics (Hamid et al., 2014).

The Halal industry in Vietnam

The potential of the Halal market can be closely associated with the prospects contributed by the influx of Muslim travellers in Vietnam. As stated in the GMTI 2018 report, the pattern of Muslim travellers visiting other countries is determined by how well those countries comply with Muslim regulations (known as "Syariah" laws), such as Halal food, Muslim-related places, clothes, accommodation and Muslim religious historical places (Halal Media, 2018). Although the context of Halal or Muslim-friendly products and services is broad, the industry is always associated with food. Thus, in growing the potential of a Halal-oriented tourism industry, the most basic need is Muslim food operators or producers. Even though Vietnam is not a Muslim country, its uniqueness and attractions have brought many tourists, including Muslims.

A decade ago, Vietnam may have had limited options for Muslim travellers, in terms of Halal food, accommodation and a selection of Muslim-friendly products. However, today, this situation has totally changed and drastically improved. Furthermore, the establishment of the Vietnam-Malaysia Centre of Halal (VMCH) and the active roles of the Halal Certification Agency (HCA) Vietnam in improving and observing the Halal integrity process show the country's seriousness in upholding this industry. This is substantiated further by the increasing number of small or large manufacturers producing Muslim clothing, the mushrooming of Halal food providers as well as Muslim-friendly traveller requirements, such as accommodation and transportation. Indeed, the concepts of the Halal industry are no longer confined to the pretext of producing foods and beverages but now also extend to other industries, such as banking, manufacturing, logistics, transportation, education and many others.

Vietnam has been known as one of the top countries in the global export industry. In the year 2017, the value of export for Vietnam was USD 220 billion; meanwhile, the value of their import in the same year was USD 204 billion, which made them the 21st-largest exporter in the world (Observatory of Economic Complexity, 2019). One of Vietnam's major exports are products related to electronic and electrical equipment, such as broadcasting equipment, telephones and integrated circuit; in addition, textiles and leather footwear are exported. However, the extracted data shows that the major categories of export products

were not related to Halal-required products, at least in the food category. This could be due to less of a focus having been placed by the country on Halal products.

However, Vietnam is also an agricultural country that has potential to export agricultural products and produce. But, based on the statistics in the year 2017, related agricultures or food products were among those less frequently exported by the country, ranging between 2.1% for products such as coffee, tea and spices, and the total of 5.8% for products such as fruits, nuts, melons, fish, crustaceans, molluscs and invertebrates (Trading Economics, 2019). According to the same source, the top countries that Vietnam exported products to are the USA (19%), the Republic of China (16%), Japan (8%), South Korea (7%), Hong Kong (4%) and the Netherlands (3%). The total revenue earned from the export industry itself has significantly increased from USD 12 billion in the year 2016 to USD 14 billion in the year 2018. The list also shows that the largest contribution of export economy statistics in Vietnam comes from the USA and East Asian countries (China, Japan, South Korea and Hong Kong).

In view of the emerging and fast-growing demand of the Halal industry from Muslim countries, such as those in the Middle East and Malaysia (in the SEA region), Vietnam, which currently has potential as an economic player, will place an emphasis on the new markets as well. Furthermore, statistics from the World Bank have shown that the percentage of imported products and goods in terms of the gross domestic product (GDP) has risen significantly from 37.78% for the Middle East and North Africa in the year 2016 to 38.25% and 61.04% in 2016 and up to 64.45% in the year 2017 for Malaysia (World Integrated Trade Solution, 2019). In comparison, despite the fact that the figure shows that there is an increasing trend of imported products, and services in the Middle East, North Africa and Malaysia from 2016 to 2017, the same statistics have shown the opposite trend of imported products from 27.61% in the year 2015 to 25.74% in the year 2016; however, the 2017 figure is not available. In conclusion, in view of the positive outlook from Muslim countries and Middle Eastern regions, this potential market shall define and shape the future for Vietnam. Furthermore, as an agricultural country, Vietnam has many advantages and opportunities to explore the emerging and growing Halal industry.

The needs for Halal logistics

Logistics and supply chain is a platform for industries such as import and export. Without the availability of highly reliable and trusted logistics infrastructure and processes, the growth and operations of other industries can be affected. This is, of course, no exception for the Halal industry. In fact, the most important driving factors of the Halal industry are logistics and supply chain (Ahmad et al., 2018). In the past, several authors have come up with various contexts of Halal logistics descriptions. For example, according to a study by Aziz and Zailani (2017), Halal logistics was defined as an industry that involves activities and processes of transporting and distributing Halal goods. Halal logistics is also described as a process of managing the end-to-end distribution of Halal goods, from grass to glass and from farm to fork, which consists of related logistics processes, such as purchasing, procurement,

marketing, distribution and storage (Tieman, 2011). The main objective of Halal logistics is, among others, to ensure that customers are getting the solid and strong foundation of Halal goods and services facilities from the provider or manufacturer to conserve its optimized quality and, therefore, the product integrity (Hamid et al., 2014).

In the case of the Halal industry, the majority of customers are Muslims who are looking for products and services complying with "Syariah" laws. As defined in the GMTI 2018 report**,** Muslim travellers can be categorized into three types: strictly practising Muslims, practising Muslims and less-practising Muslims. Thus, countries that focus on empowering the growth of the Halal industry will focus on the requirements of Muslims, such as the Muslim travellers. As an example, in measuring the preferences and statistics of Muslim travellers, a study on GMTI 2018 has defined four sets of relevant key elements: accessibility, communication ability, environmental friendliness and services offered (see Figure 3.3). Although the weightage in measuring traveller's preference to access elements (including transport infrastructure) is only 10%, the percentage of services allocated for this study is considerably higher at 45%.

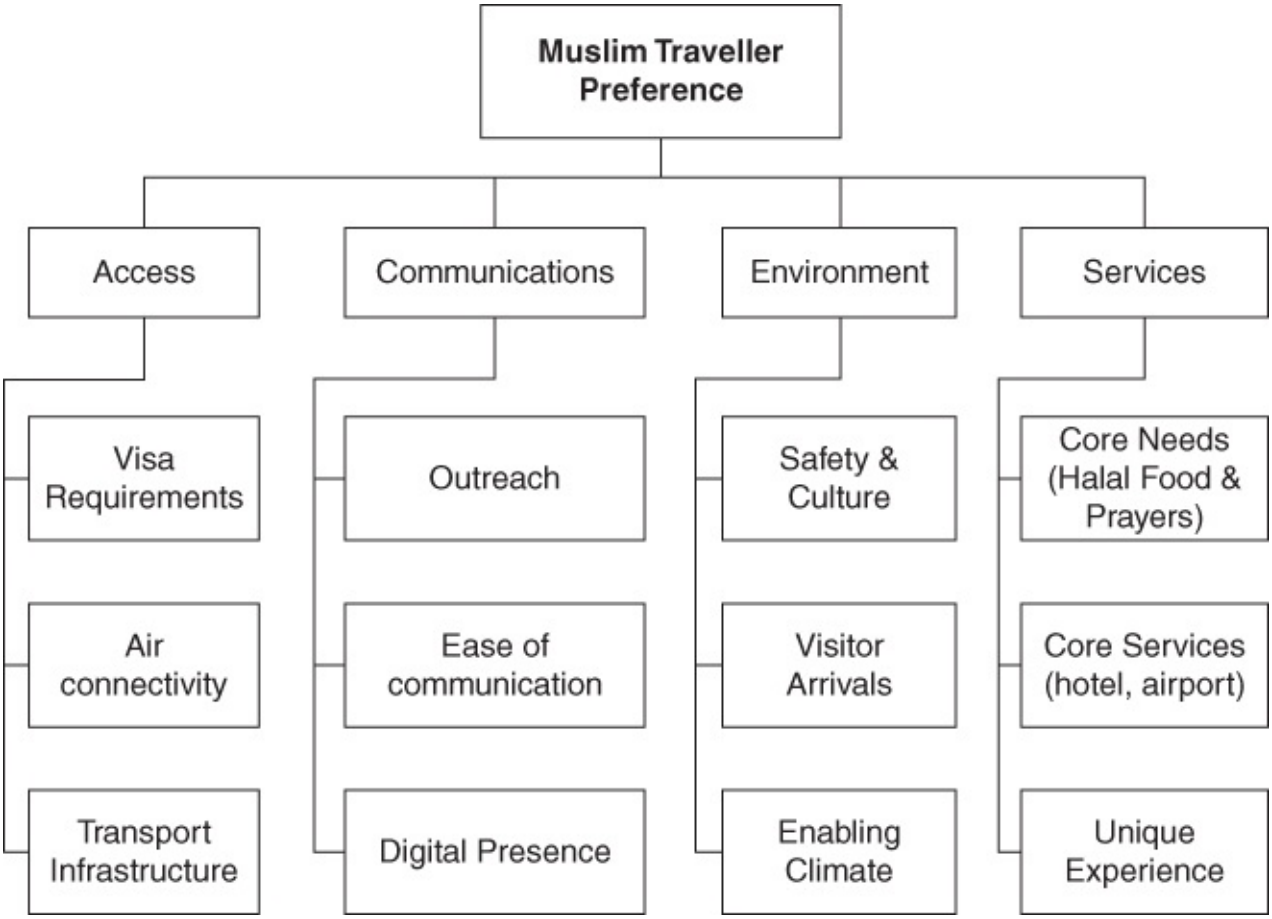

Figure 3.3 Muslim traveller preference measurement.
Source: GMTI (2018).

The element of service, as shown in Figure 3.3, indicates the priority given to core needs (such as Halal food availability) and core services (such as hotels and airports). Ensuring the sanctity and integrity of Halal status throughout the process is quite challenging. For

instance, in ensuring the Halal status of goods and products, all related content (ingredients) and processes (handling, packaging, storage and distribution) must comply with the "Syariah" laws. In principle, al activities and end-to-end processes need to comply with "Syariah" laws (Samsi et al., 2012).

Context of Halal logistics

As discussed earlier, the existence of Halal logistics is essential, originating from the requirements needed to earn Halal status for products or services. Intensifying the integrity of Halal requires an end-to-end monitoring process to avoid leakages or contamination that may put the status of the Halal itself into doubt. Within the process and activities of Halal logistics (see Figure 3.4), there are four actors involved in the process: suppliers, manufacturers, retailers and customers. These four actors in the Halal industry are actively involved in producing, distributing and receiving the products within the whole logistics ecosystem via core logistics elements, including in the warehouse and during transporation. Each of the four actors and elements are supported by four major flows: physical flow, promotional flow, information flow and Halal certification observation flow. In fact, Halal logistics can be defined as the processes of complying and assuring the process of "Syariah" laws, physical flow and information flow (Shahril et al., 2017).

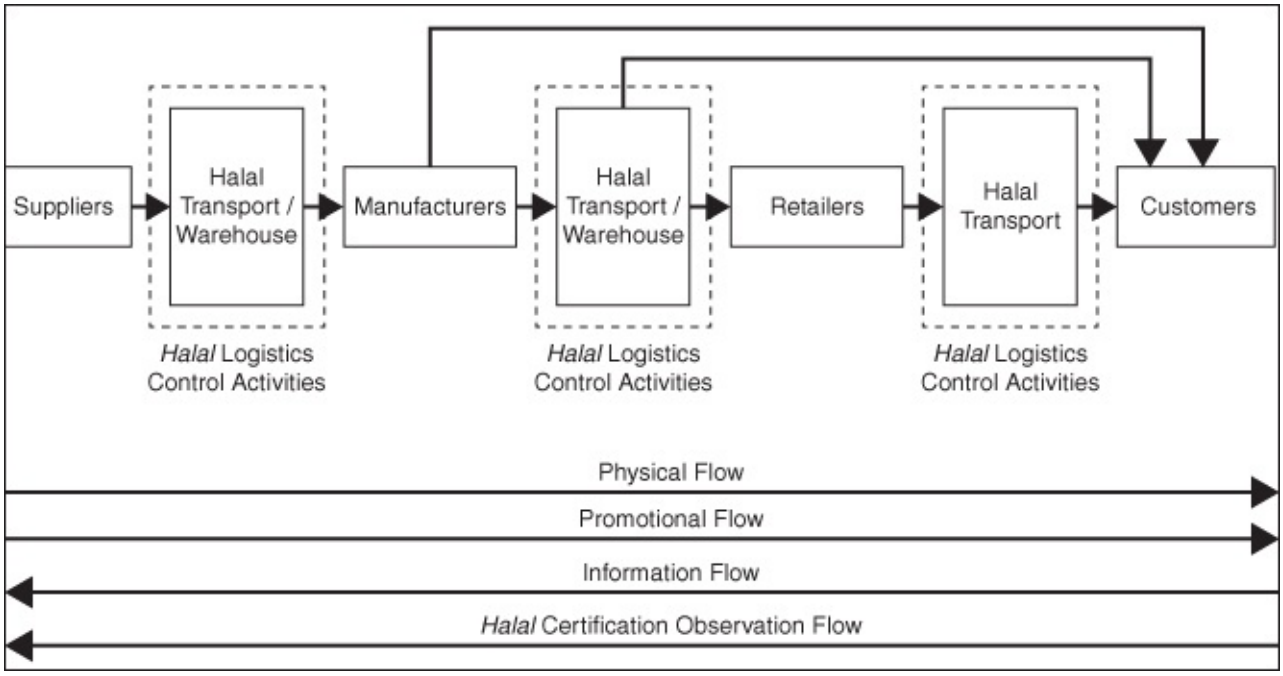

Figure 3.4 Halal logistics process.
Source: Hamid, Talib and Mohamad (2014).

Based on Figure 3.4, the end-to-end Halal logistics process involves four types of flow to support and conserve the smooth implementation and operation of Halal logistics. Be that as it may, the establishment of a Halal industry relies on its integrity by ensuring that the supply, delivery and receiving processes are aligned, and follow established standards and

guidelines. Physical flow in the Halal logistics process relates to the process of moving products or goods from the source to a destination that can be visibly seen. During this process, the Halal and non-Halal products need to be separated physically to avoid any potential contamination or leakages that may affect their Halal integrity. Meanwhile, information flow involves the process in managing types of information, such as product code, information of the product, labelling and code, and other related information (Shahril, Razimi and Romle, 2017). In conclusion, assuring streamlined knowledge through proper knowledge management (KM) at this level is crucial in providing process guidelines to the user.

Supporting the Halal logistics

To ensure Halal validity and genuinity, Halal logistics requires supporting elements, relying on its integrity. Hence, several important areas are addressed as part of the supportive elements needed to uphold and intensify the integrity of the Halal logistics itself. In ensuring that Halal logistics is implementable, several factors need to be considered by players in the logistic industry: knowledge, intention, Muslims employees and staffs, support from management, vision to change, a Halal Assurance System (HAS), harmony environments and acceptance from employees (Tarmizi et al., 2014).

Halal assurance

The Halal industry has gone beyond the mandatory needs and requirements for Muslims and become part of the trend of life and necessity. For instance, many industries have started to adopt the concept of Halal products. On the same note, the requirements for integrity assurance in the end-to-end process in the Halal industry have generated continuous efforts at all levels, from preparing, producing, transporting and packaging to delivering the Halal products, such as goods and services, from the manufacturer to end customer.

Throughout the process, the roles of certification bodies in monitoring the whole process and ensuring the integrity of products are prescriptions to its genuinity and purity in labelling the products as Halal. One of the methods in assuring the genuinity and integrity of Halal is the establishment of HAS (Tarmizi et al., 2014). Furthermore, the development of a system supporting knowledge activities has been able to offer a more efficient Halal traceability system (Samsi et al., 2012). For example, the main objective of HAS is to allow organizations to operate the industry with a clear alignment of standards and guidelines, and with regulator or authority fulfilment, such as Halal risk assessment, facilities of Halal infrastructure and equipment, and management of the system (Tarmizi et al., 2014).

Compliance and regulation

Compliance and regulation are the essence of the Halal industry, working to uphold and intensify its integrity. The most common example of adhering to the compliance is the process of fulfilling requirements for Halal certification, which will permit producers or manufacturers to label their products and services with the Halal logo. As such, certification bodies must be established in the producing countries to observe and monitor the Halal process, ensuring its integrity and sanctity; certification bodies will have different types and images of the Halal logo to be used and tagged on the products or outlets that require Halal certification.

Apart from the local requirement of Halal compliance, import and export activities across countries and regions also require global compliance processes and regulations. For instance, it was reported that there are several cases of fraud related to the issuance of Halal certificates in Europe (Tieman and Ghazali, 2014). At the same time, there are issues related to a lack of standardization among guidelines and regulations among countries since rules and policies are either in the form of tacit (non-documented) knowledge that resides in the minds of practitioners or differences of practices and backgrounds between countries in terms of to Halal guidelines (Yasuda, 2017). A search of the “Jabatan Kemajuan Islam Malaysia (JAKIM)” website has shown that there are 79 international Halal certification bodies known as Foreign Halal Certification Body (FHCB) (“Foreign Halal Certification Body (FHCB)”, 2019). The purpose of the FHCB list is to acknowledge and certify the integrity of foreign Halal products imported by Malaysia that comply with the requirements of JAKIM.

Reviewing the latest FHCB list has shown that HCA Vietnam has been listed as one of the Halal-certified bodies by JAKIM, among other FHCBs from other countries. As it is a certified FHCB recognized by JAKIM, all products that are Halal-certified by HCA Vietnam can be exported to Malaysia as Halal-certified products with the use of their own registered logo. In referring to the official website of HCA Vietnam, it has been stated that the main purpose of HCA is to act as a certification body for Halal products in Vietnam (Halal Certification Agency, 2019). In addition to the HCA, which solely looks at the certification of Halal products in the country, is VMCH, a collaborative organization between Vietnam and Malaysia.

VMCH was established in the year 2019 in the Mekong Delta City of Can Tho and is a collaboration between two corporations from Vietnam and Malaysia. The main idea behind the establishment, among others, is due to the urgent needs in assisting enterprises and companies in Vietnam in marketing their products to Muslim countries such as the Middle East. Based on the information on the official website **(**Vietnam Malysia Center of Halal, 2019)**,** the main services provided by the centre, among others, are teaching and coaching facilities, Halal testing and laboratory, Halal trading, the Halal certification body and Halal inspection.

Market demand from Muslims and their countries

In any business, the demand from customers and the market is important. A lack of demand either from the market or potential customers may affect businesses’ growth, operations as

well as the profitability of the business. Of late, various parties in Vietnam have been encouraged to target and emphasize the untapped “Halal” market for Muslim travellers in the country as well as export needs from Muslim countries, such as those in the Middle East and the SEA region, like Malaysia. As discussed in Section 2, the objective of the VMCH establishment is to accommodate the sudden increase of demand from Muslim countries, such as those in the Middle East, in importing Halal products from Vietnam. Furthermore, as discussed in detail in the Introduction, the trends of Muslim travellers, especially from Malaysia, have significantly increased based on the recent years’ figures.

Seamless information and knowledge

Seamless information and knowledge are crucial in assuring the higher integrity of the Halal industry. For instance, to assure the solid enforcement of practices to support Halal integrity, knowledge and training among implementers and practitioners are needed (Ahmad et al., 2018). From a global perspective, foreign trading of Halal products involves continuous checks and improvement processes to avoid unnecessary contamination and leakage that will affect public trust. At the same time, alignment between the knowledge and practices of Halal assurance is needed when adopting organization as part of commitment (Othman et al., 2016). For the Halal logistics industry, apart from seamless information and knowledge of compliance purposes, the indicated number of future projections for Halal activities in the industry is relevant. The Halal logistics industry requires not only the right information for future predictive requirements but also prescriptive information for checks and balances between the operational practice, standards and guidelines.

In ensuring that the Halal industry is seamlessly linked with logistics, there is a requirement for bridging information and knowledge with the practitioner (Chua, 2004). For instance, one of the issues that are highlighted regarding the integrity of the Halal industry is the misalignment of information between the practitioner and the established guidelines (Yasuda, 2017).

Knowledge management in Halal logistics

Knowledge can be categorized into two types: tacit (non-documented) and explicit (documented) (Nonaka, 1994). Leveraging on the resource-based view (RBV) theory (Halawi et al., 2005), knowledge has been regarded as an asset that is precious to the competitiveness of the organization. However, in enjoying the value of knowledge and its benefit to the organization, there must be an interaction with the external environment that can be acquired through the process of externalization and internalization (Tsai, 2008).

Several past studies on Halal integrity have emphasized the importance of knowledge, such as its roles in the development of Halal traceability systems (Karlsen et al., 2010; Samsi et al., 2012). In fact, the need for a solid and strong structure of knowledge is admitted as one of the successful factors of specific industry, such as Halal tourism in Japan (Yasuda, 2017)

and the implementation of Halal supply chain (Tieman and Ghazali, 2014). Thus, the recent findings of several studies shall address the concern of the past study conducted by Bohari, Hin and Fuad (2013) on the importance of understanding knowledge in the Halal industry to bridge the gap between implementation and established guidelines.

Thus, it is significant that proper management of knowledge in organization be ensured. The term KM comprises acquisition, diffusion, storing and application of knowledge in organization utilized effectively by the employees within an organization (Nonaka, 1994; Alavi and Leidner, 2001). Business organizations have seen the importance and benefits of KM, especially in ensuring effective production, sharing and application of knowledge (Davenport et al., 1998). Derived from a prior discussion, the importance of overlooking the establishment of Halal logistics in view of the requirements of Halal itself ensures closed observation and monitoring from end to end to avoid leakages. For example, adoption of KM as a strategy in the implementation of customer relationship management (CRM) within the tourism industry in Vietnam indicated that KM and dynamic capabilities have a strong influence on the performance of organization and CRM itself (Ngo, 2017).

Hence, in ensuring smooth alignment and synchronization between Halal industries and Halal logistics in Vietnam, it is important to investigate the issues of how KM is able to support the success and operability of the fraction of the Halal industry. Managing knowledge in organization is essential, regarded as a powerful intangible asset for organizations in achieving competitive advantages. The management of knowledge in organizations allows them to achieve their visions and business objectives. However, implementation of KM in an open system is required to ensure its ability to interact externally within the environment (Tsai, 2008). Thus, in supporting the emergence of the Halal logistics industry, the earlier discussion has entailed the importance of a KM that drives the industry (Figure 3.5).

Figure 3.5 Knowledge linking the Halal industry and Halal logistics.
Source: Developed by the authors (2019).

Conclusion

The focus of this chapter is on discussing the strategic driving factors of effective and efficient KM towards supporting the emergence of a Halal logistics industry in Vietnam. Close linkages between KM in driving the establishment and development of Halal logistics in Vietnam are suggested. Based on recent developments, the country has done great in preparing for future demands from the Muslim-market countries for related Halal products and services. Focussing on the compliance and regulators entity as well as addressing the

inbound Muslim travellers is the first step towards a bigger move in the future. Although the major export profile of the country is still minimum for Halal-related products and services, there is some indication that the percentage of export requirements increases towards food-related products. As an agricultural country, with lower operating costs of employees and production as well as a strategic location within the reach of SEA region countries, Vietnam has a lot of advantages, especially in accommodating and catering for the needs of Muslim markets – inbound tourism and exports. This arises from the fact that the implementation of the Halal industry itself relied upon the needs of assuring the Halal integrity process.

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4 A conceptual framework highlighting barriers in cold chain management for Halal food products in South-East Asian countries

Mohd Hafidz Mahamad Maifiah, Anis Najiha Ahmad and Muhammad Affifuddin Iskandar

Introduction

A report by Grand View Research predicted that the global Halal food market will reach USD 739.59 billion by 2025 (Grand View Research, 2018). There are at least three key drivers contributing to the significant growth of the global Halal market. These include the sizeable numbers of the global Muslim population, positive growth in economic development in Muslim countries and the emergence of various Halal market segments from Halal consumers (Thomson Reuters, 2016). As indicated by the Research Center demographic change analysis, the projection of Muslim growth is about 73% between 2010 and 2050, and is expected to be the largest religion in the world by 2070. In addition, the increasing awareness and positive perception of the Halal and "toyyib" concepts among consumers, including non-Muslims, have also significantly helped in inducing a positive growth to the global Halal market (Golnaz et al., 2010).

The core principle of Islamic law ("Shari'ah") is partly developed from the concepts of Halal (lawful or permissible) and haram (forbidden, opposite to Halal). The word "toyyib", an Arabic term which is always paired with the word Halal, refers to a product or something that is clean, pure and wholesome in terms of its quality and safety. Halal and "toyyib" in Islam are eminently established based on the principles of Islamic values (Zakaria and Abdul-Talib, 2010). Halal is inclusive, driven by value and quality (Kotler and Armstrong, 2010). This has changed the traditional approach in marketing, which focusses on a consumer-based approach. The practice is applied to justify the consumption of various products, including foods, cosmetics, medicines, pharmaceuticals and services.

The adoption of the "Shari'ah" element in the conventional supply chain concept/framework provides a reference guideline for the Halal supply chain. The Halal supply chain is important in preserving the Halal and "toyyib" status of finished food products from the farm to manufacturing and customers. The huge global markets of food

products, spanning different countries, make Halal food products vulnerably susceptible to non-Halal contamination. Many studies reported on issues pertaining to authenticity, adulteration and fraudulence of Halal food products with non-Halal sources (Table 4.1). Several theoretical frameworks on Halal supply chain have been proposed (Talib et al., 2015; Omar and Jaafar, 2011; Omar, 2017; Zulfakar et al., 2012). The establishment of a comprehensive Halal supply chain framework is highly useful towards the successful implementation of Halal supply chain objectives. The discussion on Halal supply chain is generally applied to various logistic segments including, for example, warehousing and transportation, which mainly focus on the food and beverages industry.

Table 4.1 Cross-contamination and fraud cases related to Halal

Year	*Location*	*Item*	*Contaminant*	*References*
2000	Mexico	Mexico Sausages and burger	Undeclared porcine species meat patties products	(Flores-Munguia et al., 2000)
2005	Italy	Horse meat sausages	Pork meat was added fraudulently in Italian horse fresh sausages	(Di Pinto et al., 2005)
2011	Iran	Halal meats	Unlawful (adulterated) meats containing poultry, pig, donkey and horse meat	(Doosti et al., 2011)
2013	South Africa	Minced meat, burger patties, deli meats, sausages and biltong	Detection of porcine DNA in various meat products	(Cawthorn et al., 2013)
2013	UK	Meat pies and pastries	Porcine DNA	(Whitworth, 2013)
2013	UK	Frozen burgers	Porcine DNA	(Whitworth, 2013)
2013	UK	Lamb burgers	Traces of pork	(BBC News, 2013a)
2013	UK	Vaccine	Pork gelatine	(BBC News, 2013b)
2013	US	Chicken sandwich	Mislabelled as Halal	(Arabian Business, 2013)
2013	China	Homemade food products	Mislabelled as Halal	(Lipes, 2013)
2013	Hungary	Pork tenderloins	Pork tenderloins labelled as beef	(European Commission, 2013)
2013	Portugal	Poultry meat	Possible cross-contamination of poultry meat products with pork meat	(Soares et al., 2013)
2014	EU	Packaged chicken sausages	Mislabelled	(Bottaro et al., 2014)
2014	Turkey	Gelatine products (marshmallow and gumdrops)	Products contain porcine gelatine and labelling failed to indicate the use of pork gelatine	(Demirhan et al., 2012)
2015	UK	Halal slaughterhouse	Not following Halal practices in the slaughtering process	Press Association (2015)
2015	Italy	Chicken sausage	Detection of pork DNA in chicken sausages	(Di Pinto et al., 2015)
2015	Malaysia	Slaughterhouse		Harian (2015)

			Not following Halal practices in the slaughtering process	
2015	Malaysia	Fishballs	Fish ball products mixed with animal blood plasma (including pig)	Farhana (2015)
2016	Spain	Marshmallows, gummies, hard candies and complex	Detection of porcine DNA in commercial candy products candies	(Muñoz-Colmenero et al., 2016)
2017	Malaysia	Lamb	Cross-contamination of lamb with pork meat	Said (2017)

Source: Adapted from Soon, Chandia and Regenstein (2017, p. 40)

Cold chain or temperature-controlled supply chain is one of the important segments in Halal supply chain, but it is very rarely discussed in literature (Sharma and Pai, 2015). Cold chain in the food industry is essential to preserving food products for long-term storage so as to prevent them from damage. Perishable foods, for example, frozen foods, vegetables, chicken and other meat, ready-made food, etc., require low-temperature management to ensure quality and safety. The trend towards food cold chain (FCC) has been given more serious attention in the last few years, as indicated by an increased number of publications. The topic of cold chain for food products has been covered in a number of different areas of journals: namely, social sciences and management, economics, science and engineering (Shashi et al., 2018).

Halal supply chain: values and integrity

The basic entities in a network of conventional supply chain are made up of raw material suppliers, manufacturers, distributors, retailers and consumers (Sunil and Peter, 2013). The whole process flow is from the upstream to the downstream, which is segmented into three phases: namely inbound phases, production phases and outbound phases (Hugos, 2018). The inbound phase deals with material procurement and the management of activities, such as delivery of supplies coming into the plants, transportation and storage. In the outbound phase, the finished products will be delivered from the plant, which involves activities of warehousing, transportation, retailing, marketing and sales to the end customer. The framework of the conventional supply chain is adopted in the development of the Halal supply chain model in accordance with the requirements of “halalan” and “toyyiban”. A complete chain of Halal supply is from the supplier towards the end consumer (see Figure 4.1). In Halal supply chain management, the full implementation at each stage of the chain is based on the element of “Shariah” law, which provides guidelines for the whole process to ensure Halal quality (Bahrudin et al., 2011; Mohamed et al., 2016).

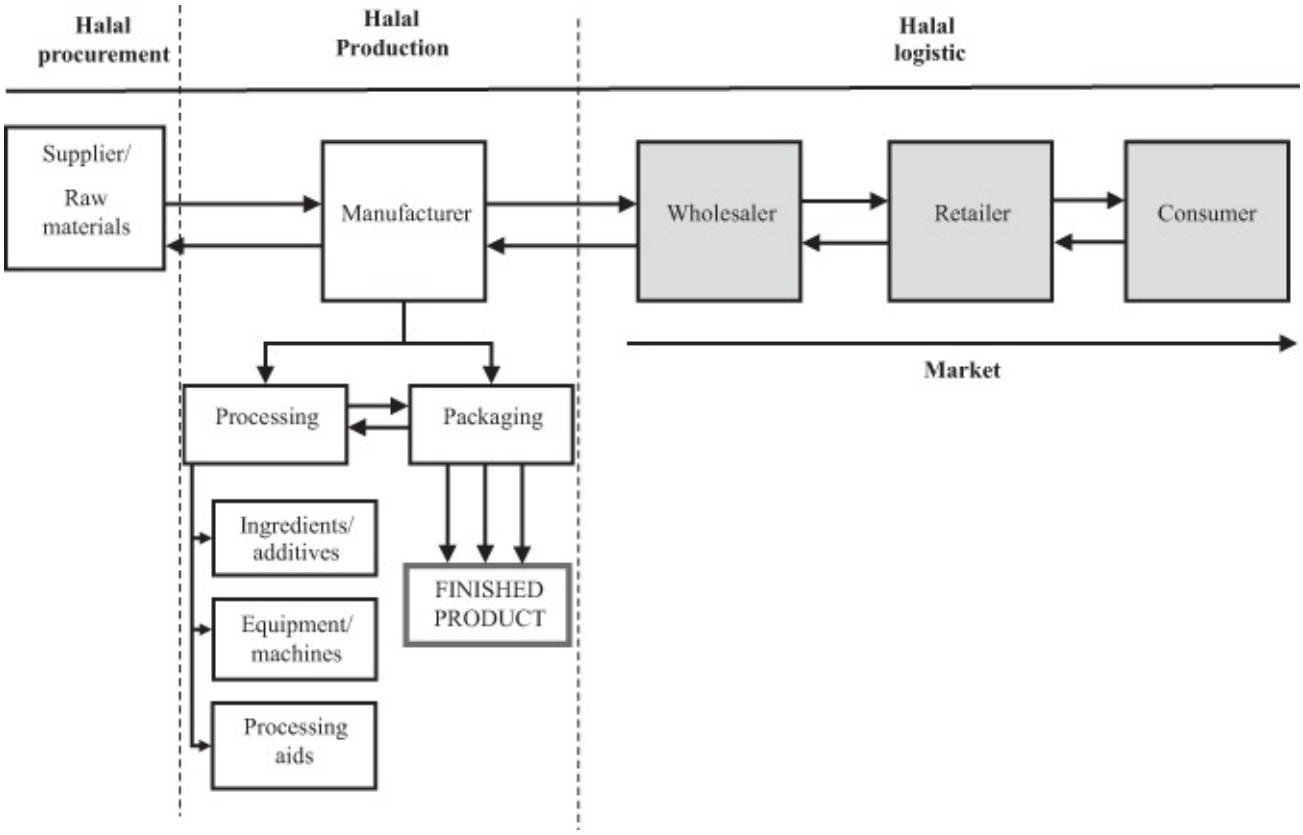

Figure 4.1 Halal supply chain. The bidirectional interactions between different stakeholders in every level of Halal supply chain.

Source: Developed by the authors (2019).

Muslim people are obliged to consume only Halal products unless there is a situation of "dharuriyah", in which there is no other option available due to time and situation. The great concern is not merely with the finished product, which must be Halal; the scope widely includes the "toyyiban" aspects of cleanliness, quality and wholesomeness. This covers the complete production line of a product, from the raw materials and ingredients to processes and logistics. The objective of the Halal supply chain is to preserve Halal integrity and the "toyyiban" quality of a product at every step of the process (Ngah et al., 2014; Mohamed et al., 2016). The activities involved in Halal supply chain consist of (1) Halal procurement, (2) Halal manufacturing, (3) Halal distribution and (4) Halal logistics (Mohamed et al., 2016). It should be noted that the aspects of human ethics and Islamic values are greatly emphasized in the set-up of Halal supply chains to ensure that the integrity and value of its proucts are value is well preserved and sustained. These aspects have not been recognized in conventional supply chains, despite the fact that the focus is on efficiency. Two major driven factors in the implementation of Halal supply chain come from institutional pressure: for instance, the regulation of Halal accredited systems, Halal policy and Halal standard, and self-determination drivers, such as the global Halal business market and opportunities (Mohamed et al., 2016).

Conceptual framework of the Halal supply chain

The identification of Halal and “toyyiban” control points is of great importance in the establishment of a Halal supply chain. A successful realization of the Halal supply chain requires mutual and collective commitments from different parties to observe Halal procedures in every operation. According to Tieman, Van der Vorst and Ghazali (2012), there are at least five rational factors that highly influence the development and establishment of a Halal supply chain. These driving factors are (1) a rational belief in quality attributes, (2) the importance of maintaining Halal integrity throughout the supply chain, (3) the importance of avoiding doubt or uncertainties in Halal food, (4) a lack of control of Halal food norms and (5) sensitivityof Muslim consumers towards Halal. Clear and detailed information about the food products, including the processes involved in Halal procurement, Halal manufacturing, Halal distribution and logistics enables the implementation of preventive measures in the first place (Mohamed et al., 2016).

Zulfakar, Anuar and Talib (2014) highlighted several factors that are significant in enhancing the integrity of the Halal food supply chain (HFSC): namely Halal certification, Halal standard, Halal traceability, Halal dedicated assets, trust and commitment among supply chain members, and the role of government. In addition, a study has identified a number of critical success factors for Halal supply chain management, including government support, transportation planning, information technology, human resource management, collaborative relationships, Halal certification and Halal traceability (Talib et al., 2015). A recent study described the HFSC implementation model, which indicated that there are at least nine factors that are crucial and significantly define the true implementation of HFSC (Omar and Rahman, 2018). The findings identified that the important dimensions are cleanliness, safety, physical segregation, storage and transport, packaging and labelling, ethical practices, training and personnel, innovative capability and resource availability.

Cold chain management: food industry

Cold chain is one of the important segments in supply chain, whose activities and processes are governed under the desired low-temperature range control, either at chilled or at frozen condition (Shashi et al., 2018). FCC is a type of cold chain categories for perishable food products, including fruits, vegetables, seafoods, processed meat products, dairy products and frozen foods. The growing demand for perishable food products in a global market indicates the vital role of the FCC segment. FCC has made a tremendous contribution in promoting and facilitating the concept of a “Global Food Village” for food distribution across the globe. The processes in handling perishable foods during the post-harvest stage include collection, packaging, storage, transport and marketing until the food reaches the final consumers’ domestic refrigerators (Kitinoja, 2013). The scope of food cold chain management (FCCM), from an engineering point of view, generally includes temperature monitoring, equipment installation and maintenance and rapid product movement. The objective of FCCM is to preserve the quality of food products by ensuring that they are under proper low-temperature conditions which guarantee their shelf life (Shashi et al., 2018).

Perishable foods are sensitive to high temperatures as they are susceptible to degradation. As biological processes occur, they lead to loss of colour, flavour, nutrients and texture changes, and finally become susceptible to microbial infection. Therefore, preserving perishable foods under appropriate low temperatures limits the metabolic process (e.g. respiration, transpiration) and inhibit microbial activities. Efficient management of cold chain will ensure the sustainable supply of foods in order to prevent micronutrient deficiencies and chronic diseases such as heart disease, cancer, diabetes and obesity (Liao et al., 2011). Proper coordination of FCCM is to ultimately ensure that the safety and integrity of finished food products are well preserved. In turn, improper management of the FCC will escalate the problem of food waste and, more worryingly, will increase the risk of potential microbial contamination leading to foodborne illnesses and problems (Minten et al., 2016).

The efficiency of FCCM differs significantly between countries. In developed countries, technologies and facilities have been established to cater to all the segments in a network of cold chain. In addition, FCC is tightly regulated as refrigeration is necessarily applied throughout the entire cold chain, with proper implementation of Hazard Analysis and Critical Control Points (HACCP) (Mercier et al., 2017). Ultimately, the efficient management of FCC in developed countries provides a sustainable food supply for global markets (Shashi et al., 2018). In contrast, there are many limiting factors to the effective implementation and management of cold chain in developing countries. Cold chain technology and infrastructures are greatly limited in many aspects, which becomes a major bottleneck for the effective and efficient implementation of FCCM (Kitinoja, 2013). The significant impacts of improper and inefficient management of FCC will end up with food losses and diseases, which will greatly impact the global economy.

Cold chain management for Halal food products: integrated concept of Halal supply chain

The topic of cold chain management for Halal food products is rarely discussed as it is generally included in the context of HFSC. The concept of cold chain management for Halal food products is perfectly adopted by the basic principles of Halal supply chain, as proposed previously in many studies. The basic element of Halal and “toyyib” for food products was suitably integrated with the conventional flow process of cold chain management. A study indicated that the product characteristic, for example, ambient and cool chain product, influences the vulnerability of the Halal supply chain (Tieman et al., 2012). This study has also indicated the two levels of segregation, a minimum and preferred level for Halal and non-Halal food products, depending on the Muslim countries and Muslim-minority countries. The segregation should cover the whole cold chain environment (e.g. cold room and container, transportation). The study indicated that in Muslim countries, the preferred segregation should be no mixing of Halal and non-Halal products in the same cold room. In turn, in non-Muslim countries, the Halal products should at least have a designated storage zone or racks with no mixing of Halal and non-Halal products (Tieman et al., 2012).

Barriers in cold chain management for Halal food in SEA developing countries

It is estimated that up to one-third of food produced in developing countries is lost before consumption (Bradford et al., 2018). South-East Asian (SEA) countries are mainly categorized by the United Nations (UN) as developing countries. These include countries such as Brunei, Indonesia, Malaysia, Myanmar, Philippines, Thailand and Vietnam. It has been reported that about 51% of food waste occurs in post-harvest storage and distribution in South and South-East Asia (see Figure 4.2). One of the major factors for the problem of food waste may be the inefficient management of cold chain. Many authors reported that barriers ensure that the integrity of cold chain supply is greater in developing countries than it is in developed countries (Mercier et al., 2017). In fact, the cold chain industry is rapidly growing in developing countries, particularly in South-East Asia. According to one market study in 2020, consumption of frozen and refrigerated products in SEA countries is expected to increase to more than USD 20 billion (Mordor Intelligence, 2019).

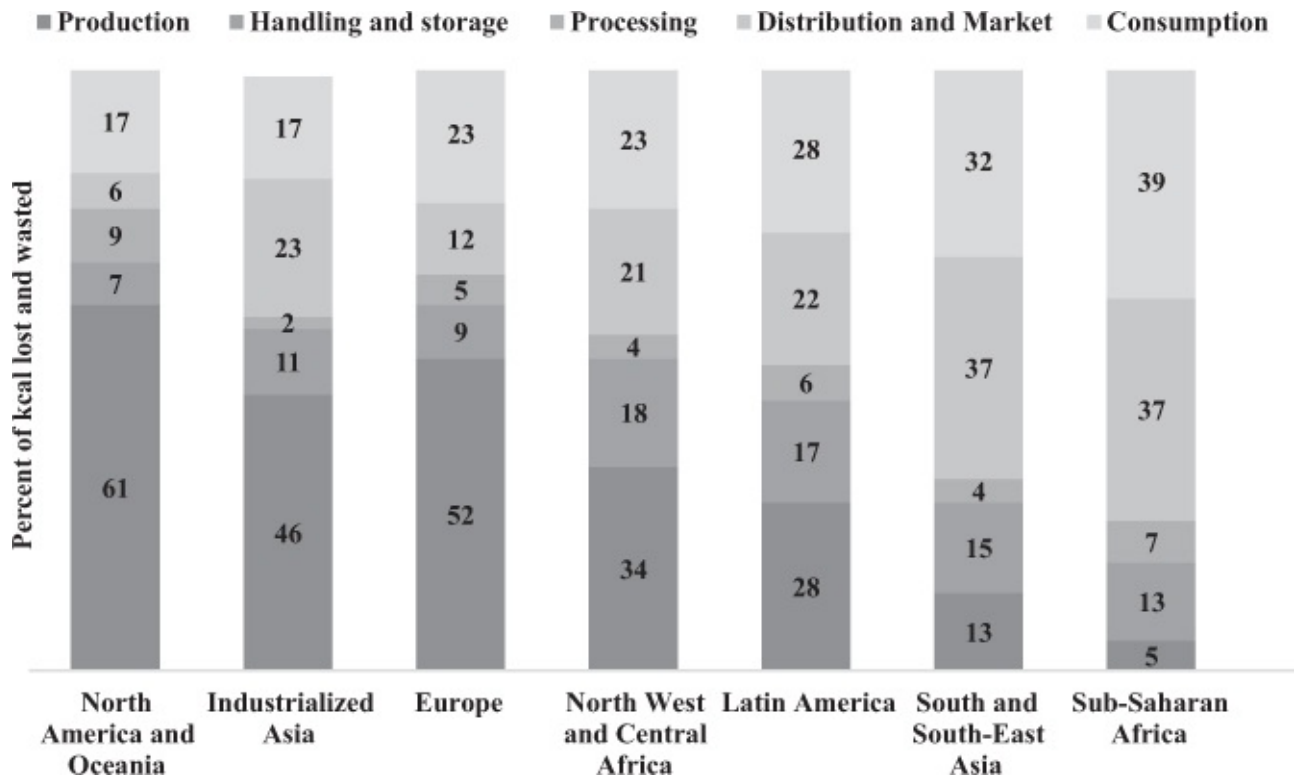

Figure 4.2 Food waste by global region and supply chain stage.

Source: Adapted from Food and Agricultural Organization (FAO, 2011).

The objective of FCCM is to preserve the perishable food products within a proper low-temperature condition in order to extend their shelf life. Notwithstanding, efficient and effective implementation of FCCM has been limited by many factors, internally and externally, in developing SEA countries. The lack of reliable and adequate cold chain facilities in these countries could be one of the main causes of such losses of perishable products. The International Institute of Refrigeration (IIR) (2009) projected that if developing

countries could obtain and have the same cold chain technology (e.g. refrigerated equipment) as that in developed countries, over 200 million tons of perishable foods could be saved – this is about 14% of total consumption in these developing countries. With the population predicted to increase to 9.15 billion by 2050 and with a faster growth rate mainly in developing countries, providing solutions is no small feat. Table 4.2 shows the comparison of population growth, refrigeration capacity and food losses due to lack of refrigeration in developed and developing countries.

Table 4.2 Comparison of population growth, refrigeration capacity and food losses due to lack of refrigeration in developed and developing countries

	World population	*Developed countries*	*Developing countries*
Population in 2009 (billion inhabitants)	6.83	1.23	5.60
Population in 2050 (billion inhabitants)	9.15	1.28	7.87
Refrigerated storage capacity (m^3/1000 inhabitants)	52	200	19
Number of domestic refrigerators (/1000 inhabitants)	172	627	70
Food losses (all products) (%)	25	10	28
Losses of fruit and vegetables (%)	35	15	40
Loss of perishable foods through a lack of refrigeration (%)	20	9	23

Source: Adapted from International Institute of Refrigeration (IIR, 2009)

A number of limiting factors that hampered the efficient implementation of FCCM have been reported (see Table 4.2). Balaji and Arshinder (2016) described a comprehensive model regarding the causes of food wastage from perishable food products derived from each segment of cold chain. The barriers may extend from the initial harvesting stage until the end stage with the consumer. Notably, the issue is very practical and useful for the Halal food segment in ensuring that the integrity of Halal and “toyyib” status is well preserved. Given that Muslims make up 40% of the SEA’s total population, it is important to tailor these barriers specifically to Halal products. The barriers for efficient and effective management of FCC can be categorized into infrastructure, resources, knowledge, skill and awareness, finance, integration, standardization and regulation (Balaji and Arshinder, 2016; Shashi et al., 2018). Many recent publications on the topic of cold chain have emphasized the gap and issue of FCCM in developing countries. It is therefore important to note that failure to properly design a good cold chain system will finally lead to the global issue of food waste and food safety (Minten et al., 2016).

Except for a few regions, such as Northern Vietnam and the Myanmar Himalayas, the climate in SEA countries is mainly tropical, hot and humid all year-round. This makes FCCM more challenging as keeping perishable food products at low temperatures could cost more in countries with hot climates than it does in those countries with mild or cold climates. Interestingly, researchers mentioned that the implementation of and compliance with Halal requirements in the Halal supply chain depends on whether the country is Muslim-majority or Muslim-minority (Tieman et al., 2012). The lower quantity of Halal goods in non-Muslim countries limits the Halal industrial players to invest, for example, in dedicated Halal

infrastructure as it will later increase the cost of Halal products (Tieman et al., 2012). Furthermore, lack of training in the management of cold chain technologies for Halal food products is one of the major limitations in developing countries (Sharma and Pai, 2015).

The major concerns in the Halal supply chain are with the increasing complexities of the mode of the modern supply chain process and management (Lam and Alhashmi, 2008) as well as the rising of operational cost of logistics (Wilson and Liu, 2010). In addition, the challenges in Halal integrity of food products have been discussed based on four supply chain dimensions related to raw materials, production, service and the consumer (Ali and Suleiman, 2018). A major impediment is the potential break of cold chain due to improper handling or limitation during the cold chain element by a certain party in the supply chain. The traceability system gives visibility and transparency to the entire food supply chain, ensuring the safety and quality of food products (Balaji and Arshinder, 2016). The systems enable the entities along the cold chain networks to acquire, store and share adequate information about perishable food products.

Notable causes of temperature abuse (i.e. products becoming colder or hotter than the required temperature) can derive from inappropriate pre-cooling; temperature fluctuations due to problems with refrigeration units; local heat sources from transports and warehouses; and during loading and unloading, and display at retailing; and the consumers themselves (Foster et al., 2003; Carullo et al., 2008; Jedermann et al., 2009; do Nascimento et al., 2014; Mercier et al., 2017). The total time duration of a cycle of cold chain is highly dependent on the specific food product and the target market. Some foods last as little as a few hours, and others last for several months or even years. Commonly, the distribution centre is a control point in FCCM systems. Each point in the cold chain is susceptible to temperature abuses, which has a significant impact on the final quality of the food products, leading to food waste and raising safety concerns (Minten et al., 2016; Mercier et al., 2017) (Table 4.3).

Table 4.3 The barriers in the cold chain management from the collective literature reviews

No.	*Barriers*	*Supply chain segment*	*References*
1	Infrastructure	Lack of cold storage (i.e. warehouse, cold room, distribution centre)	(Salin and Nayga, 2003; Balaji and Arshinder, 2016; Shashi et al., 2017)
		Shortage of refrigerated carriers (e.g. trucks)	(James and James, 2013; Balaji and Arshinder, 2016)
		Poor logistic infrastructure (e.g. old roads, obsolete transportation) and network design	(Salin and Nayga, 2003; Balaji and Arshinder, 2016)
		Lack of IT infrastructures (e.g. integrated IT systems)	(Joshi et al., 2009; Balaji and Arshinder, 2016)
		Lack of new technology and system (e.g. lack of modern food processing infrastructures, packing methods, energy efficient refrigeration technology)	(Balaji and Arshinder, 2016; Ashok et al., 2017)
		Lack of dedicated Halal logistic infrastructures (e.g. Halal warehouse and transport)	(Tieman et al., 2012)

2	Resources	Unavailability or scarcity of power and water supply	(Joshi et al., 2009)
3	Knowledge and awareness	Inadequate education of farmers/producers on cold chain	(Joshi et al., 2009; Smigic et al., 2016)
		Lack of scientific harvesting methods	(Papargyropoulou et al., 2014; Balaji and Arshinder, 2016)
		Insufficient technical knowledge to manage FCC operations among the operation staff	(Tieman et al., 2012; Balaji and Arshinder, 2016)
		Lack of FCC expertise or incompetent professional skills in handling cold chain system	(Ashok et al., 2017)
		Lack of consumer knowledge on cold chain	(Ucar and Ozcelik, 2013)
		Improper handling	(Smigic et al., 2016)
4	Financial constraints	High cost of equipment (e.g. installation and maintenance), distribution (e.g. logistic), electricity	(Salin and Nayga, 2003; Ashok et al., 2017)
5	Focus group	The different requirement between majority Muslim countries and minority Muslim countries (e.g. minimum segregation level for Halal and non-Halal food products in cold storage)	(Tieman et al., 2012)
6	Integration	Lack of communication and coordination among members in supply chain	(Balaji and Arshinder, 2016)
		Lack of information-sharing	(Joshi et al., 2009; Hsiao and Huang, 2016)
		Improper traceability	(Thakur and Forås, 2015; Balaji and Arshinder, 2016)
		Large number of intermediaries	(Joshi et al., 2009; Balaji and Arshinder, 2016)
7	Standardization and regulation	Lack of standardization (e.g. quality control procedure, inventory policy)	(Salin and Nayga, 2003; Balaji and Arshinder, 2016)
		Government regulation	(Salin and Nayga, 2003)

Source: Developed by the authors (2019)

Logistics in cold chain in Halal products

Among all the barriers mentioned in the previous section, ensuring adequate logistic is probably one of the most important in ensuring effective cold chain management. In general, logistics relates to the coordination and movement of goods. Specifically, it is defined by Christopher (1992, p. 4) as

> the process of strategically managing the procurement, movement and storage of materials, parts and finished inventory and the related information flows, through the organisation and its marketing channel in such a way that current and future profitability are maximised through the cost-effective fulfilment of orders.

The term Halal logistics was recently introduced as an extension of conventional logistics. Tieman (2013, p. 5) defined Halal logistics as “the process of managing the procurement, movement, storage and handling of materials, parts, livestock, semi-finished or finished

inventory both food and non-food, and related information and documentation flows through the organisation and supply chain in compliance with the general principles of 'Shari'ah'".

In cold chain transportation, all the related parties need to ensure the strict monitoring of transportation conditions. Even a small deviation from the limits or parameters set can compromise product safety and quality. As such, transportation of perishable products is critical. This also means that cold supply chain and logistics service providers may face extra challenges in handling products. In transporting Halal products, the challenges for Halal logistics providers are multiplied as they also needed to fulfil Halal requirements. For example, the container of transport needs to be ritually cleaned and properly segregated (Jaafar et al., 2011). Generally, there are not many certified Halal logistics providers in the region that are available to cater to the Halal demand. There is also a practice of sharing containers that may impose risks of cross-contamination to Halal products. Zailani, Iranmanesh, Aziz and Kanapathy (2017) have investigated the challenges for logistics companies in Malaysia in adopting Halal logistics. Some of the challenges mentioned include lack of demand, ambiguous Halal guidelines, lack of collaboration and others. Their complete findings are illustrated in Figure 4.3. In short, in order to ensure the efficient management of Halal cold chain products, all the challenges previously identified in the Halal logistics field also need to be overcome.

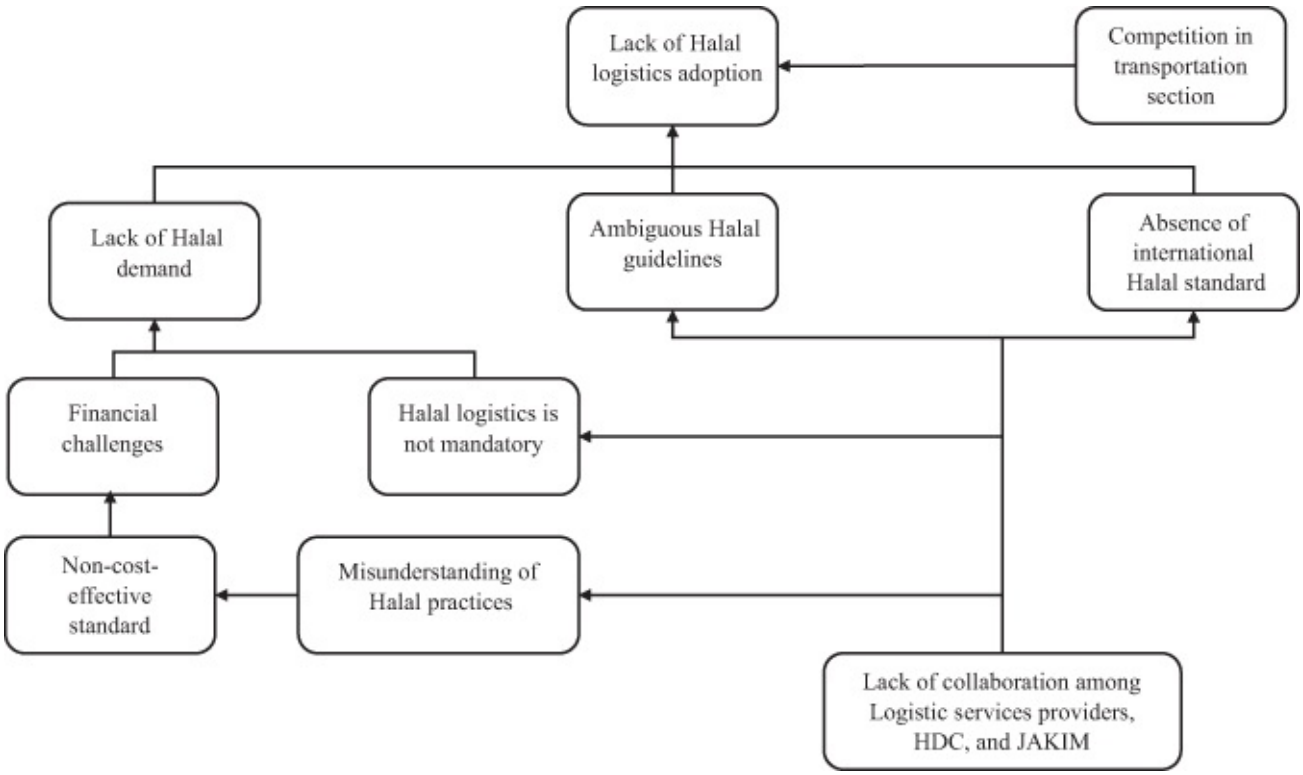

Figure 4.3 Interrelated challenges for Halal logistic adoption.

Source: Adapted from Zailani, Iranmanesh, Aziz and Kanapathy (2017).

Conclusion

Comprehensive and structured management of Halal supply chain is needed to ensure that the Halal integrity of Halal products is preserved in the whole value chain. Importantly, efficient and effective management of cold chain for Halal food products can prevent food wastage and food poisoning. The list of identified limiting barriers in cold chain management extracted from the available publications is essential for efficient cold chain management for Halal food products. This article provides academicians and practitioners a macro picture of the barriers for implementing effective cold chain management. The practitioner could focus on barriers that should be mitigated to achieve the effective management of the cold chain. For SEA governments, this article could also serve as a valuable reference for their policy making in order to further facilitate the manufacturers and cold chain service providers.

In addition, it is important to ensure the following: first, the implementation of Halal cold chain management is efficient to provide or offer sustainable supply chain without compromising the quality aspect of the product. The value-driven approach will ensure that every element/entity along the supply chain is responsible towards their "amanah" such that Halal integrity is always preserved. Second, to start investing in cold chain facilities to enhance the productivity and economic profit of every stage of the supply chain. Third, to comprehensively evaluate the market needs of Halal cold chain management to better understand what segment of investment is necessary to best facilitate the efficiency of cold chain management. Finally, this review is limited to cold chain management for Halal food products. However, the model can be adopted for other segments of cold chain products: for example, Halal medicine, pharmaceuticals and cosmetics.

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5 The premier of Halal logistics in Brunei Darussalam

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Introduction

Over the past decade, the Halal industry has continuously experienced substantial growth; one cannot deny the role and contribution of the Southeast Asian (ASEAN) countries in this growth. The ASEAN countries, predominantly Malaysia, Singapore and Indonesia, are recognised as among the pioneering nations that foresee and capitalise on the potential of the Halal industry. Aside from the three major countries, nations like Vietnam, Thailand and the Philippines have all begun to implement Halal initiatives and incorporate them into their national agendas (Dubé et al., 2016; Othman et al., 2016).

In a global context, the Halal industry has progressed to become one of the fastest-growing industries in the world and has assumed greater global awareness. Halal has transcended beyond the tenets of religious obligations and ritual conducts. Although commonly associated with food and Muslim consumption behaviour, the Halal dogma permeates contemporary businesses, such as banking and finance (Brekke, 2018), travel and tourism (Boğan and Sarıışık, 2019), pharmaceuticals and healthcare (Norazmi and Lim, 2015), marketing and branding (Izberk-Bilgin and Nakata, 2016) and even logistics and distribution management (Zailani et al., 2017).

The increasing demand for Halal products and services has led to the creation of innovative and Sharia-compliant logistical services, the Halal logistics. A Halal logistics service is specially designed to satisfy the demand from the Halal product manufacturers, service providers and consumers to maintain the integrity and quality of Halal goods and services (Zailani et al., 2018). Besides, Halal logistics is a service innovation that adds value to existing logistics service (Karia and Asaari, 2016), and such commitment could potentially have positive ramifications on a firm’s performance (Talib et al., 2016) or a nation’s growth (Talib and Hamid, 2014).

Despite the regional growth and the expansion of knowledge, little is known about Brunei Darussalam and its Halal industry, let alone the sultanate’s Halal logistics sector. From an academic context, research concerning Halal logistics in Brunei Darussalam is limited and scarcely discoursed. Hence, the purpose of this chapter is to present and confer the development of Halal logistics in Brunei Darussalam.

This chapter aims to contribute to the growing area of Halal logistics research by revealing and understanding the development of Halal logistics in Brunei. The chapter argues that doing so could provide valuable insights into local, regional and global stakeholders; attract more trading interests; and fortify and national Halal commitments.

Brunei Darussalam Halal industry background

Proclaimed as the only Islamic country in the ASEAN region, Brunei has regarded Halel as one of its main national agendas while attempting to diversify its economy and be less dependent on petroleum-based revenue. In the 9th National Development Plan (2007–2012), the Halal sector became one of the six economic clusters and is a key component towards achieving the long-term development vision: the Wawasan 2035. Presently, the 10th National Development Plan (2012–2017), along with six strategic development thrusts, aims to spur economic growth and emphasises the significance of sustainable productivity through knowledge and innovation. These national development plans outline the country's commitment to achieving a dynamic and sustainable economy where the Halal sector is a strategic and critical venture.

Brunei is among the few countries in the world that identify the Halal sector as a national growth blueprint. However, unlike other countries, the inclusion of Halal as a component of growth for Brunei is based on three core objectives: namely economic diversification[1], small-medium enterprise (SME) capacity building and fulfilling "fard al-kifayah".[2]

First, as Brunei is heavily dependent on revenues from the oil and natural gas sector, and given the volatile and fluctuating oil prices, the revenue and export gains have experienced declines in recent years (Asian Development Bank, 2019). Therefore, in response to the downturn and the pressing needs to revive the economy, the government sets plans to diversify the economy. Given the lucrative $2.1 trillion Halal industry and the growing demand for Halal products and services, Brunei sees this as a strategic venture to contend for a piece of the pie and simultaneously diversify its economy.

Second, in line with the plan to diversify the economy while capitalising on the global Halal industry's rapid growth, the government identifies the need to focuss on the SME sector. Through entrepreneurship, the government is focusing on building SMEs' capacity and ecosystem by providing practical and financial assistance as well as access to the global Halal market. As a result, according to the 2018/2019 State of the Global Islamic Economy Report, Brunei is among the leading countries in Halal food, Halal pharmaceuticals and cosmetics, and Halal media and recreation.

Third, the drive to fulfil "fard al-kifayah"[2] is the commitment that sets Brunei apart from other countries. Unique to Brunei, the call of "fard al-kifayah" is the founding commitment to the country's entire approach to the Halal sector. The commitment portrays that aside from the promising and lucrative Halal industry, the obligation to uphold the Sharia principles and protect the "ummah" underpins the responsibility to commit to Halal objectives.

Furthermore, Brunei's Halal standards and guidelines are among the most stringent in the world, particularly concerning the issues of animal slaughter. In Brunei, the standard and rules are against pre-slaughtering stunning. Hence, this approach eliminates the "grey areas" when it comes to Halal compliance. At a time when Halal integrity[3] is coming increasingly into the spotlight, especially in terms of building consumer confidence, the elimination of doubt is likely to be an integral factor in several areas, particularly in Halal logistics.

Halal logistics in Brunei Darussalam

Brunei is committed to being one of the leading nations in the Halal industry, and the logistics sector is regarded as an integral part of the aspiration and an enabler to protect the Halal supply chain. The realisation came a decade ago as one of the outcomes from the 2008 International Halal Market Conference. The awareness of the need to safeguard Halal integrity and maintain Halal compliance throughout the supply chain has led to an increasing need for Halal logistics. This is understandable as the logistics chain of transportation, warehousing, material handling, packaging and inventory management is often unknown or hidden from consumers (Nakyinsige et al., 2012; Talib and Hamid, 2014).

In Brunei, Halal meats are imported from Australia, the United Kingdom, Malaysia, China and India because cattle farming is unsuitable in the country (Khalid et al., 2018). The import of Halal meats is a logistical challenge because there is a high possibility of cross-contamination. As imported meats change hands between parties within the supply chain, Halal products may have physical contact with the non-Halal substances, thus voiding the Halal status and the integrity of the Halal supply chain (Talib and Johan, 2012; Talib et al., 2015). The commitment to eliminate potential cross-contamination has emphasised the need for Halal logistics in Brunei.

In response, the Brunei government has begun to improve the situation by ensuring Halal logistical practices across the supply chain. The effort to establish a Halal logistics operation is in the form of public–private initiatives. In 2010, Kerry Logistics and the government of Brunei were involved in an agreement to build an international brand called Brunei Halal. Kerry Logistics is a leading logistics service provider in Asia, with extensive operations across Greater China and the ASEAN region.

The partnership materialised because the demand for cold storage facilities has increased in Brunei, given the rise in the Halal food sector and increasing Halal meat imports. The cooperation between the government and Kerry Logistics involves the sourcing, distributing and marketing of Brunei Halal food products. Kerry Logistics, involvement in international freight forwarding and integrated logistics management ensures compliance with the strict Brunei Halal Standards.

Moreover, Brunei currently has an excellent opportunity within several Halal logistics service providers. To date, the Halal logistics efforts continue with neighbouring Malaysia (Sarawak and Sarawak) and Indonesia, and moved forward with signed agreements in December 2017. The collaborative efforts between International Halal Trade Hub Services, Tri-Star Shipping and Trading Brunei, FSM Logistics Sdn Bhd of Sarawak Malaysia and PT

Winmas Logistic from Indonesia aimed to expand Halal logistics services, network and infrastructure as well as establish efficient connectivity between the BIMP-EAGA and the ASEAN, along with China, South Korea and Japan (Othman, 2017).

With a commitment to safeguarding the Halal supply chain and the numerous Halal logistics public–private partnerships, Brunei continues to hold a pristine reputation and is highly regarded by the Islamic world as the centre of an Islamic lifestyle.

Brunei's legal framework on Halal logistics

In Brunei, the Majlis Ugama Islam Brunei (MUIB), or the Islamic Religious Council of Brunei in English, has amended the Halal Certificate and Halal Label Order 2017, making it compulsory for businesses linked with food preparation to apply for a Halal certificate or permit. Currently, the Order is followed on a voluntary basis and is intended to broaden the Halal certification scope to non-food products and services, in this case, the logistics activities. Besides, the amended Order is followed on also aimed to broaden the application for Halal certification, which includes Halal products, services and businesses from overseas.

In support of the law, Brunei has launched the country's very own Halal standard: the Brunei Darussalam Standard Halal Food PBD 24:2007 (MUIB, 2007). Although Brunei is yet to officially launch its standards for Halal logistics, the requirements for Halal logistics are clearly stated in these extracted clauses from PBD 24:2007 (The Religious Council Negara Brunei Darussalam, 2007).

For example, all products must be prepared, processed, packaged, stored or transported separately from any other food that does not meet the Sharia principles. Furthermore, for product storage, display and servings must be categorised and labelled Halal and segregated at every stage to prevent from cross-contamination with non-Halal substance or by-products. Additionally, Halal goods and services must be prepared, processed, packaged, transported and stored in compliance with the strict hygiene and sanitary requirements of Codex General Principles on Food Hygiene and other relevant Codex Standards. Lastly, in manufacturing and processing, suitable detection or screening devices should be used where necessary.

Based on the aforementioned excerpt, although the standard is on Halal food, the logistics elements still plays a significant part in safeguarding Halal integrity across the food supply chain. Moreover, the Halal standard is also in line with other relevant legal documents across various departments and agencies in Brunei: for instance, the Ports Act, Import and Export License and Permits, Merchant Shipping Order, Customs Regulations, Public Health (Food) Act (Chapter 182) and Public Health (Food) Regulations 2000. These laws and regulations govern the logistics procedures and processes for all Halal food import and export activities in Brunei.

Future trends and challenges

Brunei is a country overflowing with positive potential in the Halal industry. Presently, the Halal sector is profoundly institutionalised. In other countries, for instance, Malaysiam the Halal sector is backed by the government, but this is not the case in Brunei. Aside from MUIB, three other government agencies are responsible for supporting and advising MUIB with regard to Halal matters in Brunei: namely the Halal Food Control Division, Ministry of Religious Affairs; the Food Safety and Quality Control Division, Ministry of Health; and the Animal Quarantine Services, Ministry of Primary Resources and Tourism. Perhaps an MUIB should take a more central role and oversee the entire Halal sector as doing so could have positive implications, such as faster decision making, consolidated resources or the elimination of public bureaucracy.

As the country is yet to have its own standards for Halal logistics, confusion may occur because the current practices heavily rely on the PBD 24:2007 Halal Food Standard. To achieve a total Halal food chain and ensure Halal integrity across logistics functions, a dedicated Halal logistics standard is needed. Although such a standard requires considerable time, human capital and financial commitment, the venture is beneficial in the long run.

To move forward, a healthy logistics ecosystem is paramount in global trade, but complicated documentation has been a structural problem (Talib et al., 2017). There is an urgent need to digitalise the documentation process. In addition to facilitating document coordination, this approach speeds up approvals and provides updated and secure data for informed decisions. Parallel with the drive towards digitalisation, blockchain[4] technology is regarded as the best solution to curb Halal integrity issue in logistics and the food supply chain (Tieman and Darun, 2017).

Conclusion

Strategic Halal initiatives are evident in Brunei as logistics companies have established a strategic alliance with global Halal logistics players from Indonesia and Malaysia. Through the Brunei Halal Brand, the country is aiming to become one of the major players in the global Halal industry. Moreover, with the aim of providing Halal food and products of premium quality to the worldwide Muslim population, Brunei will continuously strive to drive innovation through technology to create value for customers and facilitate the digital transformation of the ocean shipping and logistics industry. Therefore, Halal logistics awareness and implementation of standards are needed for a higher level of Halal assurance for the Muslim consumers and the better protection of Halal brands products.

This chapter, considering the fact that Halal logistics in Brunei is at an early stage, lacks empirical evidence. Hence, more research is needed to understand the current state of knowledge on Halal logistics in this country. Future research should assess the Halal logistics environment by means of internal and external environmental factor analyses. This could provide a preliminary insight for more Halal logistics research and set the platform for more in-depth empirical studies in the future. For instance, empirical evidence comprising academics, policymakers and industry practitioners could enrich future Halal logistics

research and potentially unearth the opportunities and challenges that lie in Brunei Darussalam.

Notes

1 Economic diversification is the process of shifting an economy away from a single income source towards multiple sources from a growing range of sectors and markets.

2 “Fard al-kifayah” is a communal obligation in Muslim legal doctrine. It is a legal obligation that must be fulfilled by the Muslim community; if enough members in the Muslim community fulfil the commitment, the remaining Muslims are free from the responsibility before Allah (God).

3 Halal integrity indicates that the product is still Halal from upstream to downstream supply chain and free from any activity that may violate Halal status, intentionally or unintentionally.

4 Blockchain is a type of decentralised database system based on linking together previous records in secured blocks of information.

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6 Halal logistics policy development in Indonesia

Yuliani Dwi Lestari and Faridatus Saidah

Introduction

Halal or “permissible” is a term based on the Holy Quran and the Sunnah (what the Prophet Mohammed saw). It is a fundamental value and guiding principle for Muslim people. Allah has provided everything which is good to consume (Halal) and prohibited harmful things, which are considered haram. In the Al-Qur’an, the word Halal is accompanied by thayyib (Halalan thayiban), which means good or safe for consumption (which constitutes food safety), healthy, clean, and high quality (which constitutes physical, biological, and chemical aspects). Thus, Halal goes extends beyond quality. It is possible for hazardous substances to be served as long as they are below a certain level within food safety laws. However, Halal does not permit hazardous substances to be served at all (zero tolerance) (Syamsu, 2019). This has caused both Muslim and non-Muslim consumers in the world to embrace Halal products due to their quality assurance.

In daily life, Halal is usually associated with food consumption. However, conceptually, it incorporates every aspect of a Muslim person’s lifestyle, including speech, social interaction, behavior, attire, and manner (Jallad, 2008; Lestari et al., 2018b). In fact, it goes beyond food consumption and incorporates other areas (Jallad, 2008; Wilson and Liu, 2010), such as logistics and supply chains.

The number of Muslims in Indonesia alone exceeds 200 million, which constitutes 87% of the population of Indonesia. With such a large Muslim population, the Indonesian market represents a large potential for the food, non-food (i.e. pharmaceuticals, cosmetics, travel, banking), and Halal-based logistics. This aligns with trends at the global level. In 2016, global Muslim expenditure on consumption reached US$ 2 trillion and has been predicted to continue rising to US$ 3.1 trillion by 2022 (Syamsu, 2019). Industrial firms in various Halal-based sectors in Indonesia have also shown a sharp upward trend since 2018. Data on the number of Halal certifications up to the second quarter of 2018 showed that there had been 17,398 Halal certificates, and 11,249 companies had received Halal certification for their products or services, as shown in Figure 6.1.

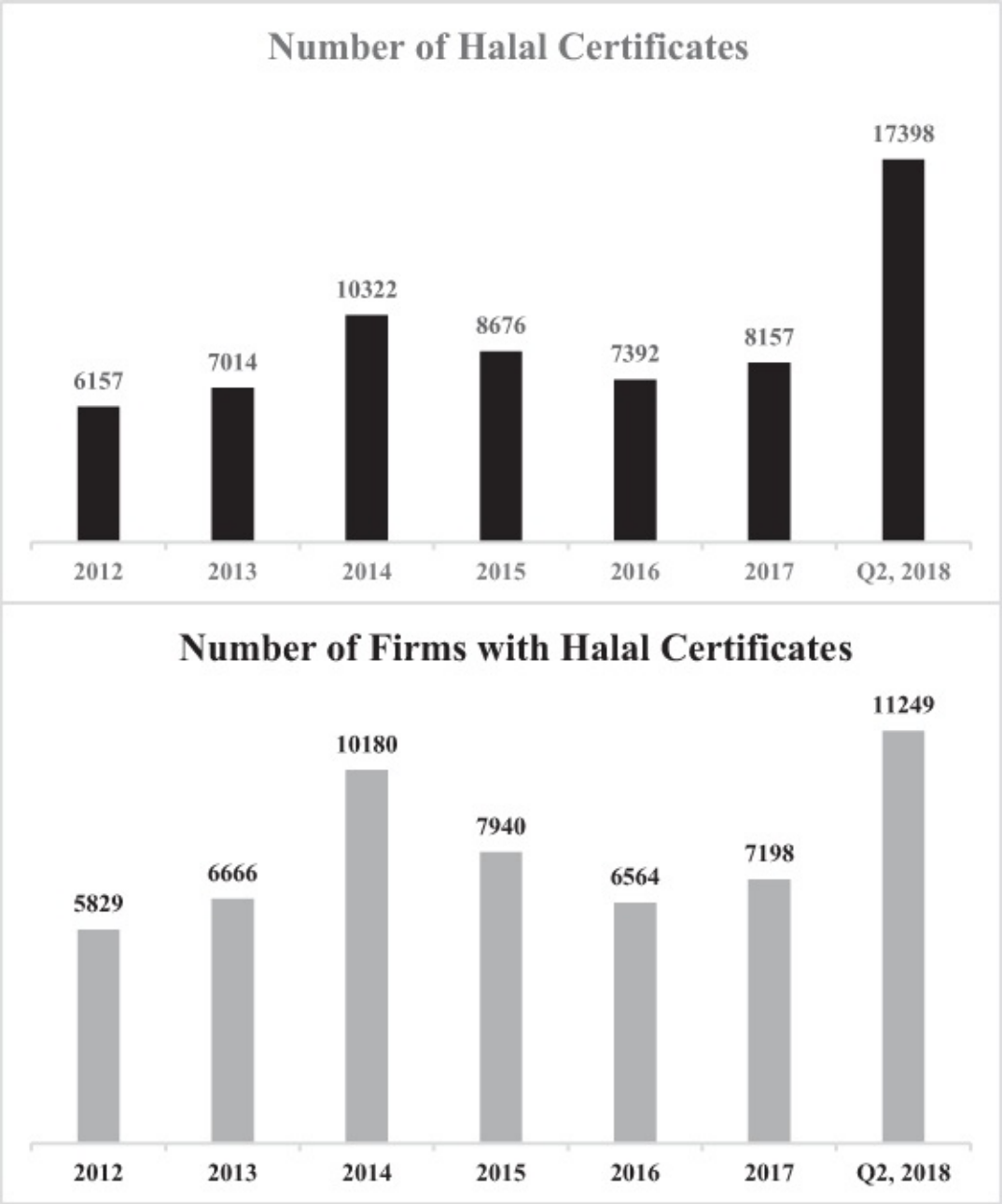

Figure 6.1 Number of Halal certificates and number of firms with Halal certification in Indonesia.

Source: Adapted/modified from LPPOM MUI (2019).

Halal policy in Indonesia

Recognizing that consumers have the right to products with a Halal guarantee, and that the Halal industry has a great potential to grow, the Indonesian government prepared a road map for the development of the Halal industry as part of the Sharia Economy Master Plan issued by the Indonesian Ministry of National Development Planning in 2019. This master plan includes four main strategies: Strengthening the Halal value chain; strengthening the sharia financial sector; strengthening micro, small, and medium enterprises; and utilizing and strengthening the digital economy. As part of the strategy for strengthening Halal value

chain, several major programs have been initiated, such as Halal Hub Region, Halal Certification, Halal Lifestyle campaign, investment incentives, and international collaboration (Bappenas, 2019). At the policy level, the Halal industry is supported by the Halal Product Assurance Act (JPH) No. 33 of 2014. This law assures consumers of the convenient, secure, safe, and availability of Halal products while adding value to businesses by producing and selling Halal products. Halal certification was voluntary until 2014, but it has been mandatory ever since. The JPH covers 11 sections consisting of 68 articles that administer Halal for the industry and society sectors of Indonesia, as shown in Table 6.1.

Table 6.1 Halal Act (JPH) No. 33 of 2014

Sections	*Articles*	*Summary of matters administrated*
One	4 articles (1–4)	General requirements: Definition of Halal products and process.Obligation to ensure that all products entering and traded in Indonesia are Halal-certified.
Two	12 articles (5–16)	Administrator of JPH: Related to the Ministry and local administration as BPJPH.Duties of BPJPH and its relation with other agencies, matters related to LPH and the Halal auditor.
Three	6 articles (17–22)	Ingredient and process of Halal product: List of haram ingredients, animal slaughter according to Islamic. Location, place, and equipment in Halal production must be separated from that of non-Halal products.
Four	6 articles (23–28)	Matters related to businesspersons: Right and obligation of businessperson to apply for Halal certification, which was a requirement for those entrepreneurs who already had the certificate.Administrative penalty and matters related to the Halal supervisor.
Five	17 articles (29–45)	Procedure for obtaining Halal certificate: Documents for Halal certification, followed by checking and examination, culminating in issuance of the Halal certificate.Matters related to the Halal label and certificate renewal.Fees of Halal certificate to be borne by applicant.
Six	3 articles (46–48)	International cooperation
Seven	4 articles (49–52)	Surveillance related matters
Eight	3 articles (53–55)	Participation of the community related matters
Nine	2 articles (56–57)	Criminal provisions related matters
Ten and Eleven	6 and 5 articles (58–68)	Matters related to transitional provisions Closing and related substantive matters

Source: Adapted/modified from Hudaefi and Jaswir (2019)

The Indonesian government drafted regulations to support the Halal Product Assurance Act (JPH) No. 33 of 2014 law. These regulations clarified the duties and functions of the government and related institutions in the Halal assurance process, regulating business actors in managing Halal products and processes, and clarified the role of the community in the use of Halal products, as shown in Table 6.2.

Table 6.2 Implementing regulations for Halal product assurance

Presidential ordinance no. 83 of 2015	*Government ordinance no. 31 of 2019*	*Ministry of religion ordinance (Draft)*
No. 83 of 2015 concerning the Ministry of Religion Articles 45–48 concerning the Halal Product Assurance Agency (BPJPH)	General requirements: Definition of Halal product and process, and obligation that all products entering and traded in Indonesia must be Halal-certified. Co-operation in providing Halal product assurance, involving BPJPH with related Ministry, local administrative, and international partners. Matters related to Halal inspection agency (LPH) and Halal auditor. Location, place, and equipment in Halal production. Fees of Halal certification process. Procedure for registration of Halal certificates. Stages of Halal certified product types. Supervision, monitoring, and evaluation.	Administrative sanctions for violations of the provisions of the Halal product process. Administrative sanctions for violations by business owners who hold Halal certificates. Supervision of Halal products. Procedure for registration of Halal certificates. Procedure for determining the Halal auditing agency. Matters related to the Halal logo. Administrative sanctions for violations of the Halal logo. Matters related to Halal certificate renewal. BPJPH financial management. Administrative sanctions for Halal registration violations. Community participation and rewards.

Source: Adapted/modified from Bappenas (2019)

Prior to the implementation of Halal Act (JPH) No. 33 of 2014, Halal product assurance was primarily managed by MUI (Indonesian Council of Ulama), and LLPOM-MUI (The Assessment Institute for Food, Drugs, and Cosmetics-Indonesian Council of Ulama) was established to perform MUI function for assessing the Halalness of foods, drugs, and cosmetic products based on science and technology as a factual consideration in determining the legal status of the product. MUI issues Halal certificates as written fatwa decisions on the Halalness status of the products, based on the fatwa decision of the Fatwa Commission (LPPOM MUI, 2012).

LPPOM MUI designs a system that can ensure the Halalness of products produced by the MUI-Halal-Certificate-holder company, which is called Halal Assurance System (HAS); as a guide for (i) companies which will develop and implement HAS; (ii) certification bodies that require HAS in the Halal certification process; and (iii) any other stakeholders, such as public society, government, and others (LPPOM MUI, 2012).

HAS criteria are generally applicable to all companies, including the processing industry (foods, drugs, cosmetics), slaughterhouse, restaurant/catering service, and service company

(e.g. distributor, warehouse, transporter, retailer). Four principles govern the HAS: (i) Companies must honestly describe all the materials used in the production process. Additionally, their daily production must be Halal according to the HAS Manual. (ii) LPPOM MUI must trust the company to develop, implement, and maintain HAS by itself based on the company's internal conditions. (iii) As a part of participatory involvement, the company must involve management and staff personnel to maintain HAS implementation. (iv) Absolutely all materials used in Halal production must be ensured as Halal. HAS does not recognize material status as low, medium, or high risk when it comes to the Halalness of the product. There are 11 criteria in the HAS, such as Halal policy, Halal management team, training and education, ingredients, products, production equipment, procedure for critical activities, traceability, handling products that do not meet the criteria, internal audits, and management review.

HAS standards that have been designed by the LPPOM MUI and used as references by Halal institutions worldwide are as follows (LPPOM MUI, 2019): (i) HAS 23000: Halal certification requirements; (ii) HAS 23101: Guidelines for fulfilling the HAS in the processing industry; (iii) HAS 23103: Guidelines for fulfillment the criteria for HAS in slaughterhouses; (iv) HAS 23201: Requirements for Halal food; (v) HAS 23301: Guidelines for the HAS manual in the processing industry; (vi) HAS 23102: Guidelines of HAS in restaurants; (vii) HAS 23104: Guidelines for catering services; (viii) HAS 23106: Compliance guidelines for the HAS criteria in logistical services; and (ix) HAS 23202: Compliance guidelines for Halal medical materials.

The flow of Halal certification in Indonesia prior to the issuance of Halal Act (JPH) No. 33 of 2014 is presented in Figure 6.2.

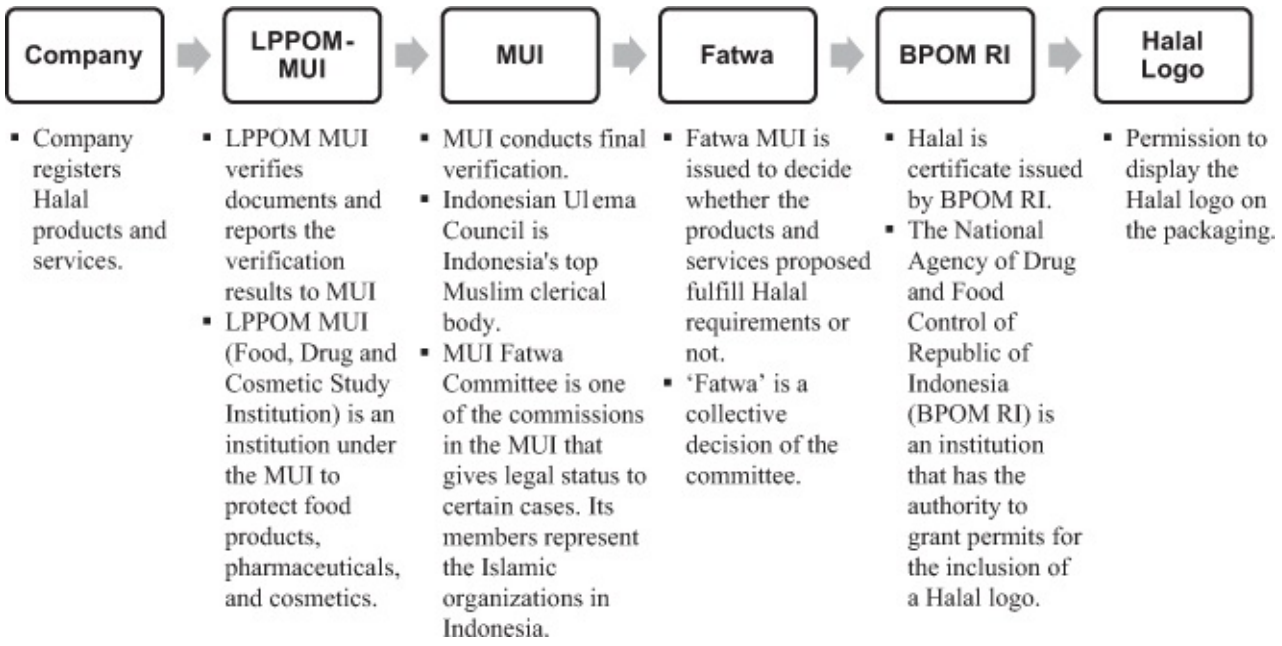

Figure 6.2 The flow of Halal certification prior to the issuance of Halal Act (JPH) No. 33 of 2014.

Source: Adapted/modified from LPPOM MUI (2018).

Thus, the issuance of Halal Act (JPH) No. 33 of 2014, in which the main actors of the HAS have been originally held by MUI and LPPOM MUI, will be shifted so as to be managed by four main parties (LPPOM-MUI, 2016): (i) Agency of Administrator for Halal Product Assurance (BPJPH), (ii) Indonesian Ulema Council (MUI), (iii) Agency of Halal Inspection (LPH), and (iv) Industrial and business community.

The existence of the Agency of Administrator for BPJPH does not reduce the functions of the LPPOM MUI. The functions of LPPOM have, so far, been transferred to a handful of institutions. This is changing institutional forms. Previously, all the institutions came under the umbrella of the LPPOM MUI. However, the Halal Act (JPH) No. 33 of 2014, which is about Halal product assurance (JPH), seemed to be separate, because of which the LPPOM's work was divided (Pratiwi and Yulianto, 2017).

The flow of Halal certification in Indonesia after the issuance of JPH No. 33, 2014 is presented in Figure 6.3.

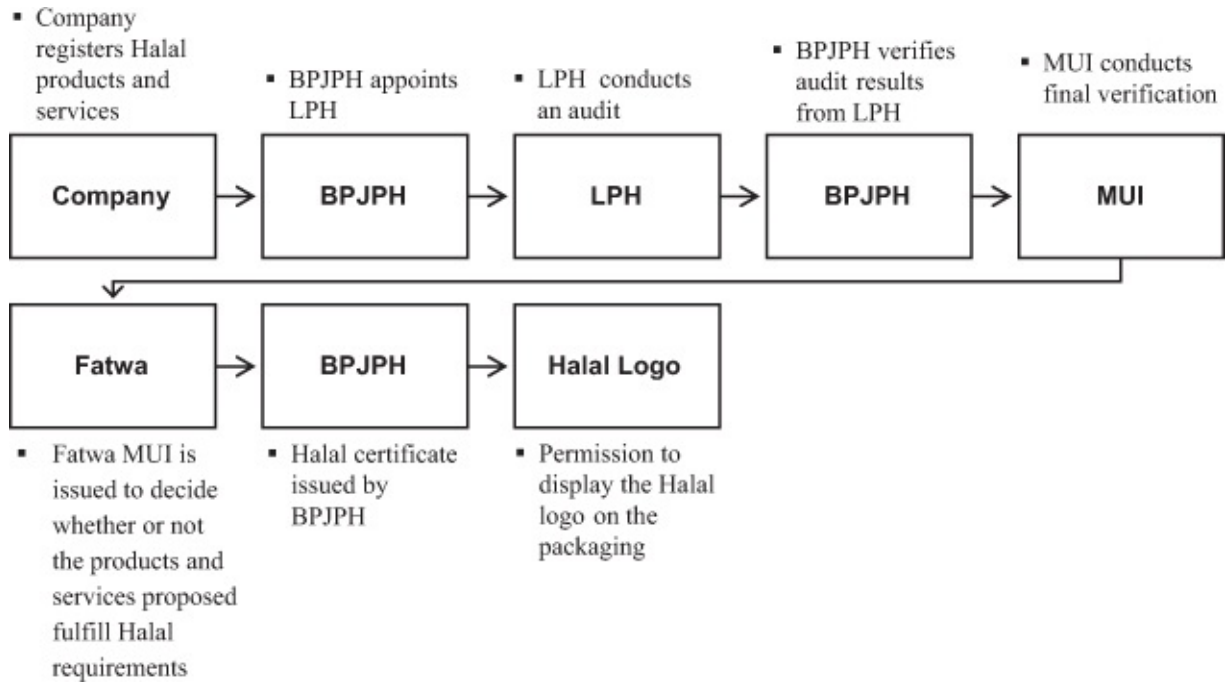

Figure 6.3 The flow of Halal certification after the issuance of Halal Act (JPH) No. 33 of 2014.

Source: Adapted/modified from LPPOM MUI (2018).

Halal logistics in Indonesia

Traditional supply chain services can be defined as a series of processes wherein raw materials are converted into final products and then delivered to the end customers (Manzouri et al., 2011; Ngah et al., 2014), whereas Halal supply chain is defined as the integration of business process and activities from the point of origin to the point of consumption, according to the Islamic law known as Syariah (Omar and Jaafar, 2011; Ngah et al., 2014). Comparing traditional supply chain to Halal supply chain indicates that cost

reduction becomes the main focus of traditional supply chain, whereas maintaining the Halalness of Halal product becomes the critical aspect or concern of Halal supply chain (Ngah et al., 2014). Although both supply chains may look alike, ironically, they are different because of the difference in their objectives. While the differences between supply coverage and logistics are clear, in that the supply chain comprises all aspects of a product cycle from origin to end user, logistics relates to one component of supply chain, which is focused on the transportation and storage of goods, addressing product movement efficiency. In general, logistics becomes a part of the supply chain process.

To ensure the Halal quality of the final product, the manufacturer or the company must guarantee that every process in the supply chain fulfills the Halal guarantee system. The Halal logo is an assurance that the product complies with Halal principles throughout manufacturing activities. Customers in general assume that Halal products with certification comply with the standards. However, these customers have not shown much concern for the possibility of logistical cross-contamination. Further, it is compulsory for manufacturers to be able to provide Halal storage facilities in order to comply with Halal logistics systems worldwide (Tieman, 2008). Thus, Halal is more than just the Halal logo on the sides of a product. It also includes developing logistical service certification, and the construction of Halal standards for processes such as transportation (Abdul et al., 2009; Muhammad et al., 2009; Othman et al., 2009; Tieman, 2011; Lestari et al., 2018b). This has led to an expansion of Halal certification to ensure a focus on logistical channels as a part of the supply chain process which is critical to most industries.

At the same time, Halal logistics implementation is growing quite rapidly, especially in countries with a majority Muslim population, such as Indonesia and Malaysia. Based on interviews with Halal authorities, namely MUI and LPPOM MUI, the current trend of commitment in implementing Halal supply chain, including logistics, shows a positive increase for the following reasons: (i) In the Indonesian context, the implementation of a Halal guarantee system for industries is mandatory and (ii) awareness of the importance of providing added value and the creation of differentiation related to Halal is guaranteed throughout the supply chain, including logistics to ensure the Halal product.

The implementation of an HAS must begin with the written commitment of each company in every supply chain. This must be supported by the Halal management team or internal Halal auditors who are responsible for planning, implementing, evaluating, and improving the HAS continuously (Syamsu, 2019). Furthermore, once the main requirements for the Halal products are supported with legal documents from an institution with credibility, the company must guarantee the Halalness of any critical activities in the logistical processes, such as handling, storage, and transportation, until the product reaches the consumers.

Since the integrity of Halal depends on the practical Halal logistics and its relevance to Halal supply chains for assurance from sourcing to customer purchase, it is necessary to design technical guidelines covering the logistical processes (other than Halal product certification). Based on the results of interviews with the LPPOM MUI, the Halal logistical assurance criteria covered in HAS 23106 are similar to the basic criteria of HAS 23000, with the following contextual adjustments to the logistical process (LLPOM MUI, 2012): First, the management must determine and specialize in Halal policy. Second, the management

must overlook the Halal management team, addressing all the sections involved in critical activities, and have clear duties, responsibilities, and authority. Third, the company must implement training procedures. Internal training must happen at least once a year, and external training must happen at last once every two years. Fourth, materials used in products must not originate from forbidden/filthy materials. Fifth, products cannot use the name of a product that has been forbidden or is inappropriate according to Sharia Islam. Sixth, facilities must ensure that there is no cross-contamination with forbidden/filthy materials. Seventh, the company must have written procedures about performing critical activities in supply chain that can affect the Halal status of a product. Eighth, the company must have written procedures to ensure the capability to ensure certified Halal products meet the criteria (approved by LPPOM MUI). Ninth, the company must have written procedures to handle products that do not meet the criteria. Tenth, the company must have written procedures about internal audits for implementing the HAS. Internal audits should be performed at least once every six months by a competent internal Halal auditor. Eleventh, the management/deputy must perform management reviews at least once a year to assess the effectiveness of the HAS.

In general, according to Bruil (2010) and Tieman (2009), there are three principles underlying the formation of Halal logistics: Namely, the avoidance of contamination, the avoidance of errors based on Islamic law, and the guarantee that the logistical operations are consistent with the concepts of Halal (Lestari et al., 2018a). To guarantee the fulfillment of these three principles, Halal logistics should be able to control and guarantee Halal conditions in all the activities in the supply chain. For example, Halal control and assurance in warehousing or storage activities includes admission, placement, storage, cross-docking, value-added logistics, order picking, and delivery of Halal products. Control and Halal assurance in transportation and distribution activities include hygiene tank, container, vehicle, loading/unloading, and product documentation (Lestari et al., 2018a). Further, Halal control and assurance include inspections at the terminal, temporary storage, consolidation, storage, and documentation of Halal products (Lestari et al., 2018a). The coverage area in Halal logistics is presented in Figure 6.4.

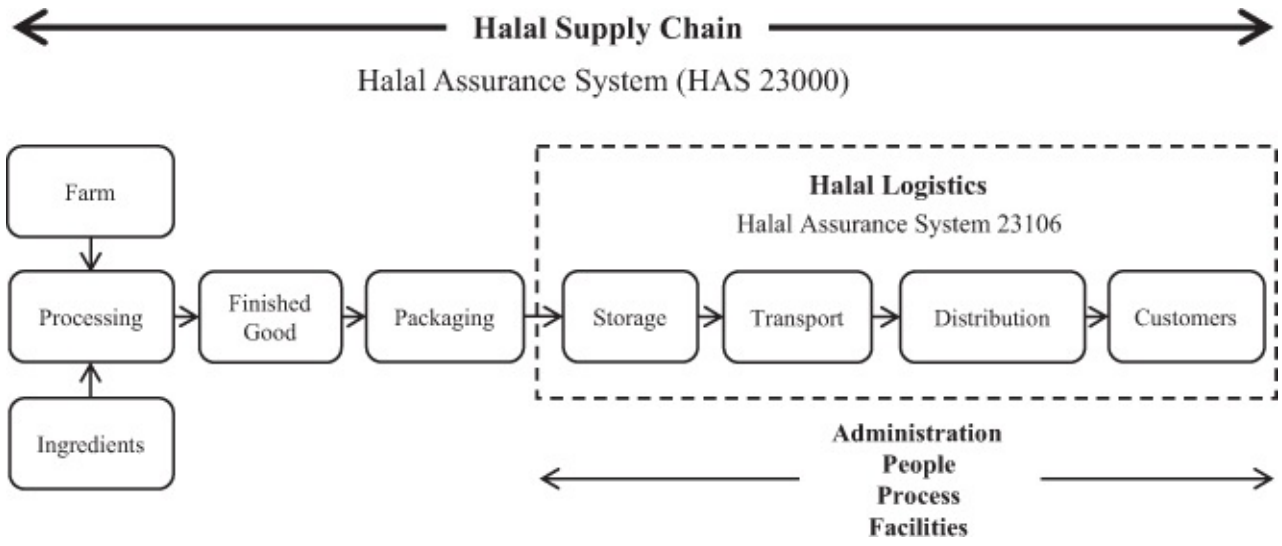

Figure 6.4 Area of Halal logistics.

Halal logistics in Indonesia has shown significant development in the last three years. Since HAS 23106 regarding Halal logistics assurance was launched, logistic companies, warehousing, and transportation services have begun building Halal-based facilities and registering Halal guarantee certifications. Based on the interview results with the LPPOM MUI, the number of logistics companies registering for Halal assurance shows a positive upward trend. At this time, there are at least ten companies that have succeeded in gaining the recognition of the Halal logistical assurance certification, as shown in Table 6.3.

Table 6.3 List of logistics service providers that receive Halal Assurance System Status (HAS) certification

No.	*Logistics services provider*	*Type of Halal logistic services*
1	PT. DHL Supply Chain Indonesia	Logistics
2	PT. Dunia Express Trasindo (Dunex)	Warehousing – Cold Storage
3	PT. HAVI Indonesia	Logistics
4	PT. Iron Bird Logistics	Trucking
5	PT. Multi Terminal Indonesia – IPC logistics Services (Halal Logistics and Cold Storage)	Warehousing – Cold Storage
6	PT. Nex Logistics Indonesia	Logistics
7	PT. Nippon Express Indonesia	Logistics
8	PT. Nittsu Lemo Indonesia Logistik	Logistics
9	PT. Schenker Petrolog Utama	Warehousing
10	PT. Yusen Logistics Solutions Indonesia	Warehousing

Source: MUI (2019)

Supply chain management is used to maintain and improve the competitiveness of enterprises by increasing control, maintaining product quality, improving industrial networks, and ensuring customer satisfaction (Rahman and Rosli, 2008). Although in general, this provides tremendous benefits to business continuity, the primary problem in the industry is related to the application of Halal logistics, which entails additional costs, such as warehouse separation and segregation according to the nature of the product, among others (Lestari et al., 2018a). Since the scope of Halal logistical management covers at least four things, administration, people, process, and facilities, as shown in Figure 6.4, it is doubtful if companies will use Halal logistics due to their complexity and high costs (Lestari et al., 2018b): First, Halal logistics should follow Sharia administration, which means that the administrative system should be built on a foundation of good governance, reliability, and honesty. Second, all parties involved should fully understand the Halal requirements. Additionally, only certified workers should be involved in Halal logistics. Third, the Halal logistical process needs to be designed in a comprehensive way to ensure the Halalness of the process: (i) Halal and non-Halal products must be segregated during transportation, handling, and storage. (ii) Halal products must have separate, dedicated tools and machinery for all logistics activities (from supplier to consumer). (iii) The safety and quality of the Halal logistical process are important. (iv) Shops/retailers must provide a Halal atmosphere (e.g. dedicated Halal counter or Halal sign). (v) A logistical service provider (LSP) that

implements Halal principles is essential. (vi) Halal certification for LSP is necessary to assure Halal and safety. Fourth, facilities must ensure that all Halal requirements are met.

Second, it takes effort to introduce Halal logistical awareness and acceptance to all employee, and there is pressure for continuous innovation and a need to improve value and image through additional competitive advantages of Halal logistics. In other words, companies need to find a balance between Halal standards and speed. (Lestari et al., 2018a). Third, since the logistical process is part of the supply chain system, the implementation of Halal logistics is dependent on the readiness of other partners in ensuring the Halalness of the product and the system, including the supplier, vendor, distributor, government, community, customer, Halal trade, and Islamic finance provider.

The fourth challenge, which occurs at the policy level, is related to changes in the regulation of the Halal guarantee system in accordance with the Halal Product Assurance Act (JPH) No. 33 of 2014, where the government is still in the process of drafting the Ministry of Religion Ordinance. This has caused the new HAS to be suboptimal. Furthermore, Indonesia faces a challenge at the strategic level about how to implement a structured and coherent Halal logistical development strategy, which starts with ensuring Halal products, followed by developing Halal supply chains and developing Halal value chains, and culminates in holistic Halal logistics, which includes financial aspects (LPPOM-MUI, 2018).

Conclusion

With the growth of the Muslim population in the world, the Indonesian government has realized that the potential of the Halal industry has also grown rapidly. This increase in population is accompanied by a shift in consumer expectations toward the fulfillment of Halal requirements. On the other hand, companies also experience increasingly complex competition when dealing with the large Muslim market. They are required to provide Halal products and processes. This raises awareness among all parties about the important role of the Halal supply chain, which includes logistical Halal systems. Responding to this condition, the Indonesian government proactively met these needs by providing HAS in the Halal Act (JPH) No. 33 of 2014. This was supported by the implementation of regulations such as Presidential Ordinance No. 83 of 2015, Government Ordinance No. 31 of 2019, and Ministry of Religion Ordinance (in the drafting process). In terms of technical guidance, Halal logistics is regulated with HAS 23106. These regulations and technical guidelines are expected to make Indonesia a reference point for other countries in the world regarding the Halal industry, especially Halal logistics.

In general, this study has proivided a description of the regulations and technical guidelines related to Halal logistics, which can be used as a reference for Halal institutions globally. Despite this contribution, this study still faced some limitations. First, the majority of the findings in this study were obtained from secondary data in official documents from the relevant Halal authority through the content analysis method, and only a small portion underline the findings based on the results of the interview. Second, the Halal authorities involved in the interview process in this study were comprised of only two agencies: Namely,

Indonesian Council of Ulama (MUI) and The Assessment Institute for Foods, Drugs and Cosmetics, Indonesian Council of Ulama (LPPOM MUI). Thus, further studies are required to improve the findings, through a deeper observation of regulation and technical guidelines involving more stakeholders, such as related Ministry institutions; non-ministerial government agencies; and the business sector, particularly logistics services providers. In addition, further studies that observe success and barrier factor determinants related to logistic services providers as well as Halal-based food and non-food industries in implementing Halal logistics are important to provide an overview of the challenges as well as the benefits of operating Halal logistics in a business.

Note

JPH is Halal Product Assurance, BPJPH is Agency of Administrator for Halal Product Assurance, LPH is Agency of Halal Inspection related matters, and MUI is the Indonesian Council of Ulama.

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7 The evolution of Halal logistics in Malaysia, Thailand, Indonesia, the Philippines and Vietnam

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Introduction

Today, the brand of "Halal" has many new prospects. "Halal" branding is not restricted to foods only; it has been further developed in to the area of Halal logistics. Currently, consciousness of Halal requirements in distribution activity is a concern not only for Halal consumers, but also for Halal manufacturers Halal traders and third-party logistics (3PL) providers. From a business perspective, Halal logistics branding acts as a differentiation strategy to achieve business sustainability. Its terminology convinces the Halal customer that a certain set of guidelines are being followed and fulfill Islamic (Shariah) law. It increases customer trust that there will be no issue of contamination throughout the supply chain activity (Wilson and Liu, 2011; Rahman et al., 2018). A growing body of research supports the importance of monitoring the status of Halal products throughout supply chain activity as there is always a possibility of the products' being cross-contaminated with Haram or non-Halal substances during delivery activity, such as transportation and at the warehouse (Rahman et al., 2018). As highlighted by Rahim, Mohamad and Rahman (2016), the Halal concept simulates advancement in the Halal trades, creating a new business drive within the country and achieving economic growth.

The Halal brand is popular in Muslim countries, such as Malaysia and other Southeast Asia (SEA) countries: namely, Thailand, Indonesia, the Philippines and Vietnam. All of these five countries are popular among Muslim travelers. The increase in the number of Muslim travelers in these countries reflects the importance of developing their Halal economies (Rahman, 2019). It can spur Halal business activity and tap into the potential of Halal logistics business to support import–export activity in these countries. The majority of the studies on Halal have focused on Muslim countries, particularly Malaysia. It is now recognized as a leader of the global Halal industry and has become a major reference for many countries in many Halal sectors, such as Halal food, Halal banking, Halal hotels, Halal restaurants, Halal tourism and Halal logistics. A majority of the studies on Halal logistics

have focused on the Halal transportation and Halal warehousing activities. There is a dearth of studies focusing on Halal logistics in SEA countries, such as Indonesia, Thailand, the Philippines and Vietnam. In this study, by using Malaysia as a key reference, the authors try to bridge the gap by looking at the development of the Halal logistics industry in these countries. The next section will discuss the potential of boosting the Halal industry in SEA countries.

Halal in South-East Asia: Muslim population and Halal economy potential

The dynamic environment of SEA, home to a total of 240 million Muslims, is recognized as a popular Muslim region, known as Muslim archipelago. In general, Islam is acknowledged as the official religion in many countries of SEA, especially Malaysia, Indonesia, Thailand, Brunei and the Philippines. Even though Islam in Vietnam is not as prominent as it is in other SEA countries, the numbers of the Muslim population are growing in Vietnam. The Halal industry has been attracting increasing interest from global participants which effectively shape business competition in SEA. Tourism activity in Vietnam has encouraged demands for Halal products among Muslim travelers. In the SEA context, it is vital to understand the Halal segmentation in order to effectively promote the development of this industry. Several distinct segments of Halal customers, such as Halal Food and restaurants, Halal cosmetics, Halal pharmaceuticals, Halal banking and many more, provide initial guidelines for Halal traders and providers to boost Halal economics in SEA.

The Global Islamic Economic Report (2016/2017) indicates that the Halal sector has evolved substantially, as evidenced by new Halal business players, new Halal products and the maturing of existing players. In truth, in SEA, the status of the Halal industry is still growing, currently in a developing phase, especially from the perspective of Halal logistics. From other perspectives, such as that of Halal food, it is acknowledged as the largest Islamic Economic pillar in SEA. However, the Halal food industry has become fragmented since there is not a single international standards guideline that standardized the Halal food regulation. Among other SEA countries, Malaysia has led the standard development of Halal food as it is a pioneer in the global Halal industry. Not having one international standard for all mainstream multinational food and beverage companies limits some of these companies from entering the Halal food industry. Recognizing the right guidelines in producing Halal products creates bigger opportunities for Halal players to grow and enhance their business. As reported in the Global Islamic Economic Report (2016/2017), Halal food companies from SEA have huge potential to create global Halal brands in the Halal food industry as well as other Halal sectors.

At present, the number of Muslim populations in SEA is continuing to grow. The significant relationship between the increased number of Muslim populations and the increased demand for Halal products services is acknowledged. Halal has been regarded as a branding for good-quality products which are safe to consume. It is believed that such

products are consumed not just by Muslim people but also by non-Muslims. A strong recognition of Halal products in the eyes of the customer creates a strong Halal brand position in SEA and global markets. As highlighted by Mitchell (2002) and Rahman, and Melewar and Sharif (2014), a strong brand image of product attributes is crucial to the success of any business, including Halal business. According to Pew Research Centre (2017), the Muslim population will be the largest in the world by the year 2070. With regard to the SEA region, Indonesia was the largest Muslim population, around 257 million. As shown in Table 7.1, the second-largest Muslim population in SEA is in Malaysia: a total of around 19 million. This is followed by the Philippines with 10 million, Thailand with around 3 million and Vietnam with less than 1 million.

Table 7.1 Number of Muslims in Malaysia, Indonesia, Thailand, the Philippines and Vietnam

Country	*Total Muslim population (million)*
Indonesia	257
Malaysia	19
Philippines	10
Thailand	3
Vietnam	<1

Source: The authors (2019)

Table 7.1 clearly shows the increase among the Muslim population and indicates a solid growth of Halal products in SEA. From the Halal food perspective, Muslims are expected to spend $1.9 trillion by 2021 (Global Islamic Economic Report). According to Statistica (2019), the existing Muslim market size is valued at 2.11 billion USD, and it has the potential to reach 3 billion USD, while the global market is projected to reach 58.3 billion USD by the year 2022. Recognizing this potential development of the Halal industry in SEA and worldwide, every country needs to establish their Halal ecosystem to support the development of the Halal industry in each country. In fact, assessing the internal and external environments of the Halal industry could serve to nurture such ecosystems and predict Halal market trends for every Halal sector, such as Halal food, Halal hotel, Halal restaurants, Halal pharmaceuticals, Halal cosmetics, Halal travel, Halal banking, Halal transport, Halal warehouses and many more.

To tap into the potential of the Halal market in SEA, a great effort in identifying and monitoring key Halal business drivers is critical. Determining key factors is significant as it helps to clarify current trends of the industry as well as supply and demand. In fact, understanding the characteristics of the Halal market is essential to achieving sustainability in the Halal business. The next section will briefly deliberate the key drivers of the Halal industry in SEA.

Halal market in South-East Asia

The future prospects of the Halal market in SEA countries, namely, Malaysia, Indonesia, Thailand, Vietnam and the Philippines, look very exhilarating. As highlighted by Halal Industry Quest (2016), there are six key factors that drive the Halal market: namely, sizeable and growing Muslim populations, growing economic development in Muslim countries, emergence of the local and multinational Halal players, indirect marketing and population, Muslim lifestyle and tourism activity, and the rise of a Halal ecosystem (see Figure 7.1). This is aligned with scholars hip in modern marketing theory that suggests that the various segments be evaluated to establish a successful strategy for the Halal market. In fact, leading gurus in marketing (i.e. Kotler and Armstrong) emphasized that assessing various market segments thoroughly will help business organizations to identify and recognize which Halal market segments could serve well and bring the prospects of Halal products and services to the Halal economy in particular.

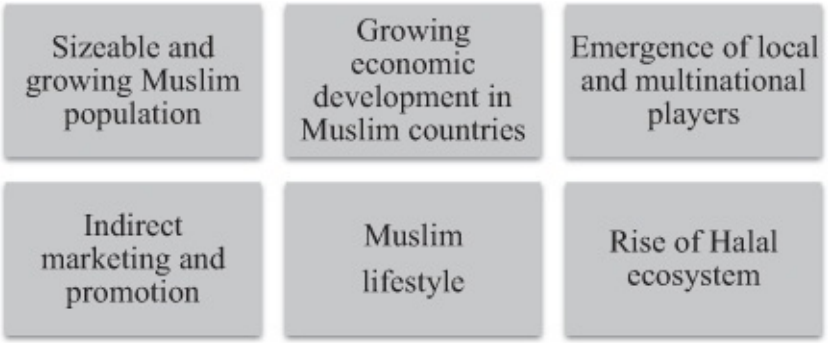

Figure 7.1 Six key drivers of the Halal market in South-East Asia.
Source: The authors (2019).

As highlighted in Figure 7.1, the first and second factors that drive the global Halal market, including SEA, are the sizeable and growing Muslim population, and growing economic development factors. With the increased number of Muslim populations, the demand for Halal products has also increased. As published by Pew Research Centre (2017), the Halal market will be huge, and there will be a great potential for all Halal business players to tap the market. Not focusing on the Halal market reflects the loss of a sizeable market share and business profitability. With regard to this factor, on the supply side, the Halal business players should carefully analyze the market and involvement with Halal innovation activities by providing businesses that support Halal supply chain activities from farm to fork, such as focusing on the Halal logistics business. This new area of business is a good market to tap for many logistics providers worldwide.

The third key driver for the Halal market is the emergence of Halal local and multinational players.

It is remarkable that until now the emergence of world Halal players in the SEA market has helped to develop the Halal industry. Halal has been regarded as a major breakthrough industry that opens up new business opportunities to all. Halal industry players in SEA should take advantage of the Halal market opportunities provided by partnership with their neighboring countries as well as the government and relevant agencies. According to Bernama (2019) in The Edge, Malaysia should take advantage of the Halal market

opportunities provided by the government and the relevant agencies to warrant the advancement of Halal industry. Strategic partnership between local and global players may also contribute to the success of Halal business in SEA.

The fourth key driving factor of the Halal market in SEA is indirect marketing and promotion. In general, indirect awareness of Halal products and services is created or promoted through the use of social media and social media campaigns by industry players. Literally, in some countries, the Halal industry was introduced to others by their friends and relatives as well as through direct and indirect communication. In fact, other Halal activities, such as Halal tourism, Halal restaurants, Halal fashion, Halal pharmaceuticals, Halal logistics and many more, have emerged from the advertising and communication effort. The fifth key driver of the Halal market in SEA is Muslim lifestyle. There is a growing body of evidence and realization that sees Halal as a way of life. At present, Halal products or services are consumed not only by Muslims but also by non-Muslims. In principle, the Halal definition itself consists of two elements: namely, permissible and “thayyib”. The word “thayyib” in Islam refers to the cleanliness, wholesomeness, quality and safety of an item to be used or consumed (Khairuddin et al., 2018). The Halal lifestyle concept here refers to the way of life that includes all priorities commanded in Islam. Halal business players should be aware of the potential of their business by tapping into this market segment to make themselves successful in business and achieve sustainability. The sixth driver of the Halal market is the rise of a Halal ecosystem. The Halal ecosystem is dynamic and consists of multi-institutions and various networks from government and non-government sectors. It is significant for Halal business players to understand the dynamics of the Halal ecosystem globally and in their countries to penetrate the new market. The major sector in the Halal ecosystem is Halal food. The movement of Halal food is the main issue and results in the need for Halal logistics in the supply and distribution channel. As such, the integration between the user and the provider in the ecosystem helps to boost Halal economic growth. The Halal industry in Malaysia and other countries would not have been sustainable without the right ecosystem.

Halal Market in Malaysia, Indonesia, Thailand, the Philippines and Vietnam

The Malaysian Halal industry developed as early as the 1970s, and after almost four decades, Malaysia has become the key reference for other SEA countries in terms of Halal implementation, Halal monitoring, Halal quality control, Halal certification and Halal standards and regulation. One of the largest companies in Malaysia, Nestle Malaysia, is among the pioneers to receive Halal certification from JAKIM. Nestle established its Halal policy in 1992 as well as its committee to control its Halal activity (Fishcher, 2016). After four decades of Halal industry establishment in Malaysia, the industry is growing rapidly from Halal products to Halal services, including Halal logistics. Halal logistics emerged as a result of the need to maintain the integrity status of Halal products throughout the supply chain channel (Rahim et al., 2016; Khairuddin et al., 2018; Rahman et al., 2018). In Malaysia, the development of Halal parks facilitates the growth of a Halal industry. Halal

parks refer to a community of Halal producers and services located in common areas, with the aim of preserving the integrity of Halal products. These parks were established in Malaysia and monitored by the Halal Development Corporation (HDC) Malaysia. This organization was developed with the aim to facilitating the growth of the Halal industry in Malaysia. As mentioned on the HDC website, there are 22 Halal parks across Malaysia, with a total investment of RM13.3 billion, and they provide employment opportunities for 12,776 people. The Malaysian government has spent billions to they provide a seeding ground for Halal-related industries locally while also serving as the platform for foreign investments in Halal products or services. In fact, through MITI (Ministry of the International Trade Industry), the government has come out with eleven strategic thrusts for the development and promotion of Halal industry in Malaysia, including the Halal logistics sector. Table 7.2 lists the 11 strategic thrusts of the Halal industry market in Malaysia.

Table 7.2 Eleven strategic thrusts to support the Halal industry market in Malaysia

No	*Halal industry market strategic thrust in Malaysia*
1	Increase the awareness of Halal products and services in Malaysia
2	Manage competition among Halal global players in the region
3	Invest and enhance competitiveness to gain access to raw materials
4	Increase research and development (R&D) activity for Halal products and services
5	Establish Halal Shariah compliance services
6	Refer to the Halal standards guidelines
7	Safeguard product quality and food safety
8	Universal developments of Halal parks
9	Harmonizing and Muslim-friendly Halal certification process
10	Increase coordination among agencies involved in development and promotion of the Halal industry
11	Strengthening the internal capacity of the organization

Source: The authors (2019)

In Indonesia, the Halal industry is valued at about USD 560 billion a year (Manurung, 2019). It has expanded from the food sector to cosmetics; pharmaceuticals; Islamic finance; Halal spa and tourism; Halal medical devices; as well as Halal logistics, which include Halal transport and storage. This rapid Halal development in Indonesia has triggered interesting trends in the lifestyle and mindset among the Muslim and non-Muslim population. The Global Islamic Economic Report 2017/2018 shows that Indonesia was the Muslim country in SEA with the highest expenditure on food and beverage in 2016 (US$169.7 billion). Even though the Halal industry is highly developed in Indonesia, there are still some challenges. As stated in the the Indonesia Islamic Economic Masterplan (2019–2024), the key challenges of an Indonesian Halal economy are inadequate Halal regulation related to the Halal industry, lack of public awareness and literacy on Halal products and services, lack of training among the Halal organization, an inadequate Halal management team and inadequate risk management of the Halal sector, lack of technology use in the Halal industry to improve Halal business performance and decision-making, and establishing Indonesian Halal standards at the international level (Indonesian Ministry of National Development Planning, 2019).

In A recent article by Nikkei Asian Review (2019) projected that the Halal market would reach $3 trillion by the year 2023. Indonesia and Malaysia seem to be the leading countries in the SEA region to tap into this Halal market, followed by other countries, such as Thailand, the Philippines and Vietnam. In general, the Global Islamic Economy Indicator evaluates the quality of the overall Islamic economy ecosystem across the Islamic economic pillars. Table 7.3 shows the Global Islamic Economy Indicator in five countries in the SEA region.

Table 7.3 Global Islamic Economy Indicator for Malaysia, Indonesia, Thailand, Philippines and Vietnam

GIE Indicator score	*Malaysia*	*Indonesia*	*Thailand*	*Philippines*	*Vietnam*
Halal travel		✓	✓		
Halal food	✓				
Islamic Finance	✓	✓			
Halal recreation	✓				
Halal fashion	✓				
Halal pharmaceutical and cosmetics	✓	✓			

Source: The authors (2019)

The data presented in Table 7.3 demonstrate that the Philippines and Vietnam are still developing and have slowly developed, respectively, in terms of the Halal industry, including Halal travel, Halal food, Islamic Finance, Halal recreation, Halal Fashion as well as Halal cosmetics and pharmaceuticals. As reported in Global Islamic Economy Gateway (2019), the Philippines started accelerating its Halal industry at the regulatory level in the year 2016, when President Benigno Aquino signed the Philippine Halal Export Development and Promotion Act. Two years later, Philippines National Halal Certification was established. With respect to Halal certification, including Halal logistics, Malaysia has become a key reference for the Philippines.

In Vietnam, even though Muslims make up a minority of the population, the Halal food industry in Vietnam has great potential. As stated in Vietnam News published in 2015, Vietnam is familiar with the Halal products, and the Halal industry in Vietnam is growing. In fact, Vietnam is known as one of the leading exporters of agricultural products. However, Halal awareness needs to be strengthened in the Vietnam market as not many enterprises understand the Halal regulation and certification process. In fact, Halal logistics is also new to them; as such, providing the right knowledge and training is vital to boosting the Halal industry in Vietnam.

Thailand has a strong recognition of Halal products and services compared to the Philippines and Vietnam. Thailand is recognized as the leader in Halal travel in SEA. The history of the Halal industry and certification in Thailand has four stages, as emphasized by Priyakorn (2018). Historically, Halal in Thailand began as early as 1949. In this era, Halal status in Thailand was judged by an Islamic or religious group of people and scholars. After 1949, the Halal industry started to develop further until the 1990s. During this era, the Shiekhul Islam office issued Halal certificates to nursing centers for the first time. At the same time, in the 1970s, the Thailand Islamic Center Committee was established, with a

focus toward developing Halal Food Standard in Thailand. In the third stage of Halal development in Thailand in 2003, the Halal Standards Institute was launched. One year earlier, a group of members in the Thailand Islamic Center Committee had succeeded in attracting Thailand's government's agreement and confidence to develop a Halal food hub in Southern Thailand. This attracted much attention regarding the Halal players to boost the Halal industry further in Thailand, including awareness of embarking into the Halal logistics business. As highlighted by Rahman, Mohammad, Rahim and Noh (2018), the aim of Halal logistics is to ensure that the integrity of Halal products is upheld from origin to point of consumption, especially during handling, transporting and at the warehouse. In the fourth stage of Halal development in Thailand, Halal logistics and supply chain was linked with the use of technology. As mentioned by Priyakorn (2018), at this stage, the Halal certification process will be connecting to Internet of things (IOT), cloud computing as well as information communication system. All four stages of Halal industry development in Thailand are illustrated in Figure 7.2:

Figure 7.2 Four stages of Halal industry development in Thailand.
Source: The authors (2019).

Halal logistics service provider in South-East Asia

Halal logistics and supply chain can refer to the process of planning, implementing and managing the efficient transportation, seamless flow and storage of Halal products (Davis and Mentzer, 2006; Rahman, 2012). These Halal products include Halal-certified raw materials, Halal semi-finished and Halal finished goods. It is important to ensure that the status of the Halal products carried along the supply chain is Shariah-complied. The shift from conventional logistics to Halal logistics service can be regarded as an innovation in logistics services. The main aim of Halal logistics is to avoid cross-contamination during the delivery as well as at the storage or warehouse. As highlighted by previous scholars, there are ways in which cross-contamination can happen. One of these ways is in the handling of the products, which necessitates the control of personnel. The logistics provider should also control the tools or utensils used in handling Halal products, the location of the transport as well as the cleanliness of the storage or warehouse (Rahman et al., 2018). Therefore, having

a good management system to handle logistics is vital to ensure that cross-contamination is not happening during logistics activity along the chain.

The 3PL service provider in the SEA sector has been consistently improving due to the increased demand of import/export. Increased demand on Halal product movement has resulted in the creation of a Halal logistics service provider (HLSP). In Malaysia, a certified HLSP is under JAKIM control. JAKIM is a body of the Department of Islamic Development Malaysia. The role of JAKIM in Malaysia is to monitor and control Islamic affairs, including Halal certification. Those companies, including logistics companies, that intend to get Halal-certified, have to comply with specific guidelines and procedures. For example, in Malaysia, Standards Department of Malaysia and JAKIM have produced the MS2400 Halal supply chain. These standards guideline consist of three parts: namely, Part 1 (transportation), Part 2 (warehouse) and Part 3 (retail).

The development of HLSP in other SEA countries as compared to Malaysia is not as rapid. In Malaysia, there are around 100 HLSPs that have been certified as Halal logistics providers. Table 7.4 shows the different authority or certification bodies in Malaysia, Indonesia, Thailand, the Philippines and Vietnam.

Table 7.4 Certification body in Malaysia, Indonesia, Thailand, the Philippines and Vietnam

Country	*Halal certification body/Halal authority*	*Year of establishment*
Malaysia	JAKIM	1997
Indonesia	Majelis Ulama Indonesia	1975
Thailand	The Central Islamic Council of Thailand	1997
Philippines	Halal Development Institutes of the Philippines	2016
Vietnam	Halal Certification Centre Vietnam	2019

Source: The authors (2019)

Halal logistics research in Malaysia, Indonesia, Thailand, the Philippines and Vietnam

Having reviewed past literature on Halal logistics and supply chain, there are not many empirical studies that cover Halal logistics and supply chain in SEA countries. Most studies have discussed Malaysia. For instance, researchers have investigated a Halal cargo warehouse (Ngah et al., 2015; and Khairuddin et al., 2018; Rahman et al., 2018), Halal meat logistics (Tieman et al., 2013),strengths and weaknesses of Halal logistics in Malaysia (Talib and Hamid, 2014), Halal supply chain among the manufacturers (Ngah et al., 2014) and many more. Today, many firms find Halal products and services more beneficial and economical in increasing their business opportunities. Many Halal traders and manufacturers have decided to pursue an effective logistics strategy by offering Halal logistics services,such as Halal transportation, Halal warehouse and storage to their customers. According to Ballou (2007), service improvement among logistics service providers is vital to sustaining the business. Offering Halal logistics services as an innovation in their service could help the logistics service providers to compete and sustaining business. As such, a call for research in

the area of Halal logistics and supply chain, especially in SEA countries, is needed to gain a richer understanding of the Halal logistics and supply chain process from these countries. Building on the research into Halal logistics and supply chain would also attract attention from practitioners toward collaborating with scholars in research and application.

Conclusion

The evolution of Halal logistics shows positive development in SEA. Based on the aforementioned discussion, we believe that this short article provides interesting reading material. More specific and focused research needs to be performed in the area of Halal logistics and supply chain issues, especially in unexplored geographical areas like Thailand, the Philippines and Vietnam. Concerning the function of Halal logistics in supporting Halal traders in SEA, a more empirical write-up is needed to provide additional sources of information on Halal logistics in SEA. Further empirical studies in a bigger context may be performed inductively or deductively, with the development of propositions and hypotheses. An empirical multiple case study approach may also be relevant to gain deeper insight into the issues or challenges of the potential Halal logistics business in SEA.

As this chapter is among the earliest studies to examine Halal logistics potential in SEA countries, specifically Malaysia, Thailand, the Philippines, Vietnam and Indonesia, this study contributes to the understanding of Halal development and provides a research avenue for scholars to do research in the future. Researchers may look into the issue of Halal transportation, Halal warehousing and Halal retailing in the SEA countries, and investigate the issue and challenges of Halal logistics implementation in related countries.

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8 Halal development in Singapore

Halal logistics perspective

Nor Aida Abdul Rahman, Azizul Hassan, Md Fauzi Ahmad, Mohd Khir Harun, Maria Romeli and Hazariah Mohd Noh

Introduction

The term Halal is a prolific lens for many traders, businesses, manufacturers and logistics providers as well as scholars to use in looking further into its role, its transformation and how it helps boost the economy in many countries. Singapore is one of the popular countries in Southeast Asia (SEA). The recent development of Singapore in relation to the Halal industry is promising. Increase in the demand of Halal products and services among Muslims and non-Muslims, including tourists to Singapore, as well as expatriates, has signified the importance of focusing on Halal business. Businesses in Singapore with Halal certificates act as a marketing device to promote tourism activities, which, in turn, boost the Halal economy in Singapore. For the past decade, there have been increasing activities on Halal development in Singapore, starting with Halal stalls and restaurants, Halal retail and Halal trade; recent focus has been on Halal logistics and supply chain. The growth of the already sizeable Muslim population and the number of Muslim travelers and Muslim expatriates has driven the demand for the Halal sector in Singapore.

Due to its strategic location in the heart of Asia, next to Indonesia and Malaysia, Singapore has become the most open trading nation in the world for the Halal industry. In fact, the strategic location of Singapore in the middle of key trade flows from many regions, such as Europe, the Middle East, the United States, Australia and Asia, strengthens its position as a global trading hub, including Halal hub activities. As reported recently, in two years' time, Singapore will become a center for the Halal logistics hub in Asia. Generally, transportation activity in Singapore is land and rail-based. With its Changi Airport, Singapore is known as a major aviation hub and major transshipment port in Asia. From a tourism perspective, it has received more and more Muslim travelers every year, and was recognized as the sixth most popular destination for Muslim tourists. As reported by Singapore Business Review (2018), Singapore has been chosen as the top non-Organisation of Islamic Cooperation (OIC) destination for the past eight years. The rise of Halal travel activity in Singapore has led to an increased number of Muslim travelers as well as a demand for Halal tourism activity, including Halal transportation and warehousing in Singapore. With the recent development of the Halal industry and Halal tourism activity in Singapore, the needs for Halal logistics and supply chain have become critical to maintain the Halal integrity along

the supply chain, from point of origin to point of consumption. Numerous articles have been published on this innovative Halal area: namely, Halal logistics and supply chain worldwide. However, not many published articles focus on SEA countries, especially Singapore. Since Malaysia is the leading Halal industry in the world, many research works being focus on its Halal environment at the expense of others. Hence, there is a strong motivation on the researcher's part to explore the Halal industry development phase in Singapore by focusing on Halal logistics and supply chain. To the researcher's best knowledge, there is still not much written on Halal logistics and supply chain in Singapore, which will make this study very useful and beneficial to readers, especially practitioners, the state and academic scholars.

This chapter begins with an introductory section on Halal and Singapore, followed by three phases of the Halal industry: namely the introductory phase, growing phase and future phase. The discussion is then focused on the Singapore's plan to become a Halal logistics hub as well as the role of technology in Halal logistics and supply chain activity. The chapter closes with practical implications for the logistics players, businesses, government and societies. A number of research proposals for future scholars are also presented.

Singapore and Halal industry

Singapore is an island country located between Indonesia and Malaysia. It is a non-Muslim country with a total population of less than 6 million people. Singapore is recognized as a heavily urbanized country and is known as Lion City. Its geographical location between Malaysia and Indonesia makes Singapore an ideal hub for Halal food production and Halal trading. In a recent article published in Malay Mail, it was reported that Singapore will become the most advanced Halal Hub in SEA by the year 2021. The hub is under construction and is expected to have a Halal central kitchen, as well as Halal food processing units, cold rooms, Halal excellence center and multi-logistics operation in a big area. As reported in Halal directories in 2012 and 2013, there were 9,264 Halal certificates issued by the Singapore Islamic Religious Council known as Majlis Ugama Islam Singapore (MUIS). MUIS was established in 1968 in Singapore with the aim of looking after the administration and interest of Singapore's Muslim Community, including Halal certification and Halal administration activity in Singapore. As published in the article by Mohamad, Baharuddin and Ruskam (2015), Singapore has always encouraged the best practices of "Shariah" compliance for their Halal businesses. In Singapore, both industries of Islamic Finance and Halal pharmaceutical are striving to give their Muslim community the best practices of the "Shariah"-compliant aspect of their products.

A study by Alqudsi (2014) found that in Singapore, the main attribute of getting Halal products, from a consumer perspective, is its having a Halal logo and certification. This shows that with Halal certification, customers tend to be more confident in Halal products or services. From a business point of view, businesses that have Halal certificates will be more recognized and have more of their customers' confidence. In Singapore, Halal business is not limited to Halal restaurants only; it also covers Halal pharmaceutical and cosmetics, and

Islamic Finance, and the latest Halal focus is on services and Halal logistics. In Singapore, all Halal-related activities, including Halal trading, are monitored and controlled by one body called MUIS. Among the key roles of MUIS, as a part of Halal certification activity, are providing Halal education as well as development grants for Halal organization. Figure 8.1 shows the key roles or function of MUIS.

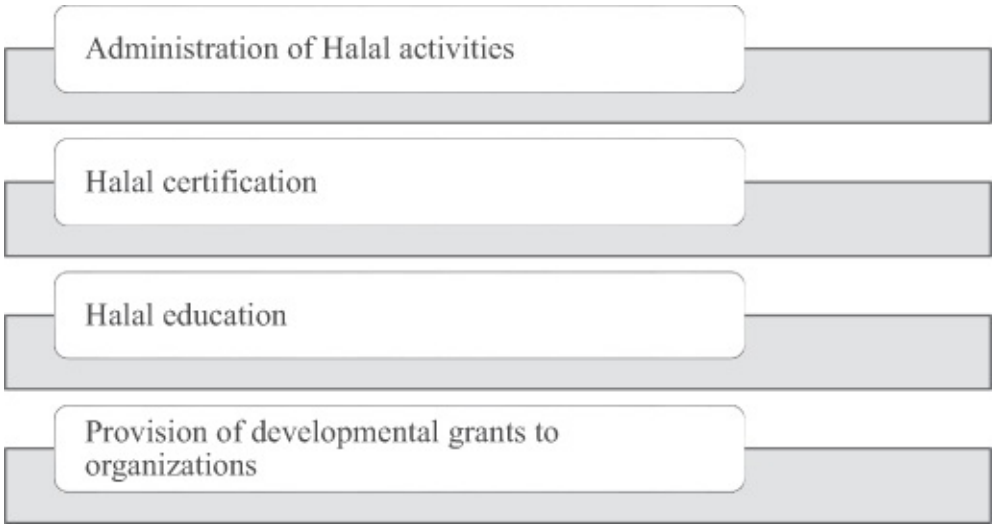

Figure 8.1 Key role of MUIS.
Source: Developed by the authors (2019).

The establishment of the Halal industry in Singapore began as early as the 1980s, about forty years ago, with the consumption of Halal meat products. According to Singapore, its Halal focus is quite similar to the Halal industry focus in Malaysia. In 1981, MUIS wrote to the Federation of Australian Muslim Councils to seek clarification on the content of Australian beef exported to Singapore following inquiries from the Muslim population after reading reports about Australian beef being contaminated or mixed with kangaroo meat. By that time, the integrity of Halal meat had already become the main issue in Singapore. After ten years of the introductory phase, in the 1990s, Singapore starts to look seriously to develop its Halal industry. Halal restaurants started to put Halal products in supermarkets or retail. In the 2000s and beyond, MUIS became more involved with other Western countries, such as Australia, Germany, Switzerland and France. Malaysia and Indonesia have become the main reference for Singapore in terms of certification. In fact, these two neighboring countries, (Malaysia and Indonesia) have become the major markets for Singaporean Halal-certified products.

Recently, Singapore organized SIHAT 2019. SIHAT stands for Singapore Halal Food Trade Exhibition. This event is the first Halal event in Singapore which provides a business platform for Halal traders to introduce their products and expand their Halal business opportunities. With more than 30 years of experience, it is very possible that Singapore will begin to lead in the Halal market. Its first-ever Halal food trade exhibition, SIHAT 2019, aims to redefine the global Halal business and experience. Considering the importance of Halal knowledge, this first approach is needed to introduce the concept of Halal to the Singaporean economy and its people, who may have very little knowledge of Islamic culture

and tradition. The vibrancy of the Muslim minority in Singapore will be the catalyst to provide the solution to this new challenge in developing a Halal industry.

Considering the huge market for Halal food across SEA, including in Singapore, the country's government is trying to introduce and develop further Halal economies including many industry points of view, which are not limited to Halal food, but also include Halal banking, Halal tourism, Halal spa and Halal pharmaceutical; the latest is Halal logistics. The frequency of introducing a Halal logistics concept to the Halal ecosystem in Singapore is vital. As mentioned by Muhadzir (2018), understanding Halal logistics needs is significant in Singapore. Muhadzir (2018: 1) said that "when people talk about Halal logistics they always think about transport and cargo. Whereas it falls into bigger roles and responsibilities among the stakeholders. Halal logistics must encompass the activities of supplier, retailer, manufacturer and distributors". At present, Singapore starts to focus on the innovative opportunity represented by Halal, especially in the field of Halal logistics and supply chain (Khairuddin et al., 2018). Figure 8.2 shows the three-phase development of the Halal industry in Singapore, as discussed.

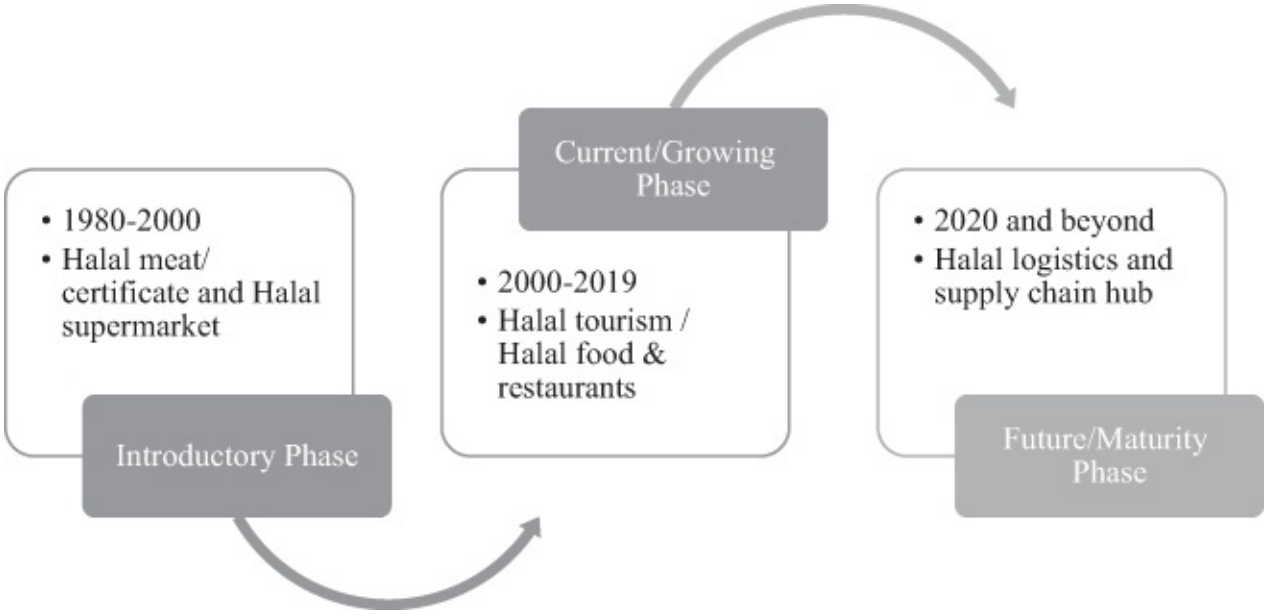

Figure 8.2 Three phases of the Halal industry in Singapore.
Source: Developed by the authors (2019).

Moving from conventional logistics and supply chain to Halal logistics and supply chain

Understanding and identifying the key difference between conventional logistics and Halal logistics is important to further devlop the Halal logistics industry in Singapore. In general, logistics activities begin by moving inbound materials from the supply side to the manufacturers, which is followed by delivering the finished products to the distribution center or the customer. It is acknowledged that logistics activity in SEA began as early as the 1920s, with origins in the military. According to Rahman (2012) and Rahman, and Melewar

and Sharif (2014), the evolution of the physical distribution of logistics management and supply chain management reflects the importance of moving the materials from one location to another, which includes managing the relationship between channel members in supply chain activity. This includes the information flow from each point of supply chain activity. The term “Halal logistics” was introduced as the result of innovative strategy in logistics business activity. Moving the Halal product across the supply chain requires a systematic Halal management system to ensure that the status of the Halal product remains Halal from farm to fork. Halal logistics not only refers to the movement of the product during delivery or transporation, but also includes the handling process at the storage or warehouse and at the retail store.

A number of research scholars in logistics and supply chain agree that the term supply chain management emerged because of its multifaceted logistics function, plus information-sharing between channel members (Cooper et al., 1997). Rahman, Mohammad, Rahim and Noh (2018) added that Halal logistics enhanced the previous logistics function with the aim of upholding the Halal integrity of the Halal product throughout the supply chain. The theoretical underpinning of physical distribution of Halal logistics and supply chain management is illustrated in Figure 8.3.

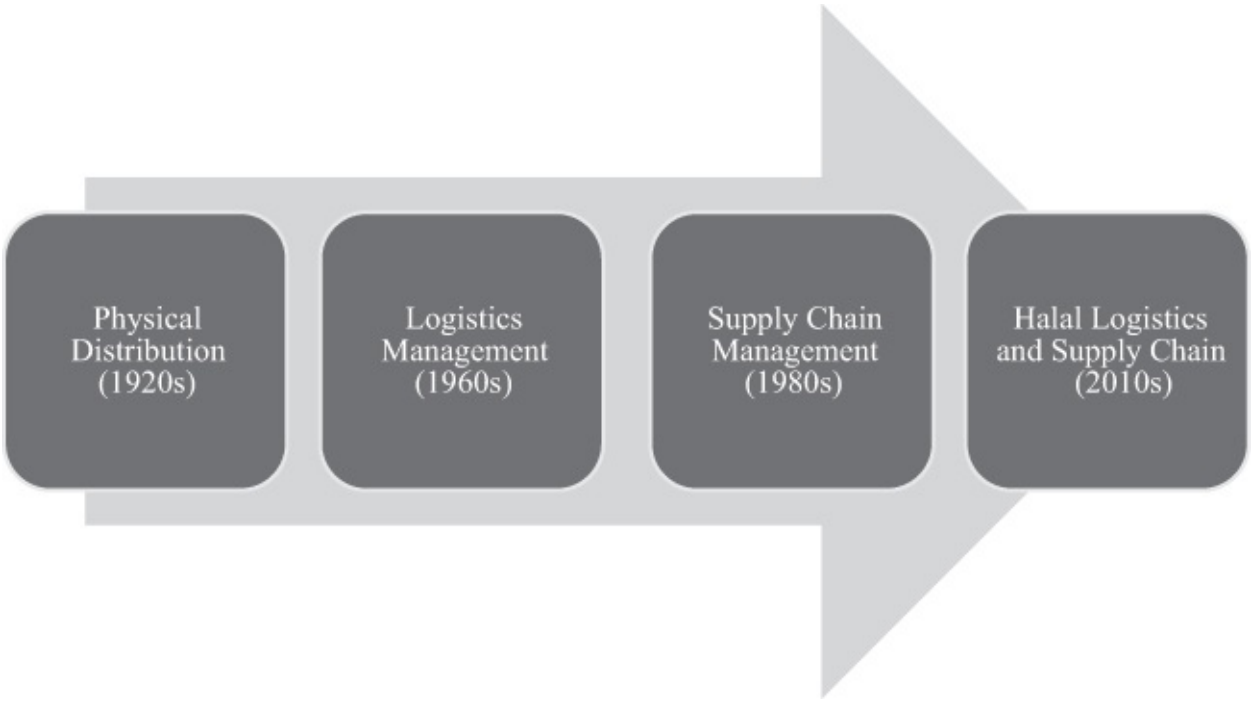

Figure 8.3 Physical distribution to Halal logistics and supply chain.
Source: Developed by the authors (2019).

Halal logistics area in Singapore: Halal logistics hub development

In general, Halal logistics development in Singapore can be divided into four main areas: namely, Halal logistics hub, Halal logistics route, Halal logistics management and Halal

logistics transport, as illustrated in Figure 8.4. Recently, Singapore announced its intention to build 600,000 square feet of Halal logistics hub in two years, with a cost around $80 million to $100 million dollor. Given the fact that this Halal logistics hub will become the most advanced Hub in the SEA region, it will offer more productive logistics activities to all neighboring countries, including transportation, storage and warehousing, a Halal central kitchen, cold rooms, Halal processing factories and many more. It is appreciated as a more prevalent position, a touchpoint between local and international Halal traders and business communities. In developing a distinctive, strong and favorable hub, Singapore not only provides opportunities for companies to grow but also expands and internationalizes their operations.

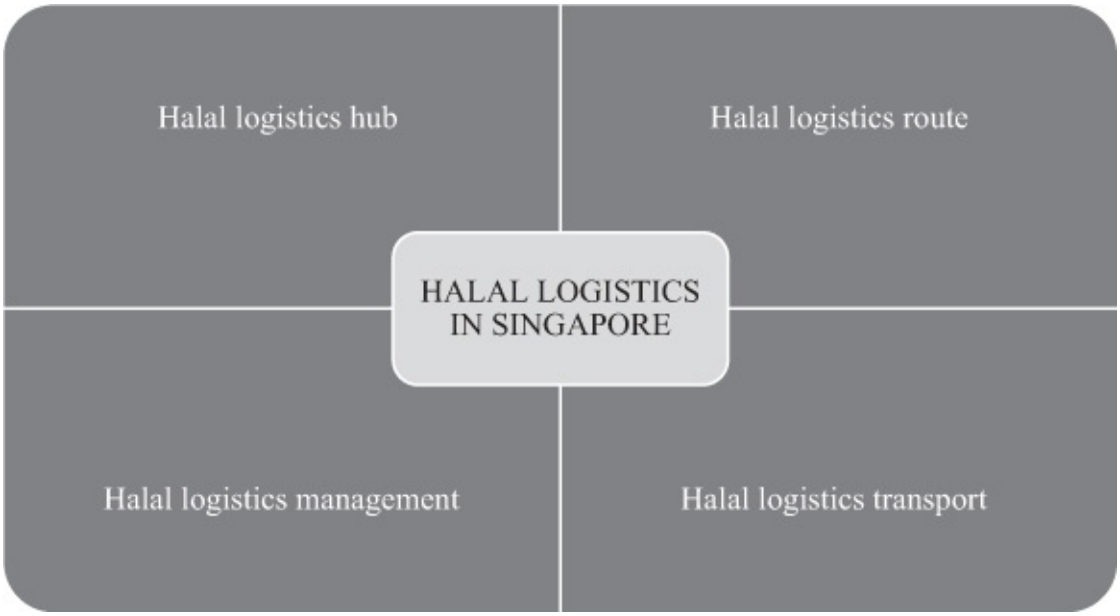

Figure 8.4 Halal logistics area in Singapore.
Source: Developed by the authors (2019).

The importance of expanding the Halal Hub in Singapore was appreciated by the Singapore government, together with the Singapore Malay Chamber of Commerce and Industry (SMCCI). As reported by Ahmad (2019) in Bernama, this advanced Halal logistics hub will complement the Halal industry in Singapore and the South-East region through the integration of Halal-related services in to one ecosystem. In principle, with strong quality control and advanced logistics service infrastructure and technology, Singapore can become a role model for many Halal players (Malay Mail, 2009). As mentioned by Kamaruddin, Iberahim and Shabudin (2012), Halal business players are willing to pay for the cost of Halal logistics if they are able to achieve Halal compliance parameters in their business logistics system. Even though the cost of Halal logistics may be higher than conventional logistics, fulfilling “Shariah” compliance in transporting or carrying Halal product is a priority. Maintaining Halal integrity throughout the supply chain is the prime objective for Halal business.

While Halal logistics awareness has increased, technological influence on logistics performance is still relevant. The importance of technology in any business to improve

communication, decision-making and business performance is still undeniable. The next subsection will elaborate on the importance of technology in Halal logistics.

Technology and Halal logistics hub

The need to be innovative in initiating more Halal logistics and supply chain services is imperative. Halal logistics service provider (HLSP) is the expert in handling Halal logistics activities, specifically in transportation and warehouses. The concepts of Halal warehouses and Halal transport are crucial in meeting industry needs. The rapid rise of technology convinces us that this field has its own sagacious quality that affects firm performance. The notion of technology is widely used in both consumer and industrial markets, regarded as one of the key external factors that could benefit or harm any business performance. Among the earliest scholars to discuss technology terms is Mansfield (1975), who describes technology as hard to explain and evaluate. He (1975) proposes that technology is widely used for horizontal and vertical transfers, where in vertical transfer is achieved when information is transmitted between basic and applied research, and horizontal transfer signifies the technology used in one place and organization. The rapid use of technology in almost every aspect of business operation at present led to the well-being of every facet of business today, including logistics business. As explained in a recent article by Sivarajah, Irani, Gupta and Mahroof (2019), technology used and digital transformation allow for active user engagement, gathering competitive intelligence to facilitate business sustainability activities among business players, including in the Halal logistics sector. Technology encompasses nine pillars: namely autonomous robots, simulation, horizontal and vertical integration, Internet of Things, cybersecurity and block chain, cloud computing, additive manufacturing, augmented reality and big data & analytics. Table 8.1 explains the general role of each technology and how it might help the Halal logistics industry to grow in Singapore.

Table 8.1 General role of nine pillars of technology in supporting Halal logistics and supply chain in Singapore

Technology pillars	*Definition and example in Halal logistics and supply chain application*	*References*
Autonomous robots	Autonomous robots can be defined as a robotic system with more deliberate function, such as robust functionalities, as well as facing a diversity of open environments and performing a variety of tasks and interactions, reducing deployment cost. This technology may be used in the Halal supply chain hub via robots or drones: in order to monitor the process at the warehouse, for example.	Ingrand and Gallab (2017)
Simulation	A part of using simulation in transportation, simulation technology may also be helpful in logistics activities, such as investigating the logistics network or the impact of the variability associates with transportation delays. Simulation always maps onto the physical relationship among the port, terminal, warehouse, distribution center and customer. Simulation technology could be very helpful in supporting Singapore's becoming a Halal logistics hub in the future.	Pruchnicki, Burian and Christopher (2011)
Horizontal and vertical integration	Horizontal and vertical integration happens in many organizations and industries, including logistics. Many logistics firms have used horizontal or vertical strategy to	Cruijssen, Cools and

	reduce costs or control the market, and increase efficiency and gain competitiveness in the Halal logistics market.	Dullaert (2007)
The Internet of Things	IOT refers to connectivity of a system. For example, interrelated communication network, interrelated digital machines and computer devices It is also called IOT. It will increase the ubiquity of the Internet by integrating every object for interaction via embedded systems, which leads to a highly distributed network of devices communicating with human beings as well as other devices. This is very significant to the Halal sector, especially in controlling communication network as well as improving cross-border networks.	Xie, Yang and Vinel (2012); Li and Ryerson (2019)
Cybersecurity and block chain	An effort to protect computers, mobile devices, servers, communication system, electronic systems, data and networks from malicious attacks. Current situation in Halal logistics has moved to block chain and many cyber terrorism cases reported in logistics sector. Cybersecurity is one of the most important element for Halal logistics and supply chain hub establishment in Singapore as it could protect the system used and transaction from cyber attack.	Ning, Liu and Yang (2013)
The cloud computing	This refers to data centers that are available to many users via the internet. It is related to data storage management. For instance, Dropbox and Google Drive. Cloud computing has attracted interest from logistics service providers. Due to the nature of logistics, where a large number of stakeholders need to interact, the cloud is a capability where “all” can be “connected” without much cost. Essentially, by using a web browser, anyone can be connected.	Li, Wang, Li, Li, Wang and Du (2013)
Additive manufacturing	Additive manufacturing (AM), also known as three-dimensional (3D) printing is a promising component of the digitization of manufacturing and is the process of layered printing to build up a 3D object. The building up of layers is normally either through material deposition through a nozzle or through melting a powder by laser or electron beam. The ink or feedstock can be a variety of materials, such as plastics, metals or ceramics. It is mostly used in manufacturing organizations.	Wagner and Walton (2016)
Augmented reality	Augmented reality has a bright future in manufacturing and the logistics sector. It refers to a technology that superimposes a computer-generated image on to a user's view of the real world and is mostly used in the logistics industry, especially in the warehouse, to monitor the human and improved decision-making process.	Cirulis and Ginters (2013)
Big data and analytics	Big data refers to the large amount of data unstructured, diverse and complex. For instance, in the logistics sector, big data can be used to reduce inefficiencies in last mile delivery, provide transparency to the supply chain, optimize deliveries, protect perishable goods and automate the entire supply chain.	Wang, Gunasekaran, Ngai and Papadopoulo (2016)

Source: Developed by the authors (2019)

The importance of technology has been acknowledged in many areas, including logistics and supply chain activity. Rahman (2012) stresses the idea that technology is the main element in supply chain transition from the physical distribution era of the 1950s. It has been acknowledged that the key evolution from physical distribution (1950s) to logistics management (1970s) and supply chain management (1990s) derived from technology, which has subsequently connected all channel members in the supply chain. The process, methods and system used in business firms are examples of technology that lead to successful business operations and sustainability. All the parties involved in supply chain are tied to information that is being shared by all channel members. As highlighted in a recent article by Ellram and Murfield (2019), technology will become one of the top issues discussed in supply chain management; however, it is infrequently discussed in the area of logistics and supply chain, including aviation-specific perspectives.

Despite the growing interest of technology in the Halal logistics field, it has been argued that we have a shortage of experts in the field of information and communication technology (ICT) and Halal logistics. The use of technology in logistics activities could capture and analyze the data, thereby making the process of information-sharing among Halal channel members easier. In fact, it is recognized that technology might also ensure a speedy Halal logistics process with high accuracy and reliability. As highlighted by Grant, Lambert, Stock and Ellram (2006), ICT provides any organization with better monitoring of logistics activities, such as logistics ordering, movement or transportation of goods and storage of goods. This is also supported by Jeffers (2010), who emphasizes the strong link between the operation of logistics and communication technology, which, in turn, improves communication among channel members.

Halal technology could also relate to its importance, especially to integrating with logistics activities at the cross border, which involves an import–export activity. Maintaining the Halal status of a Halal product throughout supply chain activity, especially at the cross border, is a complex task as it involves a different practice and regulating parties from two or more different economies. Integration of the process using the same technology may help to improve the Halal logistics process at the cross border. It is important for Halal players to identify or develop a Halal critical point (HCC) framework for cross-border Halal trade activity to maintain the Halal integrity of the Halal products or services. The coordination and mutual work, together among all parties involved in Halal logistics activities, are vital to upholding Halal integrity across the supply chain. Greater collaboration among channel members, with the help of a technology and communication system, will improve Halal logistics performance. In fact, this chapter could also be used by Halal practitioners in Singapore as a supplementary document to ensure a quick understanding of the newly revised MS2400 which, in turn, will help readers achieve Halal business optimization.

Conclusion

Despite the increased recognition of the Halal logistics study, little is known about how Halal logistics can be successfully implemented. Vague research looks into Halal logistics performance in SEA but not in Singapore. Halal firms in the 21st century have grown to understand the significant impact of technology use in logistics operations. The availability of the key areas on new development of Halal logistics and supply chain hub could help the industry to facilitate its business activity to ensure Halal compliance logistics business for both transport and warehouse in the country. Since there are not many scholars who publish on Halal logistics and supply chain in Singapore, this study calls for more logistics and supply chain researchers to empirically research Halal logistics service performance as well as Halal logistics hub feasibility. In fact, there is a strong gap in understanding of how technology affects Halal logistics business performance.

A number of future research topics are also proposed in this study. Halal logistics and supply chain is the central area that requires focussed in future research. There is ample opportunity for scholars to further explore every aspect of logistics in supporting the Halal

ecosystem, including the Halal tourism businesses, such as Halal service quality; Halal warehouse implementation; and HCC during transportation, at the warehouse in retail. In conclusion, this chapter provides a general understanding on the development of the Halal logistics in Singapore by recommending areas to be explored in future. It also crafts four figures and provides one table that explain the Halal ecosystem and the role of HLSP in supply chain activity. In terms of scholars' perspective, the study also calls for more researchers to study the area of Halal logistics and supply chain in Singapore, such as Halal service quality at the Halal logistics hub, Halal logistics service quality from a logistics provider perspective, Halal supply chain performance, HCC for transportation, HCC for retail, HCC for warehouse and Halal warehouse implementation.

This study will be among the pioneer studies to focus on Halal logistics and supply chain in Singapore.

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9 The development of Halal logistics in Thailand

Suhaila Abdul Kadir

Introduction

The international Halal industry is expected to gain a higher demand as a result of the instruction of the renewal and innovation of products and services. This means that the Halal market is the world's fastest-growing, among the consumer segments in a growth context (Nordin et al., 2017). The development of the world Halal industry is increasing every year, not only in Islamic countries, such as Dubai (United Arab Emirates), Turkey and Saudi Arabia, but also in non-Islamic countries, such as Thailand, Singapore, Japan, America and Australia, which are beginning to show interest and emphasis in the production of their own Halal products to satisfy the high world demand (Johnson, 2015).

In Europe alone, the Muslim population was 49 million in 2010 and has increased by 140% since in last ten years; in America, the Muslim population increased at a rate of 25%; in Australia it increased by 250%; and Asia, with a population of 1.65 billion, increased at a rate of 12% in the same period (Kettani, 2010). Two big markets for Halal foods are countries in the Middle East and South-East Asia. These two zones alone represent 400 million Muslim consumers. Furthermore, there are also non-Muslim consumers who prefer Halal products (Star, 2010).

Halal concept

In Islam, the concept of Halal is very important as the main guideline for Muslim consumers (Shah et al., 2016). Halal originated from an Arabic word, meaning legal or permissible. The term is used in the Islamic religion as daily life guidance for Muslim society. Muslims believe that Allah (God) is the creator, and Muhammad (Prophet) is Allah's last messenger. Halal refers to all that is permissible, and haram refers to all that is not permissible, according to the guidelines provided by Allah in the Quran and clarified (in the tradition and custom) by the messenger of Allah (PBUH) (Ramli et al., 2016).

The Halal concept is not limited to food as it is also inclusive of distributional processes, handling, packaging and storage. Halalan Toyyiba concepts is stipulated as healthy in the Islamic teaching covering dietary, quality, cleanliness and safety for all people and is not

meant that only Muslims can practise in food production (Ramli et al., 2016). Halal has a wide scope, extending beyond food and drink issues (al-Qaradawi, 1977).

The awareness of the importance of Halal products and safety is increasing alongside the global Muslim population (Abllah, 2018). Halal embraces the aspects of no fraud, no dangerous poison, etc. (Maa'mor, 2003). Consumer fraud is commonly defined as deceptive business practices in regards weight, quality, expiration date, contact and brand.

As such, understanding the Halal concept theoretically and practically is vital. The Halal issue is closely connected to the daily individual activities of consumers. Even proper understanding pertaining to the Halal concept may subsequently influence the attitude and action of the consumer, beyond their being able to cultivate healthy consumerism culture (Shah et al., 2016).

Halal industry

The Halal industry is categorised in two different scopes: the Halal product and Halal services (Noor and Wahid, 2015). MITI has categorised the industry into three components: namely food, non-food and services. They treated Halal logistics as part of the service category. Halal logistics refers the product showing the logistics service that is being provided to the customers (Shah et al., 2016).

Halal goods and services industries are being recognised globally and are expected to be part of the new future of the economic growth sector. The growth of the global Muslim population greatly contributes to the use and demand of Halal products globally. (Hamidon and Buang, 2016).

The development of Halal product and service-based industries is not new. The demand for the production of Halal products is seen as high compared to the domestic and international demands for other productions, largely influenced by the significant growth of the Muslim population in recent years. Currently, there are about 1.84 billion Muslims in the world; by 2023, the population is expected to increase to 2.2 billion (Sharianews, 2018). The Halal industry looks promising as the market is wide, exceeding those of various other groups, including non-Muslim societies. In terms of marketing strategy, the Halal product potential is not limited to the Muslim market but also includes non-Muslim consumers.

Halal industry development using sophisticated technologies, innovation and complex process should be managed by a valuable system so as to not have any implications towards the workers, neighbours and environment (Aziz and Zailani, 2016).

The global Halal industry is expected to rapidly develop in various sectors, especially banking, medical logistics and supply chains, with the estimated market value of USD 150 billion a year. At the same time, the global Halal market is expected to expand at a rate of 25% per year. The global Halal market value is estimated at RM7.6 trillion per year. In the European region, specifically, the Halal food business is expected to expand in the coming years due to increasing demands for Halal products among the region's supermarkets. This is evident following various promotions performed by the government and the agencies concerned (Mohamad, 2011).

Halal industry in Thailand

Every country is able to develop its own Halal industry: for example, Thailand specialises in productions, while Malaysia is an expert in marketing. Thailand proposes that Malaysian investors be involved in a joint venture with Thai business members in the estate Perindustrian Halal Pattani, while Malaysian investors propose the creation of networks pertaining to the Halal development of products and making Pulau Pinang Port the main export gateway (Jaafar et al., 2013). The majority of Thailand's population are Buddhists, and the Muslim population in Thailand is a minority, consisting of 10% of the estimated total of 69.7 million (Sharianews, 2018).

Even though Thailand is known as an agricultural and main food-exporting country in the ASEAN region, she showed the great potential of her Halal industry in 2010, when she exported the fifth-highest number of Halal products in the world (Sharianews, 2018) and is recognised as the first as such in the ASEAN region (Abdul, 2014). The involvement of Thailand in the Halal industry is very advanced, taking into account the percentage of the Muslim population in Thailand, which is estimated in the region to be only 10.9% from the total of 69.7 million (Nazirah et al., 2015). To date, 4,600 food-processing factories have obtained Halal certifications from The Central Islamic Council of Thailand (CICOT), and an estimated 120,000 of food products in Thailand possess Halal logos. This makes Thailand the biggest among Halal food product producers in the ASEAN region. Most these products are meant for the local market; this has proven the Thai consumer's priorities for safe products (good/"toyyib"), especially ones with Halal certificates (Nazirah et al., 2015).

Thailand is aggressive in ensuring that its products are Halal-friendly and is the world's sixth-largest exporter of Halal food, earning USD 5 billion per year. Based on this report, out of 30,000 current Halal food-producing factories in that country, 8,000 companies obtained certificates for Halal certification. Presently, Thailand is increasing the number of companies with Halal certificates to ensure that the white elephant country achieves the target of becoming the third-biggest Halal food products exporter, after Brazil and the United States of America, in a few years' time. Besides selling the products to 1.5 billion Muslims, the Thai government hopes that the goods with Halal status are always believed to be clean, nutritious and good for human consumption, and capable of drawing the interest of the whole world population, totalling about 7 billion (Bangkok Post, 2018).

Mansouri (2014) stated that study and research pertaining to Halal in Thailand has become more developed and is encouraged by Pusat Islam Thailand. The aforementioned scenario is influenced by the effort and determination of the Thai government to become the main producer of the world's Halal food. As such, the Halal industry is one of the main priorities of the Thai government's administration. Industrial function and exporting of Halal food in Thailand have been strengthened under Thaksin's administration (Sarntisart, 2005). In 2010, the Thai government proclaimed the slogan 'Thailand Kitchen of the World' to enhance Halal industry development (Nazirah et al., 2015).

It was no surprise when Thailand became the tenth-biggest world Halal food exporter, amounting to 200 billion Baht (US$ 6 billion) or 22% of the whole food export. Among

Thailand-exported foods are rice, maize, powdered tapioca, sugar, crackers, chicken, fish, prawns, tuna fish, vegetable juice, fruits, processed fruit by-products and essence.

According to Bangkok Post (2018), the National Food Institute (NFI) of Thailand has the potential to make good on its promise for growth and advanced development of the Halal food market. This is indicated by the country's high-quality agricultural products and capable industrialists, the reliability of the country's religious institutions and the government's support.

The neighbouring country was obviously seriously striving to become an active participant in the global Halal industry when it established the Halal Science Centre at the Chulalangkorn University (HSC-CU), Bangkok in 1995, and the Halal Institute at the Prince University, Songkhla, a few years later. According to the director of HSC-CU, Dr Winai Dahlan, the setting up of the Halal Centre and Institute enables Thailand to achieve various new innovations, including producing soap and liquid detergents from clay to facilitate the process of cleansing according to Islamic teaching. They even invented a special kitchen, with a blockade zone separating the Halal from the non-Halal products, which was widely used during the SEA game at Korat, Thailand. Universiti Chulalongkorn (HSC-CU), Bangkok and Universiti Prince of Songkhla also offer courses to Thai Airways employees and staff of the manufacturing sectors in the country on the correct method of ensuring products are Halal (Khan, 2011).

Halal logistics industry

The definition of Halal logistics includes a planning process, implementation and efficient management, seamless flow and competent storage; all products with a Halal certificate (raw material, semi-finished or finished goods) must fully adhere to Islamic Laws, from its origin to its end users. Halal logistics is about embedding excellence in the supply chain throughout the source, production and distribution processes. When the producer places the Halal logo on the products, this means that the source, manufacturing and distribution comply with Halal. Consumers believe that manufacturers should be seriously ensuring Halal compliance along the supply chain. This means that there are requirements for Halal storage facilities throughout the world (Tieman, 2008).

Meanwhile, Zulfakar, Anuarb and Talib (2014) are of the opinion that Halal logistics uses a similar principle to conventional logistics, but with some exceptions regarding the type of products that are being handled. This shows that Halal logistics is the contributor in the Halal value chain that distributes Halal products from the source to the users without breaking the chain. Halal industry growth depends on the success of Halal logistics. This is the key to facilitating the manufacturing and trading of Halal products and services (Shah et al., 2016).

Upon hearing the word 'Halal', many people believe that it refers directly to food products, especially those of the Muslims. But in reality, there are various other products and services that can be offered, including health-care and pharmaceuticals, self-care and cosmetics, and tourism and finance services. Muslim consumers prefer to buy Halal products, especially because these products were produced through the Halal process. As such, it is

problematic that many industrialists are still not clear on the Halal logistics concept and often misunderstand it (Nordin et al., 2017). However, their learning to use Halal logistics can greatly benefit their business.

Industrialists should not confuse Halal logistics and conventional logistics. Halal logistics and conventional logistics operate on the same process and functioning; the difference is that Halal logistics requires special facilities or ownership of Halal equipment. In conventional logistics, non-Halal goods can be placed together during transportation and storage; this is not the case in Halal logistics. Second, Halal logistics only handles Halal-certified goods. Uncertified Halal goods considered not permissible (such as pig products and alcoholic drinks) are forbidden as a part of Halal logistics services, and as such, such goods usually use conventional logistics services. Furthermore, it is vital to avoid the presence of non-permissible materials as the mingling of Halal and haram contaminates the whole Halal logistics operation (Tieman, 2011).

Halal logistics appears to be a platform for the Halal supply chain, which is important in the food and drink preparation process as it involves the management of resources, operation, storage and supervision of the materials, breeding equipment, and food and non-food inventories (Kontena National, 2010). Halal logistics will ensure that all processes of cultivation, breeding, diet, preparation, cutting, packaging, storage and transportation are based on the standard decided by JAKIM and Jabatan Standard Malaysia (i.e. MS2400: 2010) (Norman and Wahid, 2017).

In addition, Halal logistics management is subject to Syariah Laws related to the various activities of transportation, producing products, processing and packaging, storing, inventory, scheduling and distribut, retail and delivery and consumer services (Tieman, 2013; Talib et al., 2014, 2015; Figure 9.1).

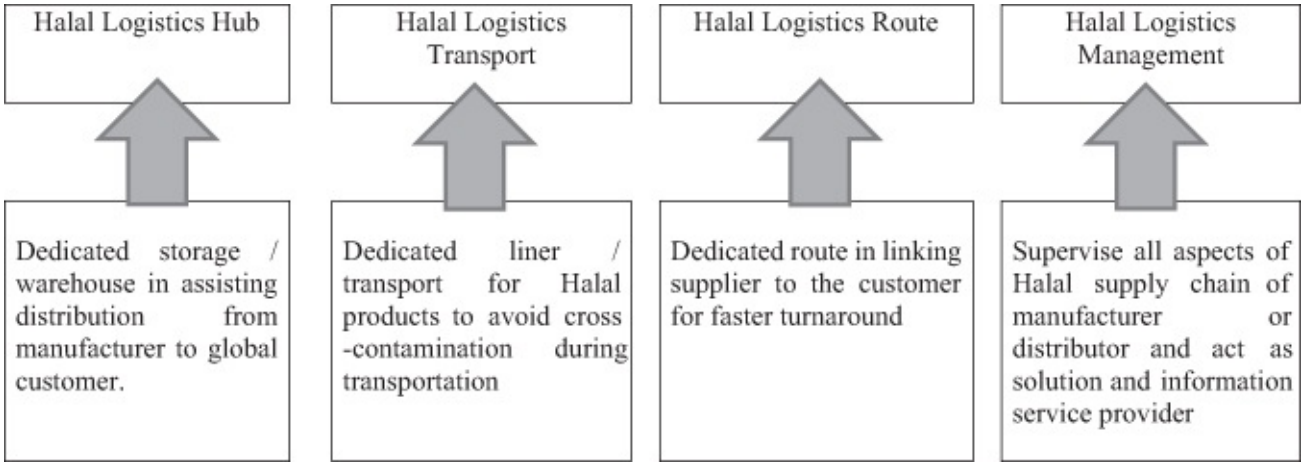

Figure 9.1 Areas of Halal logistics.

Source: Zhan, Watcharapun, Wangbenmad and Sangkapan (2016).

Halal logistics in Thailand

Thailand utilizes special logistics in working with its neighbours: Laos, Cambodia, Malaysia, Myanmar and Southern China. Additionally, Halal products can be sent from the Gulf of Thailand and Andaman Sea to the Middle East and to European countries. Halal products and services are increasingly recognised globally as an indicator of a new level of safety and quality assurance. Most small industrialists have bravely involved themselves in Halal products and services in to the global market (Zhan et al., 2016).

Manufacturers in Thailand are more aware of the consumers, increased interest in Halal goods, and there are chances for growth in the existing Halal industry. These Halal products not only satisfy the needs of the Muslim community but also focus on the general consumers who are aware of the health and general benefits of these products. As for the growing potential, more logistics industrialists are involved in this market, even though a lot of adjustments and improvements may be required for supply operation. This is because Halal goods must be processed and handled with great care, according to the Islamic teaching, and should be free from any impurities (Logistics Manager, 2017). Thailand is the world's first country to have its own Halal Science Centre due to its objective to become number one in Halal industry, its three institutions striving to change perspectives and raise the status of the Halal standard in the country (Halal Focus, 2017). Beyond this, the Halal Science Centre at the Chulalongkorn University is focussing on research and development of Halal products in Thailand, while "Pejabat Pattani" is focussing on production and entrepreneurship, such as improving PKS and starting up industrial factory and agriculture (Halal Focus, 2017).

Presently, there are few Halal service industrialists because of very difficult procedures. Some suppliers may look to Halal goods as a market with limited opportunities, though in fact more than 7 million people use Halal goods in Thailand, to the extent that the area is attractive for those who intended to invest (Nikkei Asian Review, 2017). To ensure that Thailand becomes the world's first country to have its own Halal Science Centre, Yusen Logistics of Japan plans to build a warehouse, complying with Islamic Laws, in Thailand, with the purpose of meeting the transportation demand in South-East Asian countries such as Indonesia, which has the biggest Islamic population, and Malaysia. This would be the first Halal warehouse in Thailand. Besides, what makes Yusen Logistics of Japan unique is that the workers would have access to forklift equipment and a special bathroom. Lorries would carry Halal goods separately from other goods (Nikkei Asian Review, 2017).

The core of successful Halal logistics management is the seperation of Halal and non-Halal products. Islamic law sets various restrictions on products; food and consumer goods, such as cosmetics, cannot come into contact with pork or alcohol, for instance. This requires not only separate storage for Halal and non-Halal products but separate warehouse facilities and equipment as well. The idea is to avoid contamination of Halal goods through contact with contaminated materials. Logistics industrialists must be careful to avoid such contamination (Nikkei Asian Review, 2017). Other than that, warehouses that store Halal goods must be closed, clean, safe and properly managed. They should separate goods, according to items and conditions. Staff working in the warehouse should always clean their hands with soap and clay before starting work. Besides, the process of transferring of Halal goods between the truck and warehouse should involve steps to avoid contamination.

In the transportation context for logistics activities, there is a tendency to mix Halal products with non-Halal. Cross-contamination can occur if there is not segregation, especially when both Halal and non-Halal products are placed in the same container in the transportation mode. One way of avoiding this is the producers/suppliers, use of their own special transportation for of their respective logistics activities. Not only would this reduce the risk of cross- contamination; it would also facilitate the distribution process to the customers (Idris and Noor, 2013). This is in line with the transportation purpose itself as transportation activities are defined as the movement of goods from starting point to destination as directed, inclusive of time and utility area that is in the logistics activities context, the movement of goods from producers to customers (Coyle et al., 2011).

In a logistics system, storage is of vital importance. As part of Halal value chain activities, Halal products must be separated from non-Halal products. Even within the warehouse, all equipment, such as palettes and forklift trucks used to handle products, should be different from those used to handle non-Halal products. In addition, Halal products should be placed on different shelves (Talib et al., 2015). If the food is not handled and stored properly, it will not be treated as Halal. Halal integrity can be maintained if products are handled and stored properly since this integrity comes from various activities along the supply chain (Tieman, 2011). This is because, as issues regarding the integrity of the Halal food value chain become more important topics, it is better that new companies with Halal certificates not only focus on production and materials but also ensure Halal integrity for the whole supply throughout transportation, storage and handling is “Syariah”-compliant, and satisfy the Muslim requirements of the targeted market.

Halal supply chain integrity

Halal has increasingly become a complete range of product offerings in supermarket chains worldwide as well as in five-star hotels and restaurants, fast food chains, airline meals, school dinners and military and even prison rations. A labelling of things as “Islamic” or “Halal” is not enough; transportation must be considered in product integrity and must work hard to build and maintain trust. How can GMP, HACCP, “Tayibbaat” and logistics be leveraged in the Halal market? We should not limit ourselves. Halal-friendly products are suitable for Non-Muslims as well. There should be an established trust so that the consumer believes that the products are really “safe to eat” and not “probably safe to eat” or harmful, from farm to fork. In terms of Halal, it is not only foods that must be safe for consumers. The general principle concerning food, according to Islamic teachings, is that everything is Halal except that which has impurity (or that which is mixed with impurity) or is harmful and intoxicating. Halal products, services and logistics must follow the Islamic or “Shariah” law, where in products must be separated from non-Halal products along the whole supply chain, whether this occurs by water, air, or land, to prevent cross-contamination with substances considered Haram. In addition, Halal products must comply with GMP and HACCP standards, and be produced and cared for under the principles of “Toyyib” (Zhan et al., 2016).

Nevertheless, not all industrialists are capable of implementing Halal logistics as there are various barriers: namely internal and external barriers (Hamid et al., 2015). Both of these may influence logistics operations (Ho et al., 2012). This shows that the industrial players have realised the barriers in the Halal logistics operations they are facing. In a study by Hamid et al. (2015), internal barriers refer to financial constraints resistant to change, and two respondent organisations that have invested in Halal-dedicated operations stated that the dedicated services and infrastructures provided are underutilised. External obstacles are categorised into three types: namely inter-firm barriers, firm-government barriers and firm authority barriers. The depth of inter-firm barriers includes standardisation issues, unsupportive collaboration, lack of Halal assets or facilities and traceability issues. Thedepth of firm-government barriers comprises a weak promotion on Halal logistics and a lack of government-run Halal training. Accordingly, the depth of firm-authority barriers includes strict Halal standards, costly certification processes and communication barrier.

Conclusion

Islam is a universal religion, valuing the individual and society's interest in spending their life on this earth as the caliph of Allah. In this matter, Halal integrity should be scoped and understood in the framework of maqasid syariah. There are very few Halal service industrialists currently due to difficult procedures. The development of a global Halal system should help to overcome these difficulties and make Halal logistics possible and practical. It is also necessary to form the Halal hub; improvement should be made in at the company level, using state-of-the-art technologies to raise productivity and product quality without ignoring the Halal guarantee; increase the number of Halal products; increase Halal campaigns for all strata of society, especially industrialists; and form cooperation between private sectors and the government, and among Halal industrialists for the common good. Success in implementing Halal logistics is not the responsibility of a single entity as far as the logistics concept in the supply chain is concerned as there are several parties involved activities, from the starting point to the end users. The integrity value, support and collaboration are important as the Halal logistics service provider, Halal authorities, government, manufacturers/suppliers, clients/buyer and consumers are interrelated, and each plays a crucial role in practising the Halal logistics of the Halal industry as a whole. This study still has its limitations since this is just a concept paper without any empirical evidence to establish stronger findings on the major issues encountered. It only focusses on Halal logistics in Thailand, and no comparisons were made directly with other countries. Therefore, future studies should include views from government agencies, Halal authorities, product manufacturers and consumers to yield greater findings.

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10 Developing an integrative model for Halal transportation in Malaysia

A Structural Equation Modelling approach

Muna Norkhairunnisak Ustadi, Ilham Sentosa, Raja Zuraidah Rasi

Introduction

Malaysia has been acknowledged as the global leader of the Halal industry, and its exports in 2013 amounted to US$9.8 billion for Halal products, making it one of the largest Halal suppliers among members of the Organisation of Islamic Cooperation (OIC) (Batrawy, 2014). Each year, Malaysia exports a variety of Halal foods to more than 70 countries worldwide (Talib et al., 2017). In 2014, over 70% of Malaysian Halal exports were categorised as food and beverage and ingredients, with the total exports valued at US$10.9 billion (RM37.68 billion), a 15% increase from the previous year (Selim et al., 2017). Figure 10.1 illustrates Malaysia's top ten export destinations for Halal products in 2014. Malaysia is the only Muslim country with the potential to lead the Halal food industry because it is a fairly progressive Muslim country. This also makes it a significant research setting. Additionally, due to the increasing demand for Halal products and services, not only within the country but also within other Muslim countries, the government has taken steps to position Malaysia as a Halal hub, particularly in this region. The issue of Halal is not only related to the production, purchasing and consumption of food; it should also consider the overall supply chain from origin to final consumption (Azmi et al., 2018).

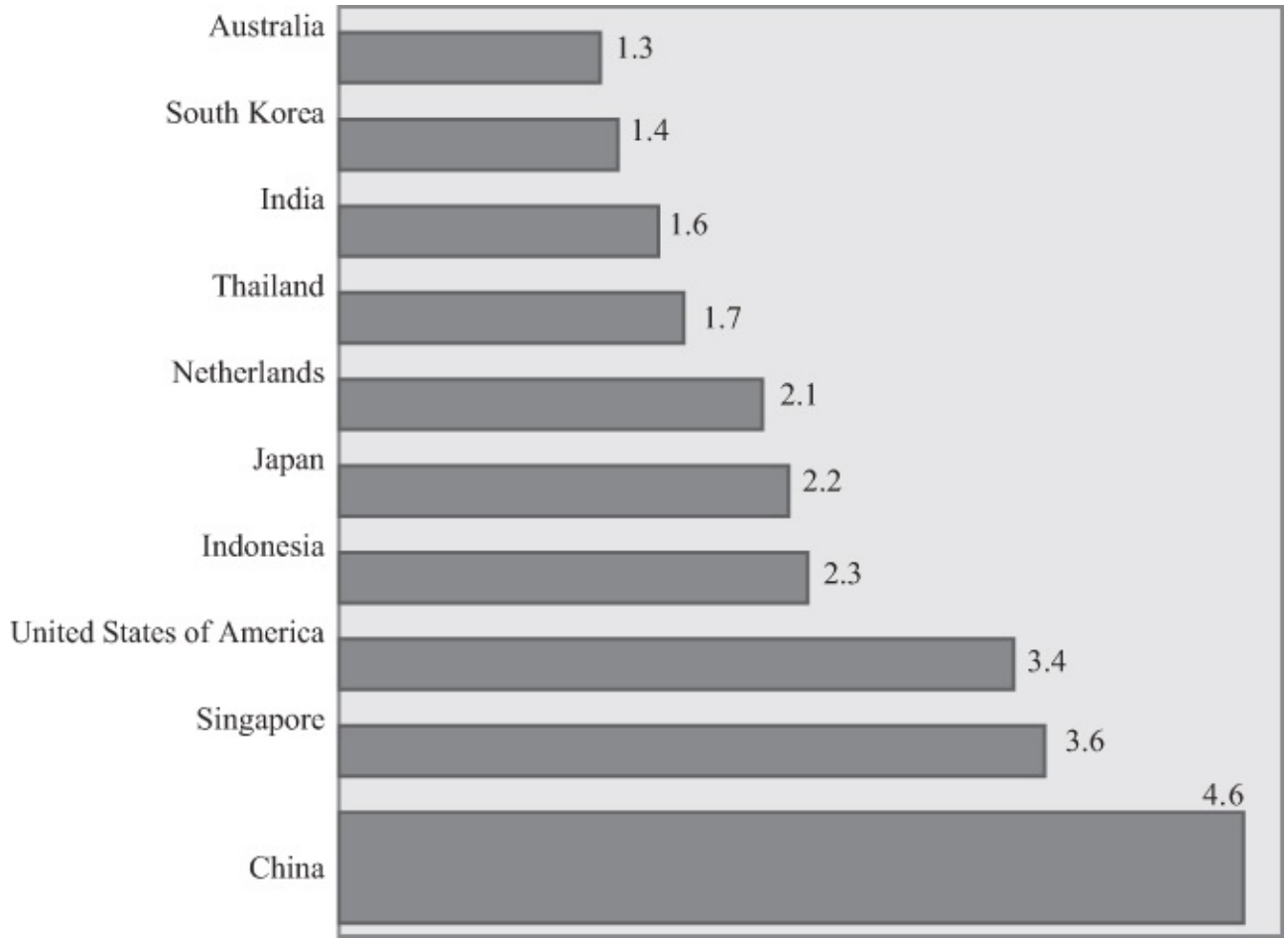

Figure 10.1 Malaysia's top ten Halal export destinations in 2014 (MYR in billion).
Source: Ministry of International Trade and Industry [MITI] (2016).

Halal transportation plays a significant role in the area of manufacturers, especially Halal manufacturers, who use transportation in their logistics activities to maintain the Halal integrity of their products. Azmi, Musa, Sihombing and Fen (2018) define the elements and components of the Halal industry more appropriately. Logistics and shipping are some of the components that are important in order to ensure that the products delivered to consumers are Halal. The foundation of a Halal logistics system is based on three fundamentals: avoid direct contact with haram (cross-contamination); avoid risk of contamination based on product characteristics either in bulk or unitised, dry or wet; and address the perception of the Muslim consumer based on Muslim market requirements, shaped by the Islamic school of legal thought, local fatwas and local customs (Devi and Firmansyah, 2019). Halal transportation is a new dimension of the supply chain in which Halal products are handled separately from non-Halal products according to Syariah compliance; the purpose of following Syariah compliance is to avoid cross-contamination to maintain Halal integrity (Shah et al., 2017).

Halal and non-Halal goods are not mixed in a load carrier or a container, or in cases of bulk shipments. There is also a difference in transportation depending on whether products are chilled or frozen. In non-Muslim countries, there is a possibility of Halal and non-Halal products being combined, put on the same pallet and mixed vertically. As per this scenario, Halal and haram products should not be transported together. If there is any misconduct, the

Halal integrity of the products could be thrown into question. Haleem and Khan (2017) mentioned that for refrigerated shipments, there should be no mixing in the same container or transportation storage of Halal and severe “Najis” (items regarded as ritually unclean), like pork. In ambient transports, there should be no mixing of Halal and non-Halal goods on a pallet or load carrier, and tertiary packaging should be used to protect the Halal cargo along the supply chain (see Table 10.1).

Table 10.1 Defining Halal practices

Author(s)	*Definition*
(Ahmed et al., 2019)	The Halal concept consists of anything that is free from any element that is prohibited by Sharia law, with an emphasis on hygiene, safety and the basis of a healthy diet that promotes the Islamic way of life.
(Verbeke et al., 2013)	As a product characteristic, Halal refers to the nature, origin and processing method of food designated for Muslim consumers. Halal is a typical credence process attribute, and thus an invisible and intangible quality characteristic that can hardly be evaluated or ascertained by individual consumers, even upon or after consuming the good.
(Muhammad et al., 2018)	The word Halal means permitted, allowed, authorised, approved, sanctioned, lawful, legal, legitimate or licit. Islam places a very strong emphasis on cleanliness in everything.
(Ahmed et al., 2019)	Halalan Toyyiban concept focusses on the overall production chain, during which the food produced should be free from any harmful products and ingredients and use only permissible ingredients (free from forbidden and wrongful sources) that are consistent with Sharia law.
(Talib et al., 2016)	Halal principles are no longer just the Muslim practice of slaughtering the animals but also encompass such issues of as sustainability, environmental friendliness, food safety and care for animal welfare.
(Al-Qaradawi, 2007)	Halal is an Arabic word meaning lawful or permitted. Halal foods refer to hygiene, and healthy foods accord with the teachings of the Quran and Sunnah of the Prophet, Ijma’ (consensus) and Qiyas (deduction of analogy according to the Syafie or any one of the Hanafi, Maliki or Hanbali Schools of thought, or fatwa approved by the relevant Islamic.

Source: Developed by the authors (2019)

This study only focusses on containerisation as the mode of transportation. The reason for choosing containerisation is that it is flexible in moving for loading and unloading processes either at a port of origin/destination or during warehousing. It has dominated due to inbound logistics and outbound logistics providers. This is to avoid cross-contamination and to overlook the fact that operations are consistent with the Halal process, which includes expectations from the consumer and other stakeholders. This will help to alleviate any doubts among Muslim consumers regarding use of the Halal products available in the market, if their services are utilised (see Table 10.1).

Conceptual development to Halal transportation

Behavioural theory is about explaining the major psychological factors that encourage or discourage a person’s behavioural intentions and actions. A comprehensive understanding of the motives behind behavioural intention and action is essential for researchers and policy makers who seek strategies to motivate behavioural change. The integration of a behavioural research context is required to ensure that behavioural factors, such as human perception,

attitude, behaviour, value judgement, beliefs and others' influences in decision making processes, are taken into account when making decisions (Camerer and Lowenstein, 2003).

Based on the Council of Supply Chain Management Professionals (CSCMP, 2008), behavioural research in supply chain management is of equal importance because the process of decision-making involves multiple decision makers (e.g. suppliers, customers and service providers) from different organisations. In this study, the integration of behavioural research with the Halal context is required to ensure that behavioural factors in perception, attitude, behaviour, value judgement, beliefs and others' influences in decision-making processes either allow for decisions to use Halal transportation services or remain with conventional transportation services. This study also argues that intention, as a predictor of behaviour, should be supplemented with other pre-intentional factors that facilitate the translation of intention into action.

The theory of reasoned action (TRA) was developed by Martin Fishbein and Icek Ajzen as an improvement to the information integration theory (Ajzen and Fishbein, 1980). According to TRA, behavioural intention is caused by two factors: attitude (evaluation of target behaviour) and subjective norms (perceived social pressure regarding performance of the behaviour), as shown in Figure 10.2. The theory also assumes that the studied behaviour should be under volitional control; however, not all behaviours are fully volitional or fully controlled by the individual (Ajzen, 2005; Sentosa and Mat, 2012).

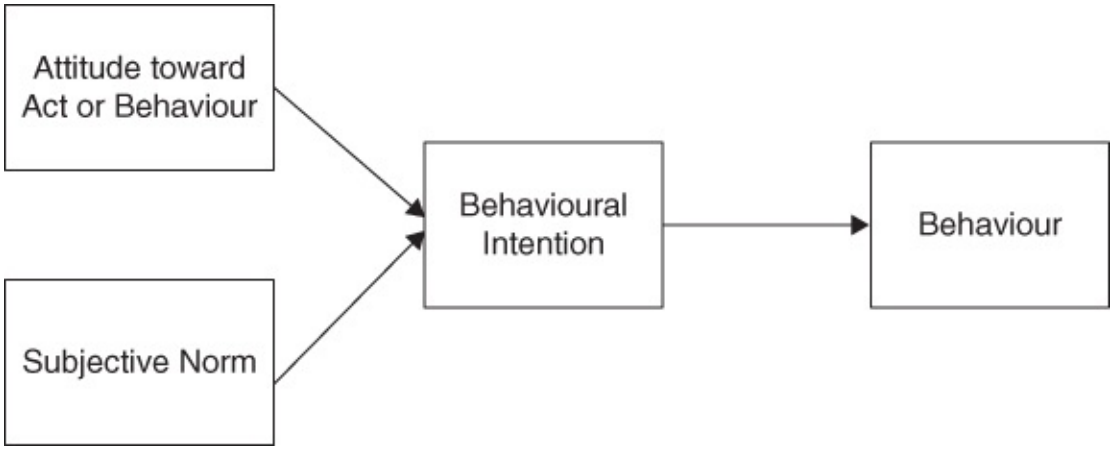

Figure 10.2 Theory reasoned action.

Source: Fishbein and Ajzen (1972).

The theory of planned behaviour (TPB) is an extension of the TRA in that it considers behaviours beyond volitional control. Ajzen (1986) stated that to include control in the prediction of human behaviour the model does not focus solely on intention as a prediction of behaviour but requires looking at the capability of control over the behaviour in question. Figure 10.3 shows the TPB. There are two versions of the TPB which can be used to predict behaviour (Ajzen and Madden, 1986). The first consists of only an indirect part of predicting behaviour, which holds intention as a main constant, while the second suggests adding a direct link between perceived behaviour control and behaviour as a substitute for the 'actual control' of the first version. Both versions were tested by Ajzen and Madden, 1986. However, it was noted that "when behaviour poses no serious problem of control, they can be predicted

from intentions with considerable accuracy" (Ajzen, 1991). Therefore, depending on the scenario, either option can be used. The direct and indirect effects of perceived behavioural control (PBC) will be explained in the following section (Sentosa and Mat, 2012).

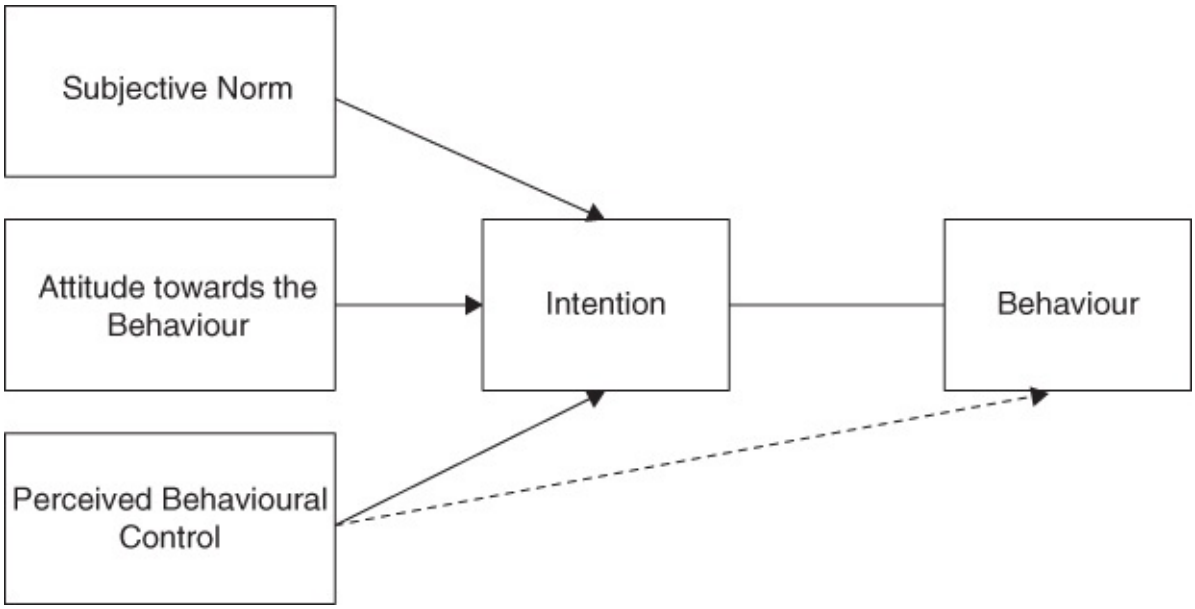

Figure 10.3 Theory of planned behaviour.
Source: Azjen and Fishben (1978).

Subjective norm, attitude towards behaviour and perceived behavioural control

Subjective norm is perceived social pressure that affects an individual's intention to engage in certain behaviours (Ajzen and Madden, 1986; Conner and Sparks, 1996). Conversely, subjective norm is associated with the aspects of social perception, either to perform or not to perform a behaviour based on other people's perceptions that may be considered important to individuals (Montano and Kasprzyk, 2008). Subjective norm in Malaysia plays an important role, where in family members, friends and colleagues are individual strong referent points (Afendi et al., 2014). Empirical studies have shown that social influence from family and friends has an effect on purchasing intentions (Moons and De Pelsmacker, 2012; Kelkel, 2015). Mass media and external communication influences the intention towards a product, which can be considered as part of social norms (see Figure 10.3).

The perception and beliefs that an individual holds about the attitude's objective can develop or change depending on timing. Normally, humans' beliefs influence other attributes, such as objectives and events. Therefore, a person needs to execute certain behaviours if they think their belief will yield positive results. Conversely, a person need not perform certain behaviours if they feel that it might cause a problem or crisis. Alam and Sayuti (2011) found that there is a significant and positive relationship between attitude and intentions towards purchasing Halal products. Their study results show that the TPB model could explain the 29.1% of the variance in the intentions to purchase Halal products. Attitude is considered an

important element in influencing consumer intentions in purchasing Halal products because those with high positive attitudes appeared to have a greater intention to purchase Halal products. This finding strengthens the statement of Ajzen (1991) that attitude can be described as an important element in predicting and describing human behaviour. A person's attitude, combined with subjective norms, forms their behavioural intention. Thus, behavioural intention is a function of both attitudes towards behaviour and subjective norms towards that behaviour, which can then predict the actual behaviour (Sentosa and Mat, 2012).

PBC has extended the traditional theory by incorporating the perceived control of an individual over a performance, as an indicator of behaviour (Ajzen, 1988, 1991). Therefore, PBC represents the perceived possibility of difficulties likely to be faced when performing certain behaviours. The control perception and PBC have expanded on the practicability of theory by explaining (1) the volitional behaviours leading to many complicated intentions and (2) behaviours which may be caused by a sequence of behaviours (Conner and Sparks, 1996).

Behavioural, normative and control beliefs

Behavioural belief (BB) is the subjective probability of performing a behaviour that leads to a certain outcome, while attitude towards a behaviour is a function of one's salient beliefs (i.e. BBs), which consist of two components: the perceived likelihood of an outcome of the behaviour (belief strength) and the evaluation of the outcome (Ajzen, 2002). Normative beliefs (NBs) are described as the behavioural expectations of other people, or groups of people (e.g. friends, family, co-workers), who are important to the individual (Ajzen, 2002). The subjective norm is represented as a function of a person's NBs about what salient referents think he/she should (or should not) do, and his/her motivation to comply (MC) (Ajzen and Fishbein, 1980). In short, NBs are subjective probabilities that particular referents will prescribe/proscribe the performance/non-performance of behaviour. Control beliefs (CBs) consist of two components which are also multiplicatively combined: the perception of the presence/absence of resources/ opportunities required to perform a specific behaviour (such as skill, resources and opportunities) and the assessment of the level of importance of such resources/opportunities for the achievement of outcomes (i.e. perceived power) (Ajzen and Madden, 1986, Chang, 1998).

Predictors of intention to use Halal transportation

According to Ajzen (1985), an individual is more likely to undertake a certain behaviour if he/she has a positive attitude towards it. When determining whether to perform a specific behaviour or not, a person is likely to assess the resulting benefits and costs (Cheng et al., 2006a). An individual tends to possess a favourable attitude when the outcomes are considered positive and, thus, is likely to engage in that specific behaviour (Ajzen, 1991; Cheng et al., 2006a). In other words, an individual's positive attitude towards certain

behaviours strengthens their intention to perform the behaviour (Ajzen, 1991). In this study, attitude towards using Halal transportation services in the context of fulfilling supply requirements in a retail business is positively related to the intention to use Halal transportation: the more positive the attitude, the greater the customer's intent to use Halal transportation services to fulfil supply requirements.

Ajzen (1991) also defines a subjective norm as 'the perceived social pressure to perform or not to perform the behaviour'. In other words, a subjective norm is the perceived opinion of significant others (relatives, close friends, co-workers/colleagues, business partners) who influence an individual's decision-making (Honkanen et al., 2005; Sentosa and Mat, 2012). In the logistic context, a business customer's intention can be influenced by pressure or influence from competitors, other suppliers and new environmental opportunities. A business customer may be exposed to large amounts of information through advertisements, business interactions and observations of experts' views of Halal transportation use.

Furthermore, PBC refers to the extent of one's perceived control over a particular behaviour, that is, the ease or difficulty that a person feels in performing an action (Ajzen, 1991). In particular, PBC assesses the perception of how well one can control factors that may facilitate/constrain the actions needed to deal with a specific situation. PBC differs from the concept of perceived locus of control (Rotter, 1996), which refers to the generalised expectancy that control remains stable across situations and actions: on the contrary, PBC is usually found to vary across situations and actions. In the context of logistics, it may be assumed that customers who have a high degree of perceived capacity, such as those who are confident of being able to use Halal transportation services, tend to have stronger Halal transportation use intention and actual use. From this, it can be assumed that an intention to use Halal transportation providers is likely to be positive when customers perceive that they have control in terms of capacity as well as autonomy (see Table 10.2).

Table 10.2 Preview on the latent constructs

Variables	*Definitions*	*Authors*
Behavioural beliefs	Behaviour refers to the degree of personal evaluation of any activity in which a person has a favourable or unfavourable desire to perform the behaviour.	(Davis et al., 1989; Ajzen, 1991; Taylor et al., 1995; Montano et al., 2008; Ahmed et al., 2019)
Attitude	Attitude refers to a degree of beliefs or feelings a person holds, either negative or positive, about performing a certain behaviour by weighing the possible outcomes.	(Davis et al., 1989; Ajzen, 1991; Taylor et al., 1995; Ahmed et al., 2019; Montano et al., 2008)
Normative beliefs	User's normative beliefs, which are the perceived expectations of specific individuals and groups, and the user's motivation to accept these expectations.	(Davis et al., 1989; Ajzen, 1991; Taylor et al., 1995; Joseph, 2004; Muhammad et al., 2018)
Subjective norms	Defined as the influence others will have on the acceptance decision. Beliefs in the model are defined as "the individual's subjective probability that performing the target behaviour will result in consequence".	(Davis et al., 1989; Ajzen, 1991; Taylor et al., 1995; Muhammad et al., 2018)
Control beliefs	Control beliefs deal with the availability of resources and opportunity, including problems concerning enacting a behaviour in conjunction	(Davis et al., 1989; Ajzen, 1991; Taylor et al., 1995;

	with the perceived power possessed by the individual; these will determine perceived behaviour control.	Montano et al., 2008; Ahmed et al., 2019; Bashir et al., 2019)
Perceived behavioural control	Perceived behavioural control represents the perceived possibility of difficulties likely to be faced when performing certain behaviours.	(Davis et al., 1989; Ajzen, 1991; Taylor et al., 1995; Montano et al., 2008; Ahmed et al., 2019; Bashir et al., 2019)
Intention	An indicator of to what extent people are willing to choose Halal logistics in their production to distribution and possession of customers to match their perception.	(Ajzen, 1991; Taylor et al., 1995; Abdul et al., 2009; Soon et al., 2017; Lestari et al., 2018; Marmaya et al., 2019)
User behaviour	As an indicator to what extent people would actually perform a certain action based on Halal logistics' attraction, perceived value and usefulness, as endorsed by intention in general.	(Ajzen, 1991; Taylor et al., 1995; Abdul et al., 2009; Soon et al., 2017; Lestari et al., 2018; Marmaya et al., 2019)

Source: Developed by the authors (2019)

Methodology

Figure 10.4 proposes the final hypothesised structural model for the study. It consists of six exogenous variables – BB, NB, CB, attitude, subjective norm and PBC – and Intention to use and the Actual Behaviour of using Halal transportation services as endogenous variables. Intention to use is hypothesised to act as a mediator between all relationships of exogenous variables and behaviour (see Table 10.3). Based on the aforementioned explanation, the causal effect relationship among latent constructs into a structural model analysis of Halal logistics model in Malaysia was proposed (see Figures 10.5 and 10.6).

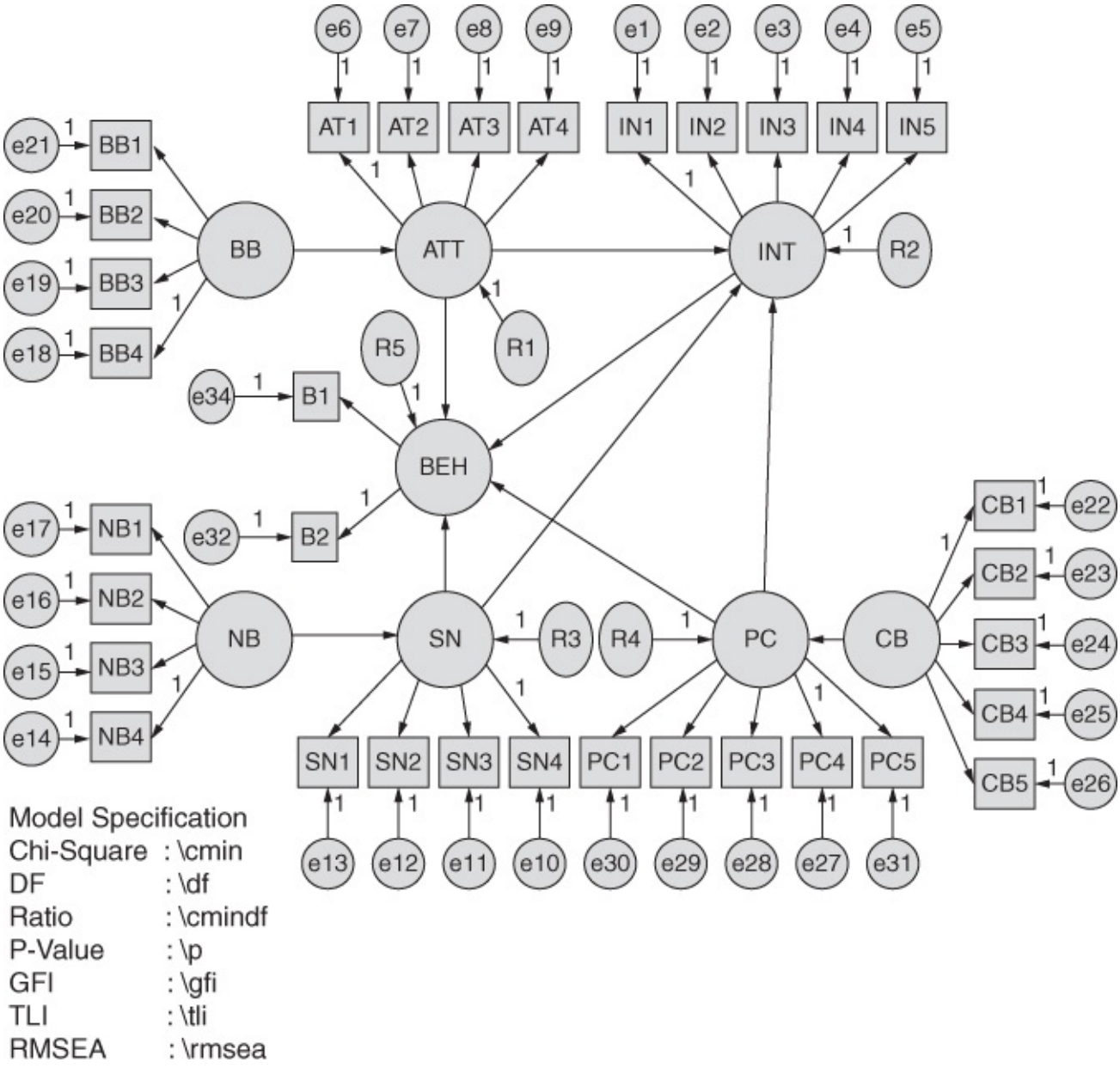

Figure 10.4 Hypothesised model.

Source: Developed by the authors (2019).

Table 10.3 Hypothetical statements

Hypothesis	*Statement*
1	Behavioural, Normative and Control beliefs confirm as antecedents of Halal transportation service predictors (Attitude, Subjective Norm, Perceived Behavioural Control).
1a	Behavioural belief has a direct positive significant influence on the Attitude.
1b	Normative belief has a direct positive significant impact on the Subjective Norm.
1c	Control belief has a direct positive significant influence on the Perceived Behavioural Control.
2	Attitude, Subjective Norm and Perceived Behavioural Control confirmed as predictors of Actual Behaviour to use Halal transportation services.
2a	Attitude brings a positive impact on the Actual Behaviour to use Halal transportation services.
2b	Subjective Norm brings a positive impact on the Actual Behaviour to use Halal transportation services.
2c	Perceived Behavioural Control brings a positive impact on the Actual Behaviour to use Halal transportation services.

3	Intention plays a mediation role on the relationship between Attitude, Subjective Norm and Perceived Behavioural Control on the Actual Behaviour to use Halal transportation services.
3a	There is a mediating effect of Intention on the relationship between Attitude and Actual Behaviour to use Halal transportation services.
3b	Intention contributes a significant impact on the influence of Subjective Norm and Actual Behaviour to use Halal transportation services.
3c	Intention plays a mediation effect on the relationship between Perceived Behavioural Control and Actual Behaviour to use Halal transportation services.
4	There is a significant interaction between Belief, Attitude, Subjective Norm, Perceived Behavioural Control and Intention to use on the Actual Behaviour to use Halal transportation services.

Source: Developed by the authors (2019)

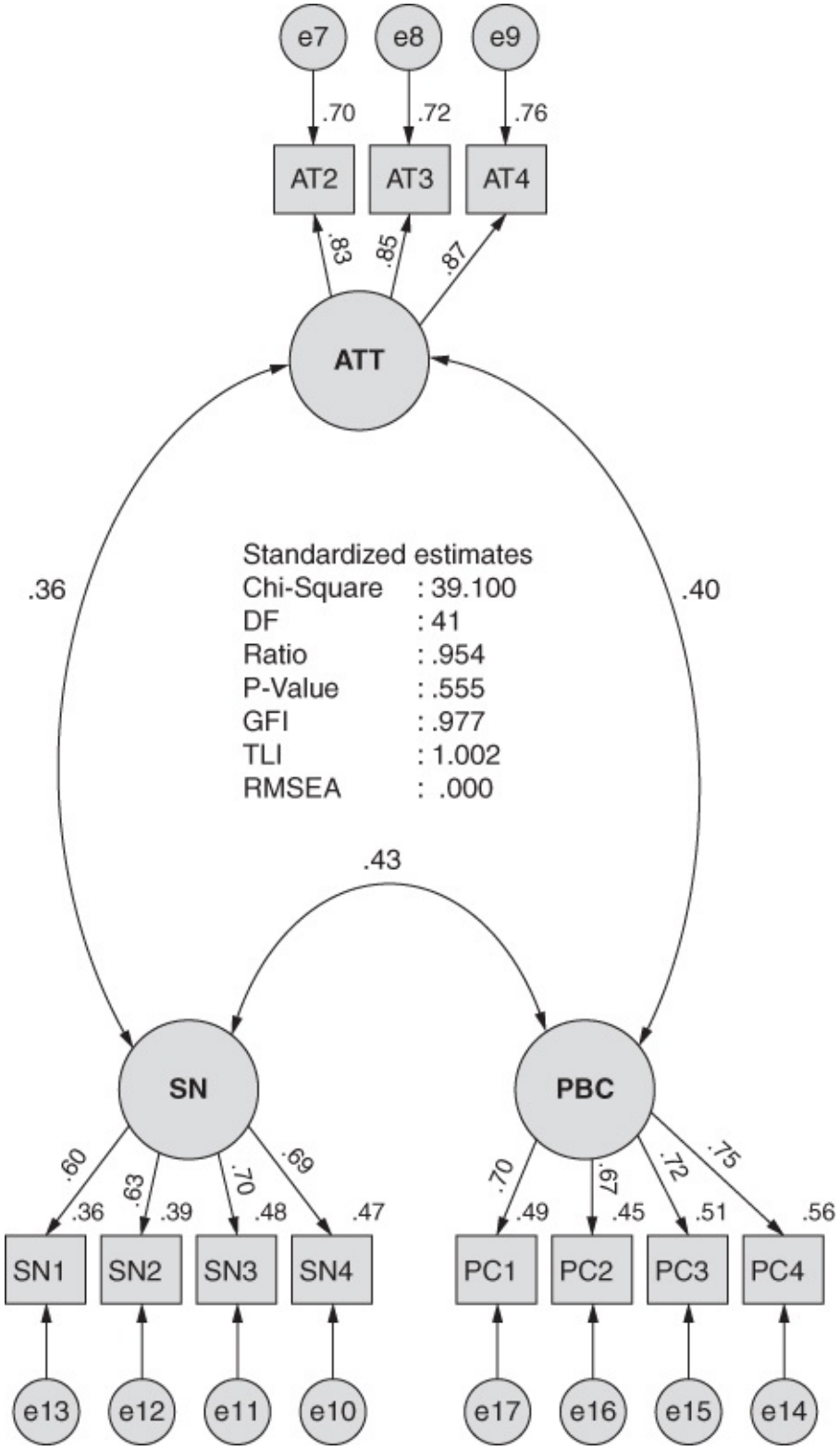

Figure 10.5 Measurement model of exogenous variables.

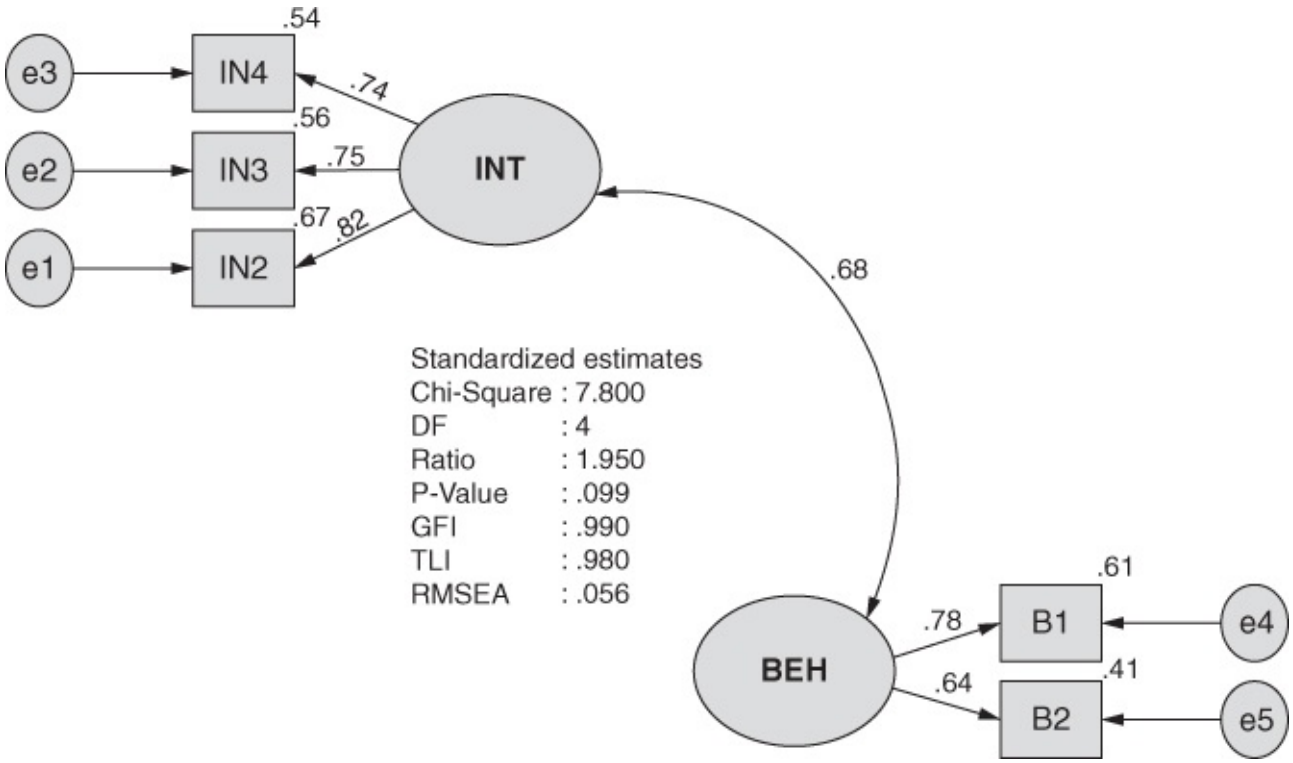

Figure 10.6 Measurement model of endogenous variables.

Furthermore, an advanced quantitative analysis using Covariance-Based Structural Equation Modelling (SEM) was employed to the Halal logistics model (Sentosa and Mat, 2012; Garson, 2016; Schumacker and Lomax, 2016). A positivism research paradigm using a descriptive approach succeeds in hypothesizing, testing and validating Halal Logistics models as a single construct (variable), and is measured with a series of latent constructs (see Figure 10.4). A hypothesised model of the Halal Logistics model in Malaysia was established, examined and tested using a first-order confirmatory factor analysis (CFA) approach, a measurement model of exogenous and endogenous variables, and generated and re-specified models (Tabachnick and Fidel, 2007; Khan et al., 2018).

Proportionate stratified random sampling techniques were employed to determine 304 samples of Halal transportation stakeholders in Malaysia. Logistics managers were involved in the close-ended structured questionnaire (Tabachnick and Fidel, 2007; Sentosa, 2008). Data collection was conducted from June to August 2019. Multivariate data outliers using Mahalanobis Distance succeed in identifying a set of outliers, and a series of data screenings of normality and a reliability test (Cronbach's Alpha) also confirmed the consistency of measurements as hypothesised (Hadi et al., 2016; Schumacker and Lomax, 2016). CFA was performed to observe the construction of detailed items, and Figure 10.4 confirms the structure as hypothesised (Sentosa and Mat, 2012; Garson, 2016; Khan et al., 2018). First-order CFA for each variable on the settings of measurement model of exogenous and endogenous constructs (Figures 10.5 and 10.6) was shown as the goodness of model fit.

Table 10.4 Variables and measurements

Items	*Code*	*Sources*

Behavioural belief (administration, process, warehouse)		
We believe that an organisation needs to be financially stable in order to become involved in Halal food supply chain.	BB1	(Davis et al., 1989; Ajzen, 1991; Taylor et al., 1995; Abdul et al., 2009; Muhammad et al., 2009; Othman et al., 2009; Lestari et al., 2018; Azmi et al., 2019)
We believe that an organisation should have an effective transportation system in order to be involved in Halal food supply chain.	BB2	
We believe that an organisation should be able to provide a dedicated warehouse for storage in order to be involved in Halal food.	BB3	
We believe that an organisation should employ people who handle the Halal food production.	BB4	
Attitude (handling process)		
Our organisation always makes sure that the transports are appropriate to the type of Halal food.	AT1	(Davis et al., 1989; Ajzen, 1991; Taylor et al., 1995; Abdul et al., 2009; Muhammad et al., 2009; Othman et al., 2009; Lestari et al., 2018; Azmi et al., 2019)
Our suppliers transfer materials to us using dedicated transport.	AT2	
Our organisation uses dedicated transport to transfer Halal food products from our place to the wholesaler, retailer or customer.	AT3	
Our organisation provides dedicated warehouse for storage of our Halal food products.	AT4	
Normative belief (Halal practices)		
Our management team is actively exploring innovative ideas on Halal matters.	NB1	(Davis et al., 1989; Ajzen, 1991; Taylor et al., 1995; Abdul et al., 2009; Muhammad et al., 2009; Othman et al., 2009; Lestari et al., 2018; Azmi et al., 2019)
Our organisation has the capacity to develop new product design to satisfy customers' needs.	NB2	
Our organisation has the capacity to develop Halal traceability and tracking systems in order to protect the authenticity of Halal food products.	NB3	
Our organisation encourages our suppliers to become more innovative in Halal matters.	NB4	
Subjective norm (knowledge)		
Our organisation uses Islamic dietary law as a source for how to produce Halal food.	SN1	(Abdul et al., 2009; Muhammad et al., 2009; Othman et al., 2009; Lestari et al., 2018)
Our organisation follows the Halal guideline of food processing in a way to increase the consumers' confidence in our products.	SN2	
Our organisation ensures that our suppliers comply with Islamic dietary law.	SN3	
Our organisation is Halal-certified.	SN4	
Control belief (health and safety)		
Our organisation has separate processing lines for Halal food production.	CB1	(Davis et al., 1989; Ajzen, 1991; Taylor et al., 1995; Abdul et al., 2009; Muhammad et al., 2009; Othman et al., 2009; Lestari et al., 2018; Azmi et al., 2019)
Our organisation uses separate bonded trucks to transfer Halal food products.	CB2	

Our organisation uses dedicated machinery and equipment for Halal food production.	CB3	
Our suppliers segregate the materials based on Halal and non- Halal before sending them to us.	CB4	
Our organisation uses detection and screening devices during processing of Halal food products.	CB5	
Perceived behavioural control		
Our organisation has a group of Halal trained workers to handle the Halal food production.	PC1	(Davis et al., 1989; Ajzen, 1991; Taylor et al., 1995; Montano et al., 2008; Ahmed et al., 2019; Bashir et al., 2019)
Our employees are trained to understand the importance and correct way of producing Halal food products.	PC2	
Our organisation gives extensive Halal training to distributors and retailers if and when needed.	PC3	
Our organisation invites Halal local authority (e.g. HDC and JAKIM) to give training to our workers.	PC4	
Our organisation guides suppliers to establish their own Halal programmes.	PC5	
Intention (application)		
We would like to use Halal transportation services.	IN1	(Ajzen, 1991; Taylor et al., 1995; Abdul et al., 2009; Soon et al., 2017; Lestari et al., 2018; Marmaya et al., 2019)
We intend to use Halal transportation services.	IN2	
We are willing to pay more for using Halal transportation services.	IN3	
We are willing to wait longer for ritual cleansing (Sertu) processes that are necessary to comply with Halal.	IN4	
We are willing to pay more for Halal transportation services.	IN5	
User behaviour (assurance and frequency)		
We assure that Halal logos in Halal foods are important.	BI1	(Ajzen, 1991; Taylor et al., 1995; Abdul et al., 2009; Soon et al., 2017; Lestari et al., 2018; Marmaya et al., 2019)
We always check on the packaging whether it has a Halal logo or not.	BI2	

Source: Developed by the authors (2019)

Findings

Measurement model of exogenous variables

Based on the hypothesised model of the Halal logistics model (Figure 10.4), the measurement model of exogenous variables which covered the interaction of first-order CFA

for each independent variable shows that the univariate and multivariate levels have fulfilled significant criteria of model validation on the single stage (Hadi et al., 2016; Schumacker and Lomax, 2016). A multicollinearity issue was missing on the interaction through a correlation value among latent construct fulfilled requirements of critical value less than 0.9 (Rengiah and Sentosa, 2015). Attitude and PBC (*Corr. 0.4*), subjective norm and PBC (*Corr. 0.43*) as well as attitude and subjective norm (*Corr. 0.36*) confirmed the significant differences of independent variables as hypothesised on the structural model to play a role as exogenous variables (Sentosa and Nik Mat, 2012). The present study totally concerns the goodness of model fit for each stage of model fit using the values of chi-square, degree of freedom, ratio (chi-square/df < 2), *P*-Value ($P > 0.05$), goodness of fit (GFI > 0.9), Tucker and Lewis Index (TLI > 0.9) and root mean square error of approximation (RMSEA < 0.08) (Sentosa and Mat, 2012; Garson, 2016).

Measurement model of endogenous variables

Furthermore, this study also has Intention to use and actual behaviour to use Halal transportation as endogenous variables. Intention was hypothesised as a mediating variable on the relationship between all predictors to the actual behaviour in terms of Halal transportation (see Figure 10.6). Correlation among both endogenous variables was performed to test the multicollinearity issue, and the result confirmed the absence of an interaction through a correlation value (*Corr. 0.68*) among latent constructs through a detailed and fulfilled requirement of critical value less than 0.9 (Sentosa and Mat, 2012). The present study also focussed on the goodness of model fit for each stage of model fit, using the values of chi-square, degree of freedom, ratio (chi-square/df < 2), *P*-Value ($P > 0.05$), goodness of fit (GFI > 0.9), Tucker and Lewis Index (TLI > 0.9) and root mean square error of approximation (RMSEA < 0.08) (Sentosa and Mat, 2012; Rengiah and Sentosa, 2015; Garson, 2016).

The generated model of Halal transportation (see Figure 10.7) confirmed 20 final items on the convergent reliability (> 0.7) of factor loading (see Table 10.6). This research succeeds in validating seven latent constructs (BB and NB, attitude, subjective norm, PBC, Intention to use and Actual Behaviour to use Halal transportation services) and 20 items as a significant measurement of observe variables. The present study succeeds in establishing a structural model based on the validation of measurement model of exogenous and endogenous variables, generated and re-specified models (Sentosa and Mat, 2012; Schumacker and Lomax, 2016). Goodness of fit index for stages on the modelling also confirms a detailed validation of the model (see Table 10.5). Hypothesis direction numbers 1, 2 and 3 have achieved the path analysis for each latent construct on the intention to use and actual behaviour as a main construct, and lastly, the final hypothesis as an interaction on the structural model analysis is also achieved (Table 10.8), which confirmed the construction and validation of Intention to use Halal transportation (Osman and Sentosa, 2013; Rengiah and Sentosa, 2015; Garson, 2016; Schumacker and Lomax, 2016). An empirical model is also established as a main guideline for logistics practitioners in Malaysia (see Figure 10.7).

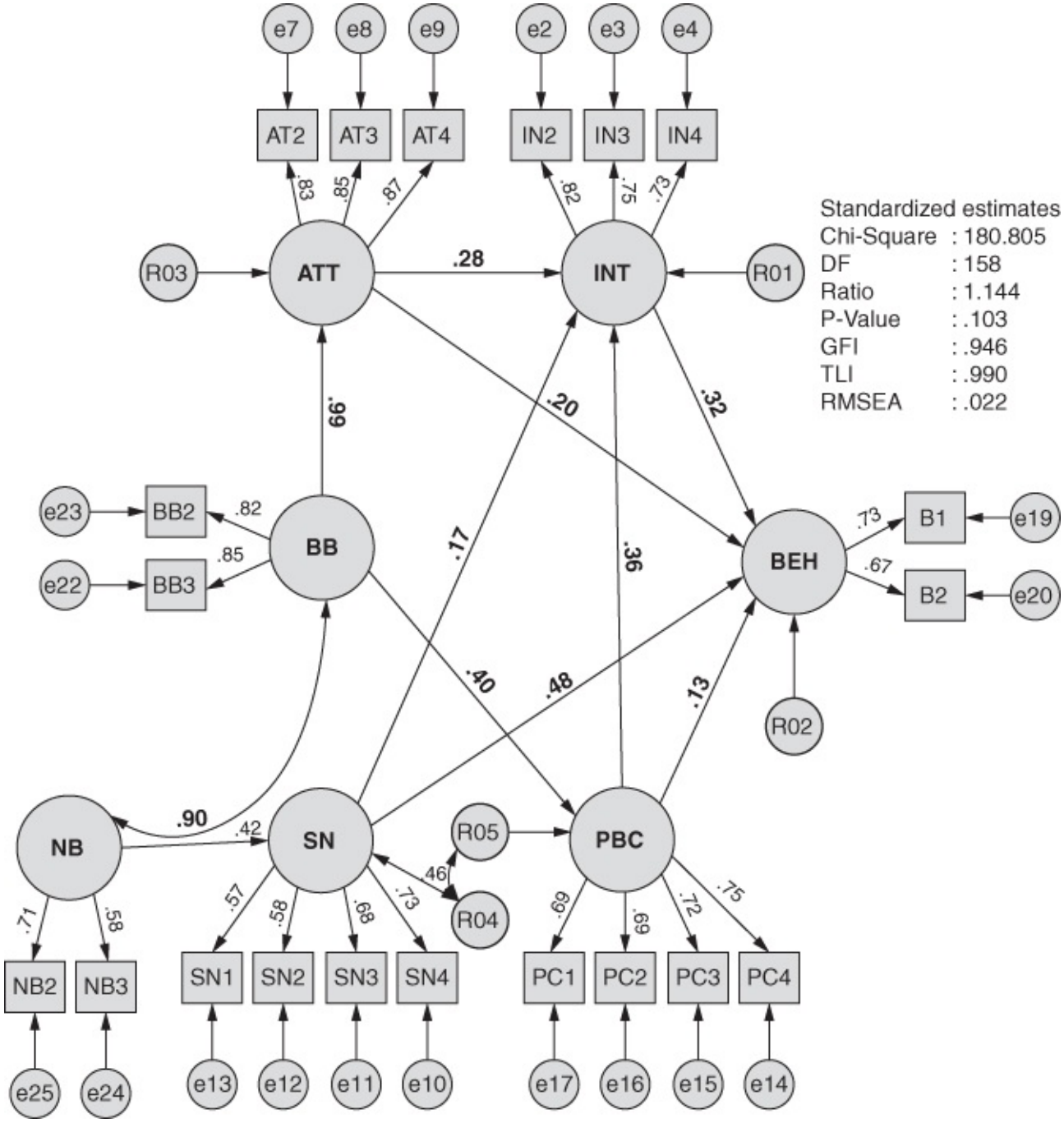

Figure 10.7 Generated model of Halal transportation in Malaysia.

Table 10.5 Journey on the goodness of model fit

Goodness of fit indexes	*Measurement model of exogenous variables*	*Measurement model of endogenous variables*	*Measurement model of antecedents*	*Generated and re-specified model*
Chi-Square	39.100	7.800	0.012	180.805
Degree of freedom	41	4	1	158
Ratio	0.954	1.950	0.012	1.144
***P*-Value**	**0.555**	**0.099**	**0.914**	**0.103**
GFI	0.977	0.990	1.000	0.946
TLI	1.002	0.980	1.021	0.990
RMSEA	0.000	0.056	0.000	0.022

Table 10.6 Standardised regressions weight of measurements

Variable and variance extracted	*Items*	*Factor loading*	*Std-error*	*Critical ratio*	*P-Value*	R^2	*Error Var. εj*
Intention	IN2	0.822	0.088	12.221	0.000	0.676	0.324
(IN CR. 0.811)	IN3	0.750	0.088	11.580	0.000	0.563	0.438
(IN VE. 0.589)	IN3	0.728	0.076	12.221	0.000	0.530	0.470
Attitude	AT2	0.827	0.052	18.652	0.000	0.684	0.316
(ATT CR. 0.888)	AT3	0.853	0.051	19.718	0.000	0.728	0.272
(ATT VE. 0.726)	AT4	0.875	0.055	18.652	0.000	0.766	0.234
Subjective norm	SN4	0.726	0.129	8.970	0.000	0.527	0.473
(ID CR. 0.737)	SN3	0.680	0.094	10.294	0.000	0.462	0.538
(ID VE. 0.414)	SN2	0.583	0.096	8.970	0.000	0.340	0.660
	SN1	0.572	0.095	8.801	0.000	0.327	0.673
Perceived behavioural control	PC4	0.747	0.102	10.655	0.000	0.558	0.442
(CE CR. 0.803)	PC3	0.715	0.089	10.981	0.000	0.511	0.489
(CE VE. 0.504)	PC2	0.690	0.086	10.655	0.000	0.476	0.524
	PC1	0.687	0.086	10.616	0.000	0.472	0.528
Behavioural	B1	0.733	0.103	9.960	0.000	0.537	0.463
(IN CR. 0.663)	B2	0.674	0.098	9.960	0.000	0.454	0.546
(IN VE. 0.496)							
Behavioural belief	BB2	0.822	0.058	17.682	0.000	0.676	0.324
(IN CR. 0.824)	BB3	0.852	0.055	17.682	0.000	0.726	0.274
(IN VE. 0.701)							
Normative belief	NB2	0.708	0.137	8.294	0.000	0.501	0.499
(IN CR. 0.590)	NB3	0.584	0.106	8.294	0.000	0.341	0.659
(IN VE. 0.421)							

Figure 10.7 configures detailed results on the final model structure, called generated model and re-specified model with square multiple correlation of the model (see Figure 10.9). Both models confirmed achievement on the goodness of model fit, which configured values of chi-square, degree of freedom, ratio (chi-square/df < 2: 1.144), *P*-Value (*P* > 0.05: 0.103), goodness of fit (GFI > 0.9: 0.946), Tucker and Lewis Index (TLI > 0.9: 0.990) and root mean square error of approximation (RMSEA < 0.08: 0.022) (Sentosa and Mat, 2012; Garson, 2016). Researchers confirmed *P*-Value as a main indicator (*P* > 0.05) on the final journey on the fit model achievement (Rengiah and Sentosa, 2015; Bryne, 2016; Schumacker and Lomax, 2016). *P*-Value of re-specified model (P: 0.103) is important to demonstrate goodness of fit indexes or significant achievement of established and tested models. *P*-Value also contributes to the minimisation of error possibility on the structural model settings. Furthermore, the present study also hypothesised BB, NB and CB as antecedents of exogenous variables (Figure 10.8). The second part of multicollinearity issue is also missing in the interaction through a correlation value among latent constructs through a detailed and fulfilled requirement of critical value less than 0.9 (Sentosa and Mat, 2012).

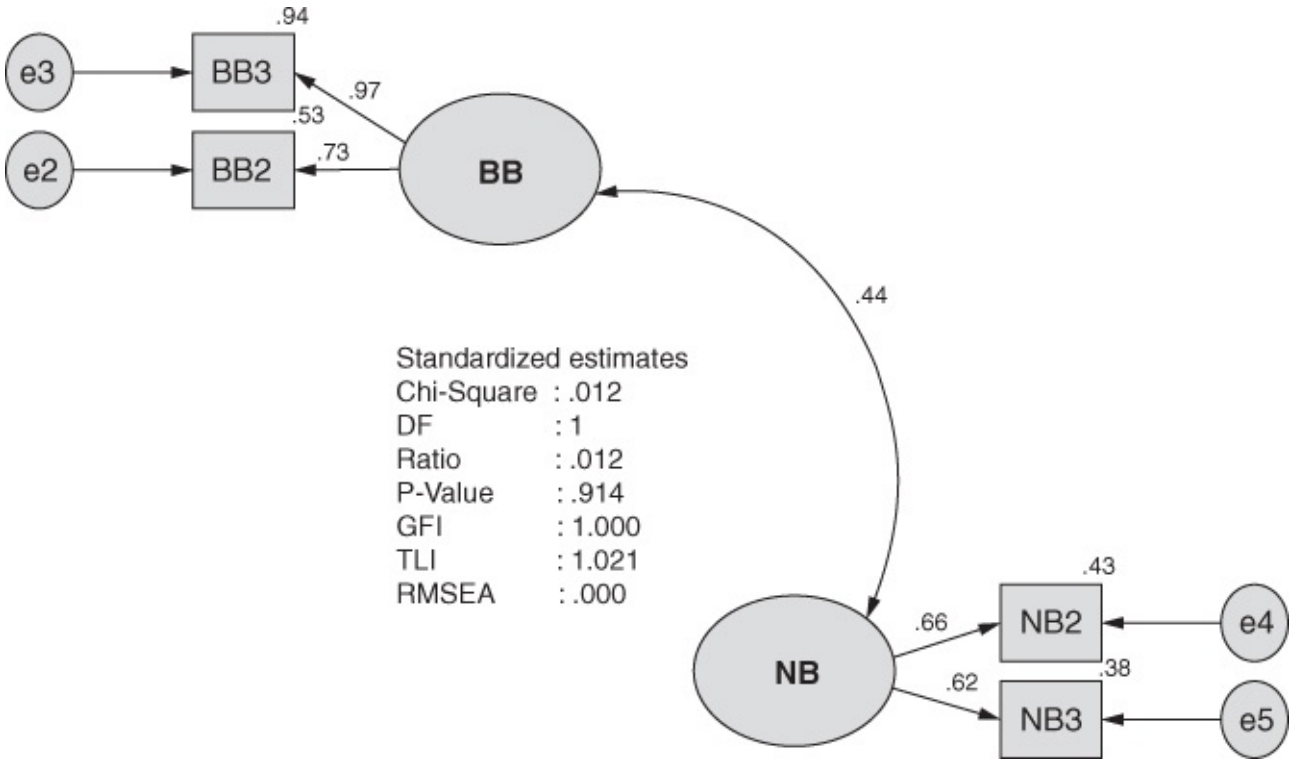

Figure 10.8 Multicollinearity test of antecedents on the Halal logistics intention predictors.

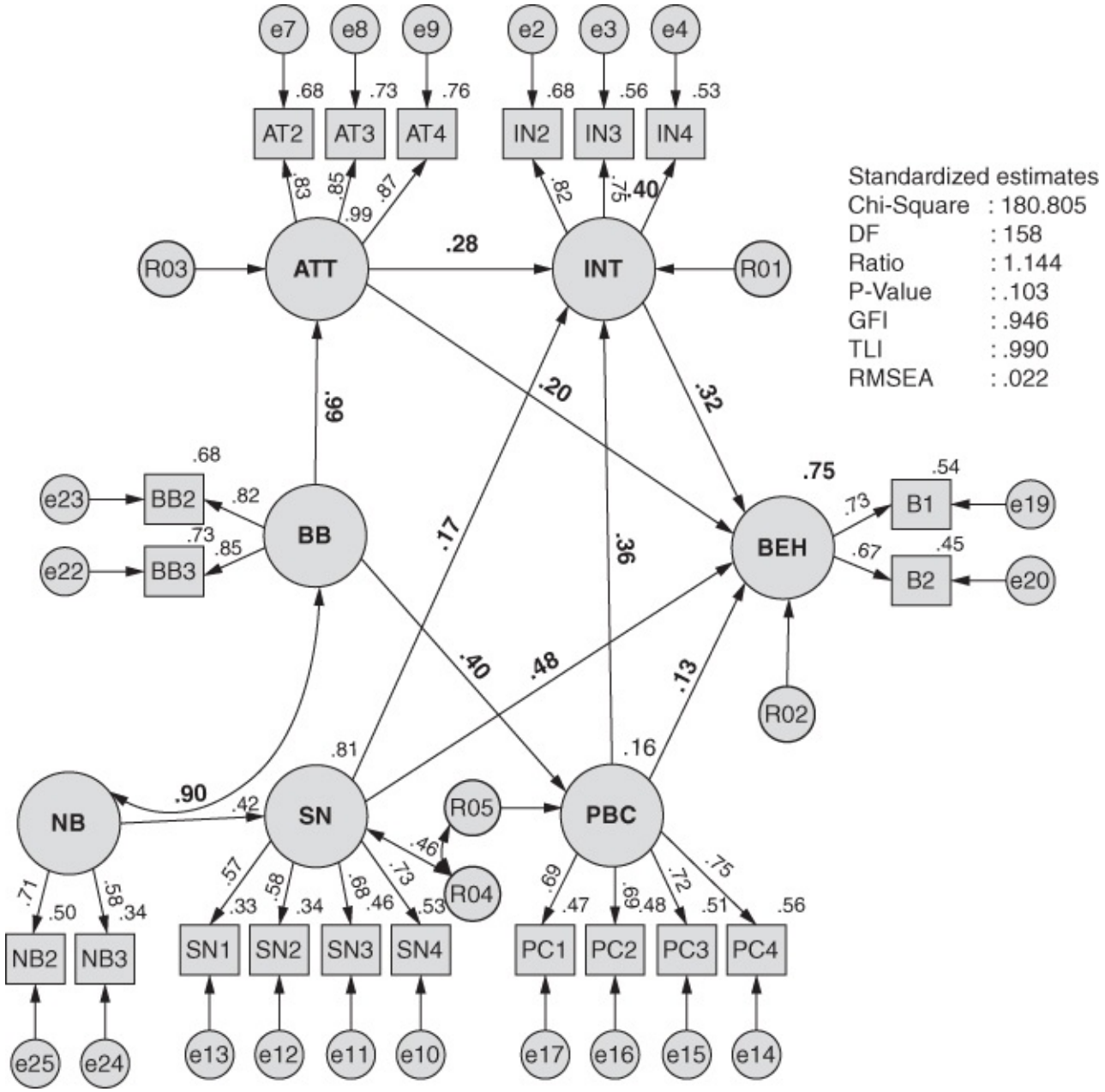

Figure 10.9 Re-specified model of Halal transportation in Malaysia.

Journey on the validation of the structural model (see Figure 10.9) goes to the confirmation of square multiple correlation for Intention to use (40%) and actual behaviour of Halal transportation (75%). The present study confirmed BB and NB as significant antecedents of attitude, subjective norm and PBC (see Table 10.7). Re-specified model of Halal Transportation in Malaysia also confirmed attitude, subjective norm and PBC as predictors of intention to use Halal transportation. Overall, this study succeeds in determining actual behaviour in the daily business of Halal transportation. Table 10.8 also shows the results of the calculated variance extracted (VE) to support the discriminant validity of constructs. Average variance extracted (AVE) denotes the average VE values of two constructs (Sentosa, 2009; Sentosa et al., 2012). According to Fornell and Larcker (1981), AVE should be more than the correlation squared of the two constructs in order to support discriminant validity (Hadi et al., 2016). Tables 10.8 and 10.9 confirm a detailed process on

the discriminant validity test on the latent constructs for re-specified model, and each AVE value is found to be more than correlation square (see Table 10.9). The present configuration of discriminant validity is supported, or the multicollinearity issue is missing (Sentosa and Mat, 2012; Osman and Sentosa, 2013; Garson, 2015). Fundamental requirements on the Halal transportation model establishment, examination and validation were fulfilled on the settings of latent construct interaction between belief as antecedents; attitude, norm and PBC as predictors; intention to use as a mediator; and actual behaviour as an endogenous variable.

Table 10.7 Path analysis of latent constructs

Exogenous	*Endogenous*	*Estimate*	*P-Value*
Behavioural belief	Attitude	0.993	0.000
Behavioural belief	Perceived behavioural control	0.405	0.000
Normative belief	Subjective norm	0.901	0.000
Attitude	Intention	0.281	0.000
Perceived behavioural control	Intention	0.362	0.015
Subjective norm	Intention	0.170	0.000
Attitude	Actual behaviour	0.197	0.005
Perceived behavioural control	Actual behaviour	0.477	0.000
Subjective norm	Actual behaviour	0.130	0.092
Intention	Actual behaviour	0.322	0.000

Table 10.8 Average variance extracted of variables

Variables	*Average variance extracted (AVE) matrix*						
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*
Attitude (1)	1.00	0.570	0.615	0.713	0.573	0.657	0.611
Subjective norm (2)	0.570	1.00	0.459	0.557	0.417	0.501	0.455
Perceived behavioural control (3)	0.615	0.459	1.00	0.602	0.462	0.546	0.500
Behavioural belief (4)	0.713	0.557	0.602	1.00	0.561	0.645	0.598
Normative belief (5)	0.573	0.417	0.462	0.561	1.00	0.505	0.458
Intention to use (6)	0.657	0.501	0.546	0.645	0.505	1.00	0.542
Actual behaviour (7)	0.611	0.455	0.500	0.598	0.458	0.542	1.00

Table 10.9 Discriminant validity of variables

Variables	*Correlation and correlation square matrix*						
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*
Attitude (1)	1.00	0.363 (0.131)	0.405 (0.164)	0.990 (0.980)	0.433 (0.187)	0.495 (0.245)	0.568 (0.322)
Subjective norm (2)	0.363	1.00	0.436 (0.190)	0.344 (0.118)	0.941 (0.885)	0.410 (0.168)	0.730 (0.532)
Perceived behavioural control (3)	0.405	0.436	1.00	0.377 (0.142)	0.419 (0.175)	0.550 (0.302)	0.590 (0.348)
Behavioural belief (4)	0.990	0.344	0.377	1.00	0.445 (0.198)	0.462 (0.213)	0.579 (0.335)
Normative belief (5)	0.433	0.941	0.419	0.445	1.00	0.443 (0.196)	0.721 (0.519)

Intention to use (6)	0.495	0.410	0.550	0.462	0.443	1.00	0.685 (0.469)
Actual behaviour (7)	0.568	0.730	0.590	0.579	0.721	0.685	1.00

This research has configured seven latent constructs with 20 detailed items as a main guideline for logistics and supply chain practitioners in ensuring Halal transportation practices. Goodness of model fit on the validation of Halal transportation was also confirmed as further guidance on the implementation of Halal transportation in the dynamic movement of the logistics industry (see Tables 10.5 and 10.6).

Results of hypothesis testing

The present study confirmed an achievement of research objectives on the establishment of a Halal transportation model in Malaysia (see Tables 10.7 and 10.10, and Figure 10.9). Table 10.10 determines the results of the the hypothesis testing which confirmed the re-specified model Halal transportation as a main result of the analysis. BB (β = 0.993) and NB (β = 0.901) were confirmed as significant antecedents for attitude and subjective norm (see Table 10.8). Based on modification indices, CB was eliminated from the interaction process (*hypothesis 1c rejected*); fundamentally, this study also found that BB has a direct positive significant influence on the PBC (β = 0.405). Hypotheses 1a, 1b and 1d were accepted, and the final hypothesis also fulfils the modelling requirement, which contributes to the significant interaction among antecedents to the predictors of Halal transportation in Malaysia and jointly together as a model of Halal transportation (Hypothesis 4).

Table 10.10 Results of hypothesis testing

Hypothesis	*Statement*	*Path coefficient*	*P-Value*	*Remarks*
1	Behavioural, Normative and Control beliefs are confirmed as antecedents of Halal transportation service predictors (Attitude, Subjective Norm and Perceived Behavioural Control).			
1a	Behavioural belief has a direct positive significant influence on the Attitude.	0.993	0.000	Hy.1a Asserted
1b	Normative belief has a direct positive significant impact on the Subjective Norm.	0.901	0.000	Hy.1b Accepted
1c	Control belief has a direct positive significant influence on the Perceived Behavioural Control.	.	.	Hy.1c Rejected
New Pathway	Behavioural belief has a direct positive significant influence on the Perceived Behavioural Control.	0.405	0.000	Hy.1d Asserted
2	Attitude, Subjective Norm and Perceived Behavioural Control confirmed as predictors of Actual Behaviour to use Halal transportation services.			
2a	Attitude brings a positive impact on the Actual Behaviour to use Halal transportation services.	0.197	0.005	Hy.2a Asserted
2b	Subjective Norm brings a positive impact on the Actual Behaviour to use Halal transportation services.	0.130	0.092	Hy.2b Rejected
2c	Perceived Behavioural Control has a positive impact on the Actual Behaviour to use Halal transportation services.	0.477	0.000	Hy.2c Accepted
3	Intention plays a mediation role on the relationship between Attitude, Subjective Norm and Perceived Behavioural Control on the Actual Behaviour to use Halal transportation services.			

3a	There is a mediating effect of Intention on the relationship between Attitude and Actual Behaviour of using Halal transportation services.	(0.281 X 0.322 = 0.09); (0.197 + 0.09 = 0.287)	0.000	Hy.3a Asserted
3b	Intention contributes a significant impact on the influence of Subjective Norm and Actual Behaviour to use Halal transportation services.	(0.170 X 0.322 = 0.05); (0.130 + 0.05 = 0.18)	0.000	Hy.3b Asserted
3c	Intention has a mediation effect on the relationship between Perceived Behavioural Control and Actual Behaviour in using Halal transportation services.	(0.477 X 0.322 = 0.15); (0.477 + 0.15 = 0.627)	0.000	Hy.3c Accepted
4	There is a significant interaction between Belief, Attitude, Subjective Norm, Perceived Behavioural Control and Intention to use in the Actual Behaviour to use Halal transportation services.	SMC = 0.749 => 75% *P*-Value. 0.103: *P*-Value Model > 0.05		Hy.4 Accepted

This study also hypothesised a series of direct and indirect effect relationships between Halal transportation predictors (attitude, subjective norm and PBC) on the actual behaviour and mediated by their intention to use. Hypotheses 2 and 3 were accepted on the detailed significant interaction to formulate Halal transportation model in the context of Malaysian logistics industries (see Table 10.8).

Discussion and implication for logistics practitioners

A major issue highlighted in the Halal industry is the shortage of qualified and knowledgeable workforce that understands the Halal and Shariah law requirements pertaining to Halal food production. These studies mentioned that while anyone may have the right understanding, it has been a challenge to apply the theoretical knowledge to actual day-to-day industry operating practice. These studies claimed that the current workforce in the Halal industry, of both skilled and semi-skilled workers, who work in the front line of the supply chain, do not have proper training in terms of maintaining the integrity of Halal products. Therefore, a shortage of qualified and well-trained workers in the Halal industry may affect or compromise the Halal status or Halal integrity of the food products moving along the supply chain.

However, due to its rapid growth, the industry faces a shortage of competent workers at every level of operations and management. People who are working in the Halal industry must be able to demonstrate comprehensive knowledge and understanding of both theoretical and practical Halal principles and practices. The workforce in the Halal food industry extends beyond the people performing the slaughtering process. The rest of the workforce in the daily production line operations, including management, should also be given the necessary awareness and education to prevent unnecessary action that might compromise the Halal status of the product that has been produced.

Due to the nature of Halal food, whereby Halal status is impossible to determine, even after consumption, Halal food manufacturers must first rely on the integrity of their supplier in providing them with raw materials that fit under the religion's requirements. Once the Halal raw materials have been procured, it is the responsibility of the food manufacturers to protect Halal status by incorporating Halal values in to the production activities. The same

principle is applied to the service integrity, in which the element of human interface is crucial, such as the competency of the workers in handling Halal food. This is key in order to prevent any incidents of cross-contamination that result in the loss of the Halal status. While the aforementioned issues are commonly found in the Halal industry in both Muslim and non-Muslim countries, there are issues that are more prevalent in non-Muslim countries. Due to the absence of Halal regulation in the non-Muslim countries, any organisation can provide or claim to provide Halal certification and inspection services for those food manufacturers that want to enter the Halal market. This has led to growing scepticism among Halal consumers and manufacturers on whether these certification bodies are trustworthy.

Meanwhile, in Muslim countries, enforcement issues are often caused by the conflict of authority and governance between the relevant Halal authorities (Talib et al., 2015). This is alarming since it has happened in Malaysia, a country where most of the population is made up of Muslim followers; the country has been viewed as the leading role model in championing the Halal industry. The Islamic Manufacturing Practice (IMP), which was introduced in Malaysia in 2005, provides a guideline of systems that are aligned with Shariah, ensuring the integration of 'halalan-toyyiban' elements into the production process. However, the usage of IMP was not widely practised as it seems to be impractical for international markets, and thus, it needs more improvement for more standardisation of "halalan-toyyiban" (Dasuqkhi et al., 2014). This situation proves that it is fundamental to have clearly defined roles and responsibilities among the various supply chain stakeholders, particularly pertaining to Halal governance, to protect the image of the Halal food industry and the consumer's interest.

Conclusion and recommendations

This conceptual framework provides explanations on the focus of this study. As the goal of the Halal supply chain is to protect Halal integrity, or, in simpler terms, to ensure that the Halal product remains Halal throughout the supply chain, it is crucial that all stakeholders in the container transportation providers play their part to ensure that the needs of the Halal consumer can be met successfully. To achieve this, the roles and responsibilities of stakeholders need to be clearly outlined and understood so as to avoid any unintentional loophole that can put the Halal supply chain goal at risk. Despite this, there is a also a need to realise that in performing their different roles and responsibilities, the actions taken by the various groups of stakeholders are somehow influenced by the forces surrounding the Halal supply chain environment.

Furthermore, based on the hypothetical model that was developed, the study shows that reinforcement intention should be analysed in depth by government authorities and governance between the relevant Halal authorities. This is done to exemplify the conflict between the relevant Halal authorities and transportation companies involved in container providers. In Malaysia, Jabatan Kemajuan Islam Malaysia (JAKIM) set up guidelines and procedures for handling Halal transportation (containerisation). According to these guidelines, container providers or transportation companies need to do ritual cleansing, also

known as Sertu cleansing, before they stack Halal products into their containers (Talib et al., 2017). The issues are raised when there is no monitoring from relevant Halal authorities of the handling process implemented in the container provider's places. When there is no monitoring or enforcement by Halal authorities, there will be loopholes in performing Halal transportation in supply chain context.

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11 The development of Halal logistics standards in South-East Asia

Halal supply chain standards (MS2400) as a principal reference

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Introduction

Malaysia is known as a leading country in the world that drives global Halal standards. Standards can be referred to as an agreed way of doing something which is related to the established norms, practice or requirements of any task or activity. Essentially, they can be referred to as a document that provides guidelines that integrate the process flow, the methods and the technical criteria of any practices. While Halal standards are denoted as a practice or requirements that follow Islamic law, they are normally created or developed by bringing together the authority and all interested parties, such as manufacturers, customers, retailers and Halal promoters as well as regulators of the specific material, product, process or service.

At present, the Halal standards establishments in many countries in Southeast Asia (SEA), such as Thailand, Malaysia, Indonesia and the Philippines, are designed specifically for each of these countries. The lack of one global Halal standard may result in difficulties for many Halal players across the globe as some of the countries may not accept the Halal accreditation of other nations. This may lead to more difficulties for the Halal players, especially in penetrating the world Halal market. Recognizing this as a big issue, Malaysia and SMIIC (The Standards and Metrology Institute for the Islamic Countries) have agreed to work together to bridge this gap. SMIIC and Malaysia (led by the Standards Department of Malaysia and JAKIM) are currently working together to establish one international standard known as Halal supply chain as a main reference for every country in the world. The lack of a global Halal standard is making it difficult for products meant for Muslims to penetrate the world market. The main idea of developing a Halal supply chain standard is to maintain the Halal integrity of the Halal product throughout the supply chain activities, from point of origin to point of consumption. As highlighted in a recent study by Majid, Kamarulzaman,

Rahman, Jaafar, Rahman and Mohammad (2019), Halal integrity refers to the effort required to maintain the Halal status of any Halal product throughout the supply chain.

Realizing the importance of the Halal standards development, this study aims to explore in detail the Halal supply chain standards in SEA, using Malaysia as its main reference case in discussion. Malaysia was chosen as the main case for Halal supply chain because it is a leading country in the world and developed Halal standard. Halal supply chain standard in Malaysia is recognized as MS2400. It has three parts: namely transportation, warehousing and retailing. Even though MS2400 is mostly used in specifically Malaysian Halal activities, it has been referred to by many countries worldwide as a guideline in exploring and implementing Halal logistics and supply chain. In this study, the discussion of Halal supply chain covers three main elements in the standards: namely Halal transportation, Halal warehousing and Halal retailing. MS2400 Halal supply chain standards were previously known as MS2400 Halalalan Toyyiban Assurance Pipeline – Part 1 (Transportation), Part 2 (Warehousing) and Part 3 (Retailing). Therefore, the deliberation of the key changes of old and new versions of MS2400 is also presented. The chapter starts with a discussion of the Halal ecosystem and Halal supply chain, followed by Halal standards in Malaysia and the main content of MS2400. Then the discussion is moved to the research method used in this study, and the key findings of the main changes of MS2400 are discussed. The chapter concludes with contribution, implication for practitioners and social recommendation for future Halal scholars.

Halal ecosystem and Halal supply chain

The rise of the Halal economy globally reflects the increase in the demand for the Halal products worldwide. Halal is not a new concept. It has been seen as a brand related to Muslim people or the Islam religion (Wilson and Liu, 2010). In principle, it touches every aspect of Muslim life, such as consumption, food ingredients, speech, things as well as action. Halal is an Arabic term that consists of two elements: namely permissible and “Thayyib” (Khairuddin et al., 2018; Rahman et al., 2018a). Permissible is connected to “Shariah” or Islamic law, which means that products must not be harmful and must be safe for consumption while “Thayyib” refers to cleanliness. Essentially, Halal can be viewed from three different perspectives: namely, from Islamic law, business point of view and scholars’ perspectives. It is acknowledged that a Muslim is strictly directed to consume Halal products or services as this is an order from Allah (God) and part of Islamic faith. It is also acknowledged that the main reference for Halal is the Holy Quran and Hadith. A recent article by Rahman, Mohamad, Muda, Majid and Noh (2018a) highlights the four main chapters in the Holy Quran which clearly explain Halal: namely chapter Al Baqarah verse 168, chapter Al Maidah verse 88, chapter Al Anfal verse 69 and chapter Al Nahl verse 114.

Several reports discussed a rapid expansion in the Halal population globally. Recently, Global Islamic Economic Report (2016) has highlighted that Muslims are the second-largest population in the world after Christians, with the top five biggest Muslim populations being from Indonesia, Pakistan, India, Nigeria and Iran. An earlier study by the Pew Research

Center has also shown that the total population of Muslims in the world is rapidly increasing year by year, with an estimate to reach 2.76 billion in the year 2050. The growth of the Muslim population globally is a prime factor pushing demand for Halal products as well as Halal services. In fact, the demand for Halal products is coming not only from the Muslim population but also from non-Muslim people as Halal products are not only recognized as wholesome to eat, of good quality and clean to use (Tieman, 2011, 2013). The increase in the size of the Muslim population, as well as Muslim tourists, has led to an increased number of Halal product demands. The greater number of Halal products and services demand has made the Halal ecosystem grow faster and wider universally. Halal products and services have expanded from food to the banking sector; hotels; pharmaceuticals; personal care; and many other sectors, including tourism (Rahman et al., 2018a). To recognize the Halal ecosystem, the living (people) and the system (Halal-related system) components should interact well in the Halal environment to ensure that every party receives benefits to support better understanding in balancing the Islamic requirement and the harmonization of the living community.

Halal has become a trend in Malaysia, and this has successfully increased the number of tourists to Malaysia (Rahman et al., 2018b). Malaysia is known as a Halal country, with almost all of their restaurants being Halal. It is a leading country that supports Halal tourism activity as it provides Halal spas, Halal saloons, Halal in-flight menus, Halal banking, Halal hotels and Halal logistics (including Halal transport, warehouse and packaging).

Currently, there are about 16 Halal-related systems that have been identified in supporting the Halal community. As shown in Figure 11.1, the 16 Halal systems that support the Halal ecosystem are coming from both Halal products and Halal services. These are Halal food, Halal animal feed, Halal banking, Halal hotels and tourism, Halal spas and saloons, Halal clothing and fashion, Halal cleaning, Halal music, Halal jewellery, Halal medical devices, Halal education, Halal leather, Halal ingredients and additives, Halal cosmetics and personal care, Halal pharmaceuticals and Halal logistics. Of these 16 types of Halal ecosystems highlighted in Figure 11.1, we could classify nine as Halal products and seven as Halal services. As seen in the figure, the Halal ecosystem is a dynamic system that integrates many parties together in a social living network. This includes business institutions, government agencies, non-government agencies and personal family members. In order to establish a Halal ecosystem, all people, including non-Muslims, should support and engage as a part of this system. This is important in maintaining the integrity of the Halal products and services.

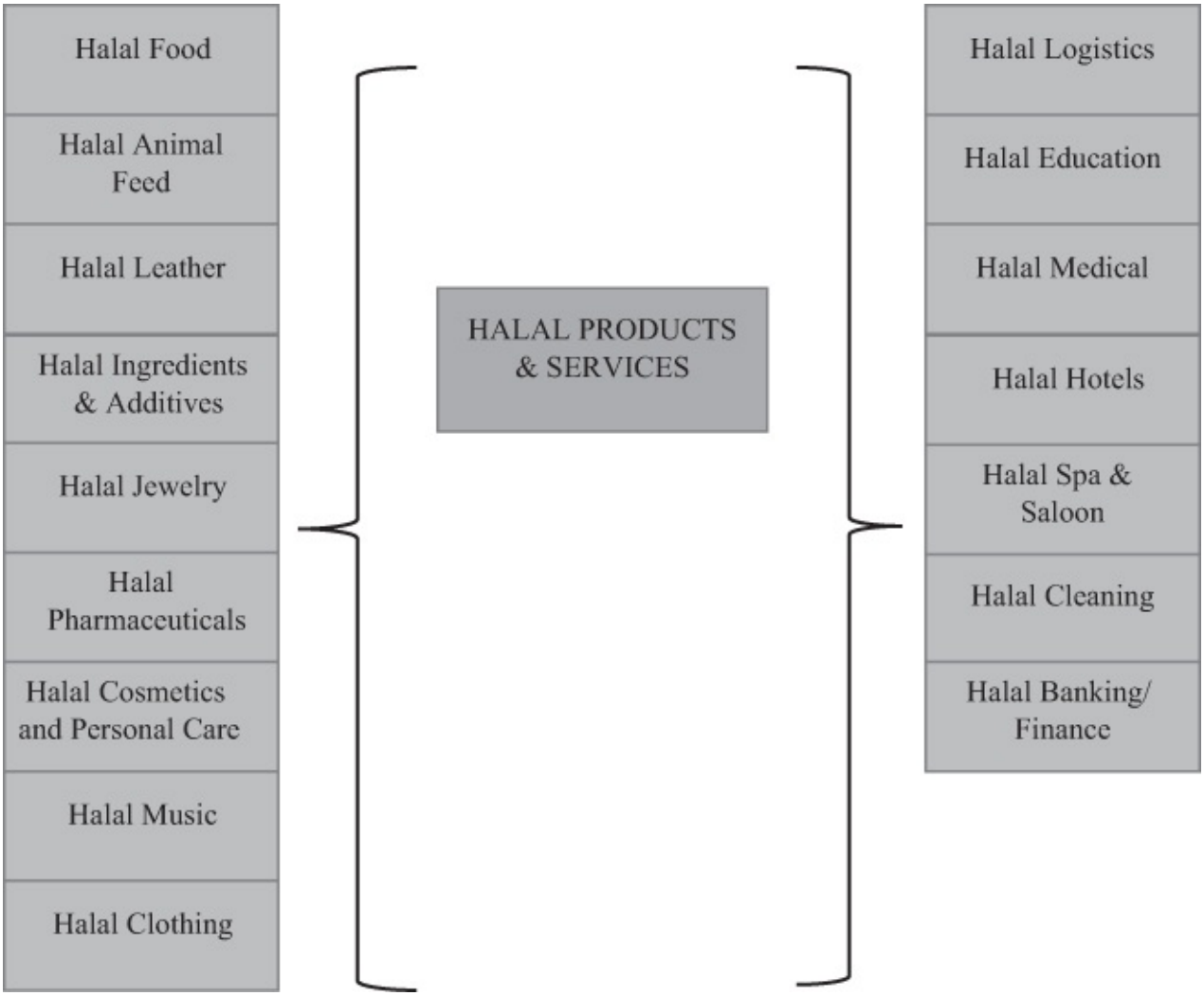

Figure 11.1 Halal ecosystem – products and services.

Source: Developed by the authors (2019).

Based on the aforementioned discussion, logistics has been stated as one of the sectors that supports Halal ecosystem. Halal logistics plays a primary role in ensuring that the ecosystem is working smoothly. Logistics has been seen as a key component in supply chain activity that supports the movement of the product from one location to another (Rahman, 2012). Logistics can be defined as an outsourcing activity that includes transportation and warehousing in supply chain channel that links supplier to manufacturer, wholesaler, retailer and customer (Rahman et al., 2017a). One of the key roles of a logistics provider is to ensure the product they deliver arrives as scheduled, with the same quality before delivery (Rahman et al., 2014). In many cases, the name of the logistics company is the logistics branding (Rahman et al., 2017a). It is important to note that the use of logistics service providers who are experts in transportation and warehousing activity are becoming prevalent as most organizations have realized that the effectiveness of their supply chain is too much dependent on their logistics services (Hamid et al., 2014; Talib and Hamid, 2014; Rahman et al., 2017b).

In supporting the Halal ecosystem, Halal logistics players play a significant role in ensuring that the status of the Halal products they carry is still Halal. As mentioned by Shariff and Ahmad (2015), the basis of Halal transportation and warehousing is to ensure

physical segregation of Halal products and non-Halal products. This means that dedicated transport is necessary to avoid cross-contamination during transportation activities (Ngah et al., 2014, 2015). A substantial number of past studies on logistics services have been performed, but not many look into the Halal logistics study specifically in transportation and warehousing activity. Even though quite a few studies have been identified, there is still a paucity of research in the area of Halal logistics compared to other Halal studies in the area of Halal food, Halal banking and Halal travel. In fact, among the 16 types of Halal products and services that exist in the Halal ecosystem, Halal logistics plays a significant role in maintaining the integrity of the Halal status of products, ensuring that it remains Halal from point of origin to point of consumption. Halal logistics is responsible for moving a product from one location to another, making it a significant topic for study which has been chosen as the subject of this chapter. Again, Halal logistics supports Halal tourism activity, especially regarding the movement of products across the Halal ecosystem.

A recent study by Rahman, Mohammad, Rahim and Noh (2018b) explains that Halal logistics includes a process of transportation, packaging, warehousing and storing. During each activity throughout the supply chain, it is vital to ensure that there is no possible chance of cross-contamination between Halal and non-Halal or Haram substances. The cleanliness aspect of the process or services is also important to ensure that the security aspect of the Halal product is well guarded (Rahim et al., 2016). As mentioned earlier, Halal is not only about permissible but also about clean and wholesome products, being used or consumed. Hence, the participation of a Halal logistics service provider (HLSP) in each supply chain is critical to ensuring that the status of Halal products that they carry throughout the supply chain is still Halal when they reach their final destination. The role of HLSP activity in supply chain networks is explained in Figure 11.2. This figure shows the two main activities by HLSP: namely transportation and warehousing. These activities are key for HLSP for both inbound and outbound activities as well as for both direct and reverse logistics activities.

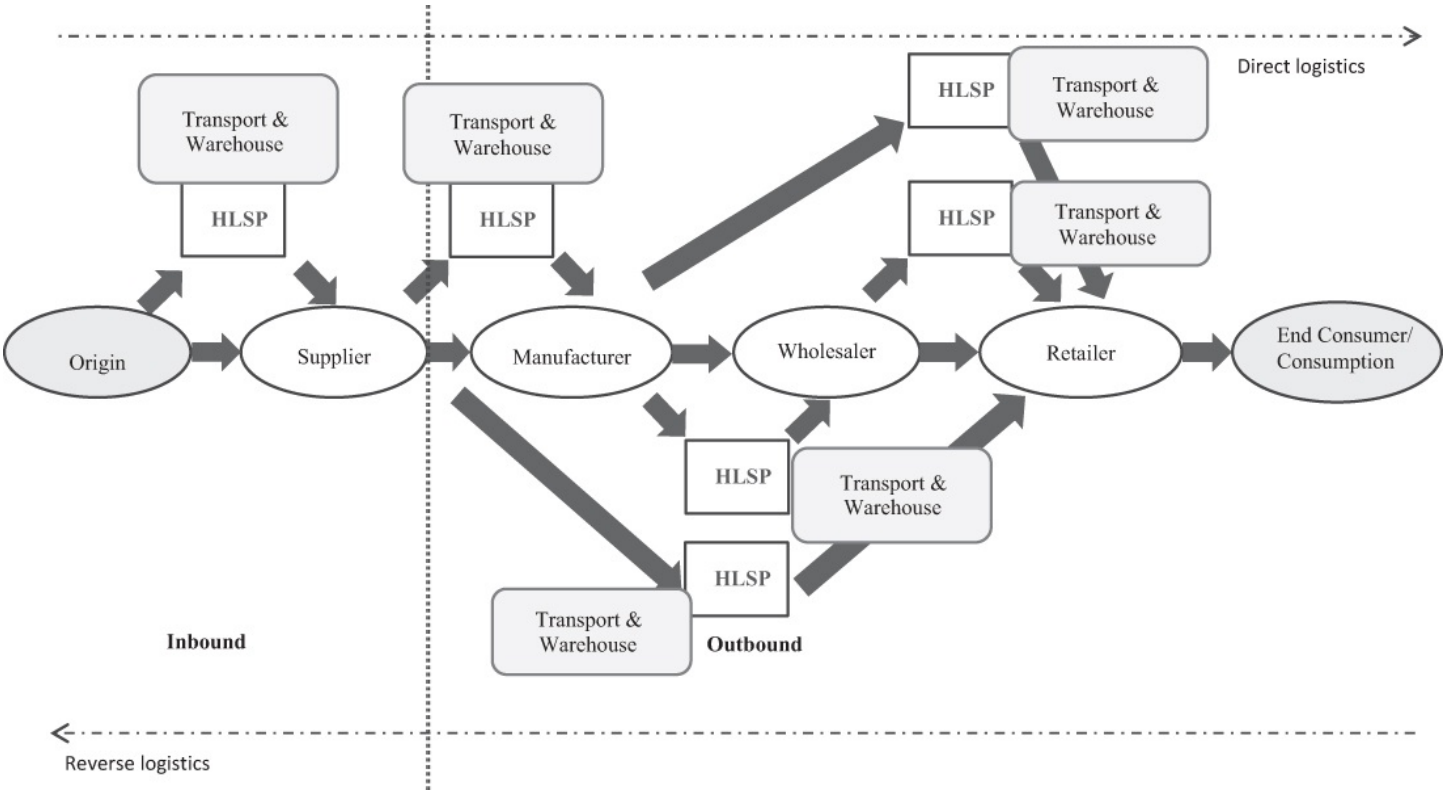

Figure 11.2 Halal logistics service provider (HLSP) and its main activity with reference to MS2400 Halal logistics standards.

Source: Developed by the authors (2019).

In order to help the HLSP to further understand their role and responsibility in carrying and handling Halal products, the Standards Department of Malaysia, together with certification body JAKIM (Jabatan Agama Kemajuan Islam Malaysia), has established Halal logistics standards. Since Halal logistics is a service, this document has been established to help the HLSP to smoothly provide their services according to Shariah compliance. The Halal logistics standards developed by the Standards Department of Malaysia, known as MS2400 Halalan-Toyyiban Assurance Pipeline – Management System Requirements for Transportation of Goods and/or Cargo Chain Services, are the main reference document for HLSP. MS2400 is considered a Halal management system that requires the HLSP to comply with certain Shariah requirements in order to maintain the integrity of the classification of the Halal products that they carry or store at the warehouse.

This standard was established in 2010 and used as a reference for HLSP extensively. As in February 2018, there have been about 86 logistics companies in Malaysia that have been Halal logistics certified by JAKIM. However, this number is only about 2% from the total number of logistics players in Malaysia. The HLSP is certified by the certification body JAKIM based on the evaluation of the Halal logistics management system they have in their organization. In detail, the main reference of MS2400 standards has been used by JAKIM to evaluate the HLSP. This shows the importance of MS2400 being carefully developed, analysed and revised.

As shown in Figure 11.2, the HLSP activity at each point of supply chain activity must adhere to MS2400 standard. This is important in ensuring that the integrity of Halal products

is safeguarded. It is the role of HLSP to carefully consider every aspect of management system in their logistics activity, especially during transportation and at the warehouse, and to avoid the products getting contaminated by non-Halal or Haram substance.

MS2400 Halal logistics standards represent a document developed by the Standards Department of Malaysia in the year 2010. It was developed to facilitate issues in Halal supply chain management, such as how to ensure Halal integrity from farm to fork, when material is being transported and when it is being stored. Essentially, there are three main objectives of MS2400 development. First, to assure that the products transported and stored at the warehouse are in accordance with Halal requirements. Second, to ensure that the physical contact between Halal and non-Halal or haram substance has not occurred during transportation and warehousing activity. Third, to preserve the Halal integrity of the product during transportation and warehousing activity.

After almost a decade of MS2400 standards development, the Standards Department of Malaysia has decided to revise the content of MS2400 to update it and make it more user-friendly to the industry as well as public. At the same time, as the situation changes, and issues arise in the industry, especially among logistics players both small and large, they have revised this document to make it relevant to the industry. In fact, since this document is being used by HLSP to get Halal Logistics certified by JAKIM, it is also significant to review any weaknesses of the document to help the logistics players ensure the ease of the process of the Halal logistics certification process.

A detailed and precise but friendly approach to the Halal logistics management system is required. This is the main aim of the revision of MS2400. Beyond this, the objective is also to harmonize the discussion in the standard with other Halal standards, especially for the three main standards in MS2400, specifically in transportation, warehousing and retailing. Therefore, in this chapter, the authors will focus more on MS2400 to highlight the new content of Halal supply chain standard that can be used as a central document to establish Halal supply chain standards in SEA. In fact, this manuscript will be very beneficial to the reader and Halal players across the globe in helping them to further understand the main components that make transportation warehouse ‘Halal’. The terms ‘Halal transportation’ and ‘Halal warehousing’ have attracted great attention from many scholars and academicians as well as from the Halal business players. The next section will discuss Halal standards in Malaysia.

Halal standards in Malaysia

The Standards Department of Malaysia is a national accreditation body under the Ministry of Energy, Science, Technology, Environment and Climate Change (MESTECC). It is well-known that JAKIM is a government body that enforced Halal guidelines and is responsible for establishing the Halal logo as well as implementing the Halal certification system. Together with JAKIM and the Standards Department of Malaysia, the Halal Development Corporation, also known as HDC, is in charge of promoting the Halal industry (JAKIM, 2010). HDC exists to boost the Halal industry in Malaysia, allowing it to be developed and

enhanced worldwide. The lack of references in the global Halal standard is the main challenge for industry players in monitoring the business operation and its integrity. According to Zulfakar, Anuar and Talib (2014), having Halal standards is vital to support and facilitate Halal business, which enables the companies to abide by relevant laws and regulations.

To date, 15 Halal-related standards have been developed in Malaysia, covering many sectors in products and services. All 15 Halal-related standards have been used by both the industry and scholars to further their understanding of the requirements of Islamic principle ("Shariah" compliance). Table 11.1 highlights the 15 Halal-related standards that have been established in Malaysia. The box highlighted in orange refers to the three parts of the MS2400 Halal logistics pipeline: Part 1 (transport), Part 2 (warehouse) and Part 3 (retail).

Table 11.1 Halal-related standards developed by Standards Department of Malaysia

No	*Halal standards document*	*Description*
1	MS1500:2009	Halal food
2	MS1900:2014	Shariah-based QMS
3	MS2610:2015	Muslim-friendly hospitality
4	MS2424:2012	Halal pharmaceuticals
5	MS2393:2013	Islamic and Halal principles
6	MS2627:2017	Detection of porcine DNA in food
7	MS2200-1:2008	ICG – Cosmetics personal care
8	MS2565: 2014	Halal packaging
9	MS2200-1:2008	ICG usage of animal bone
10	MS2594:2015	Halal chemical for water treatment
11	MS1900:2015	QMS Islamic perspectives
12	MS2300:2009	Value-based management system
13	MS2400-1: 2019	Halal supply chain – transport
14	MS2400-2: 2019	Halal supply chain – warehouse
15	MS2400-3: 2019	Halal supply chain – retail

Source: Developed by the authors (2019)

Content of MS2400

Generally, all three MS2400 Halal logistics standards have seven components. The main content of these three MS2400 standards is explained in Table 11.2.

Table 11.2 Main content of earlier version of MS2400 Halal logistics – transport, warehouse and retail

MS2400	*Main content*
MS2400-1:2010, Halalan-Toyyiban assurance pipeline – management system requirements for transportation of goods and/or cargo chain services.	This MS prescribes management system requirements for assurance of the Halalan-Toyyiban integrity of goods and/or cargo being handled through the various modes of transportation.

MS2400-2:2010, Halalan-Toyyiban assurance pipeline – management system requirements for warehousing and related activities.	This MS prescribes management system requirements for assurance of the Halalan-Toyyiban integrity of products, goods, and/or cargo during the warehousing and related activities through the entire process from receiving to delivery.
MS2400-3:2010, Halalan-Toyyiban assurance pipeline – management system requirements for retailing.	This MS prescribes management system requirements for assurance of the Halalan-Toyyiban integrity of products and/or goods at the retailing stage of the Halalan-Toyyiban assurance pipeline.

Source: Standards Department of Malaysia (2019) MS2400

Essentially, in all three standards documents, there are seven categories of explanation on the Halal logistics management system. The seven categories discussed in these documents are scope, terms and definitions, requirements, preliminary steps to enable risk management, operation of a Halal risk management plan, general requirements (premise, infrastructure, facilities and personnel) and assurance pipeline.

Research methodology

This exploratory study starts with an observation, followed by content analysis. It adopted an abductive approach in which the researcher made a conclusion from the observation that they performed during the national consultation session as well as a content analysis on the newly published MS2400 Halal supply chain. According to Shah (2016), abduction is generally understood as reasoning from effect of observation to the possible explanations. In this study, an observation was made by the researcher based on the public comment or national consultation session that was held at Sama-Sama Hotel, Kuala Lumpur, in May 2018.

Simultaneously, content analysis is also performed based on the documents gathered at the national consultation session as well as from the desk research activity. Content analysis is known as a text interpretation method in which the researcher derives the themes from the analysis of the document content used (Rahman, 2017b). Fundamentally, Autry, Zacharia and Lamb (2008) propose that observing the phenomena is the earliest steps that a qualitative researcher can take in exploring their scientific inquiry. Carper and Snizek (1980) propose that during the observation, the researcher should classify a complex set of interrelated phenomena by looking at recurring patterns and common traits among elements.

Discussion

What are the key revisions on MS2400?

In the observation from the national consultation, five main modifications on MS2400 are highlighted. There are classified as title, normative reference, improvement of terms and definition use in the standard documents, amendments of requirements and amendment of annexes. All five major revisions of MS2400 are illustrated in Figure 11.3.

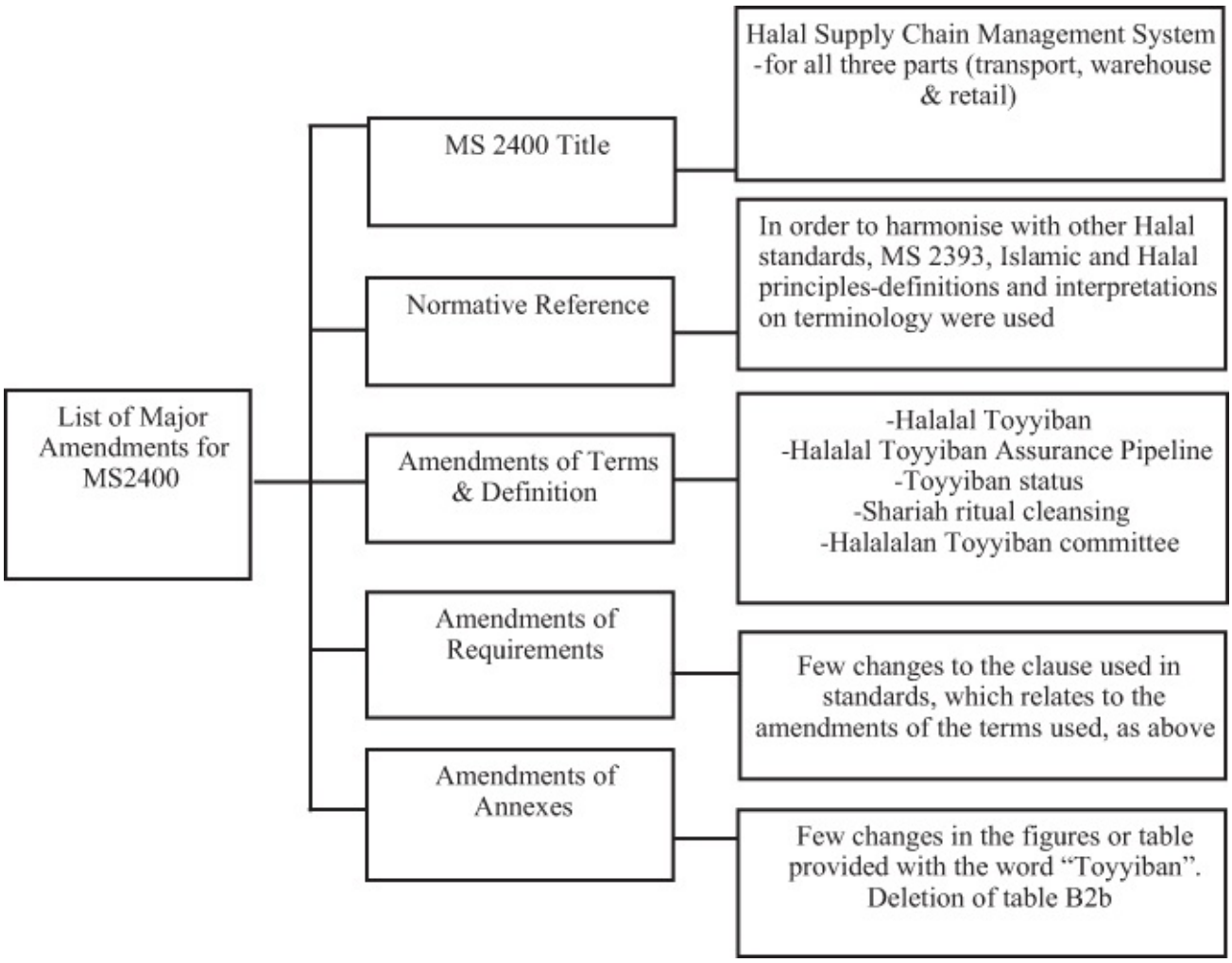

Figure 11.3 Major revision from MS2400 Halal logistics to Halal supply chain.
Source: Developed by the authors (2019).

Conclusion, contribution and future research opportunities

To conclude, with the newly revised MS2400 Halal supply chain management, all three parts, especially transportation and warehousing, are more comprehensive. The improvement on the five main areas – title, normative reference, amendment of the term, amendment of requirements and finally modification on annexes – leads to a more established document that can be recognized as a standard document that facilitates both personal users and organization.

This study contributes to the social, to the practitioner and to the theory in three different ways.

A personal user or consumer could improve their understanding of each process highlighted in the Halal supply chain standard MS2400 with a more detailed explanation on the facilitation process of maintaining Halal integrity throughout supply chain activity. In fact, a specific facilitation process is very useful for social understanding of the process involved in maintaining the integrity of the Halal product during transportation and warehousing activity.

Subsequently, the new revision on MS2400 is also worthwhile for practitioners in all industries involved in Halal. Guidance on facilitating the Halal process could be followed as a key reference for them to use in getting certified in Halal logistics activity. In addition, this document, which is also used by the certification body JAKIM, is abreast of the most recent industry-academician network.

A number of frontiers' research topics are proposed in this study. Halal logistics and supply chain is the central area that needs to be focussed on in future research to support the Halal ecosystem, including Halal tourism in SEA. There is a big opportunity for scholars to further explore every aspect of logistics in this region in order to support the Halal ecosystem, including the Halal tourism business, such as Halal service quality; Halal warehouse implementation; and Halal critical point during transportation, at the warehouse as well as in retail.

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12 Halal integrity, Halal logistics service provider (LSP)

Zawiah Abdul Majid, Mohd Farid Shamsudin

Introduction

The pioneer of the Halal standard on global logistics based on the “farm to fork” concept is required to ensure that Halal integrity is upheld throughout the food supply chain (Majid et al., 2019). Demand in the Halal food industry is increasing with the growth of the Muslim population; therefore, upholding Halal integrity is the key factor in Halal sustainability. However, the various definitions of integrity or Halal Integrity according to the stakeholders’ perspectives are unclear. Perceptions might vary, and this could create unnecessary misunderstandings due to different schools of thought. Therefore, this topic will enhance the understanding of integrity according to different views: namely from the perspectives of an individual, Corporate Culture, Halal, Food, Supply Chain and Halal Food Supply Chain.

Various definitions of integrity

The increase of Halal integrity awareness in supply chain had created high demand in terms of knowledge and practical solutions. The coverage of Halal integrity in supply chain is wide and crucial in fostering better understanding of Halal integrity philosophy. The question now is how can one uphold Halal integrity in ensuring that the “Halalness” of the product is guaranteed?

Based on that, the knowledge of the Halal integrity definition should be given extra attention to avoid any confusion. Integration and collaboration among Halal stakeholders are prerequisites in determining potential business growth for sustainability. In order to fully comprehend the meaning of Halal integrity in relation to Halal supply chain, let us look at the precise definitions of integrity. (Figure 12.1).

Figure 12.1 Various definitions of integrity.
Source: Developed by the authors, 2019.

Integrity

There are two concepts in the Islamic definition of Halal: purity and wholeness. In addition, the restoration and maintenance of that natural and primal state of purity is referred to as integrity. As mentioned in the Quran (Ar Rum 30:30)

> (O Prophet and his followers), turn your face single-mindedly to the true Faith, and adhere to the true nature on which Allah has created human beings. The mold fashioned by Allah cannot be altered. That is the True, Straight Faith, although most people do not know.

Integrity is one of the most important personal qualities that an individual in a position of power or responsibility must possess, be this in business or politics, public or private life (Akir and Malie, 2012). In every aspect of governance, many countries in the world invest in integrity enhancement and reinforcement. Integrity is the primary concern of many organizations in the countries. The thrust of integrity measurement taken by Transparency International (TI) shows initiatives embedded by the United Nations, World Bank and International non-profit organizations. However, the definition of integrity is debatable due to the differences in one's perspective.

At the same time, there are also various definitions of integrity based on renowned sources, as mentioned below. In the simplest, integrity means uncompromising adherence to a code of artistic, moral and/or other values that utters honesty, candor and sincerity. This avoids any type of shallowness, deception or expediency. Thus, integrity is the state or quality of being complete, perfect, entire and whole (Webster, 1995). It contains within it self

the core elements of honesty, reliability and trustworthiness. Eventually, there are more than seven definitions of integrity, as compiled by Ali, Tan and Ismail (2017).

Integrity as an individual

The characteristic of being ethical, honest, consistently considerate, transparent and compassionate can be classified as individual integrity. An individual posessing this quality is reliable and can be trusted in interactions with others. They are professional, trustworthy, acceptable, fair and justified in decision-making. In leadership involvement, decisions are balanced between respect and responsibility. Integrity represents critical roles toward success compared to a leader without integrity, who could not be successful due to their bad reputation in the organization. “Simply put, those who bend rules are not considered trustworthy, and without trust an individual’s value is severely diminished. Without trust and confidence, markets do not function, and value is destroyed” (Quigley, 2007, p. 9; Duggar, 2009). Let us look at the definition of integrity from the perspective of academic scholars. Akir and Malie (2012) defined integrity as the term of good governance that is followed by one’s ethical or moral convictions and as doing the right things in all circumstances, even if no one is watching. Integrity also involves keeping promises and acting consistently in a predictable way. There are, of course, many more definitions, by various researchers; the aforementioned two are among the prominent and latest in defining the word. One reason that integrity research may still be in its early stages is the failure of the literature to describe leader integrity fully and to use such descriptions to develop constructively valid measures (Moorman et al., 2012).

Integrity in a corporate culture

In any organization, changes of culture must always start from the top management and flow toward the entire organizational hierarchy. Always bear in mind that although there is a difference between personal integrity and corporate-level integrity, personal integrity, by definition, places more emphasis on the individual character’s trust and belief. Integrity at the corporate level is more concerned with how leaders can implement a new corporate culture and values that emphasize consistency, trust and predictable results.

Understanding integrity in Halal supply chain

Halal is a Quranic term that means “permitted, allowed, lawful or legal”. The opposite of Halal is Haram, which means “forbidden, unlawful or illegal”, based on the Department of Islamic Development Malaysia (JAKIM, 2008). The Quran has stressed heavily the consumption of Halal foods in numerous verses. One of them is translated as “O mankind, eat from whatever is on earth (that is) lawful and pure” (Quran 2:168). This verse emphasizes

two words. The first word is “Halal” (حلال). Halal literally means “Allowed, permitted or lawful”. The other word is “toyyib” (طيب), which means “good and pure”. Therefore, Halal is always associated with an act that is good and pure, which also requires the presence of hygiene, quality and sanitation. The combination of these words derived another term, “Halalan Thoyibban”, which means permissible and good (JAKIM, 2008). Al-Qaradawi (1999) indicated that there are four types of drinks and foods that are prohibited in Islam. These include, first, any food or drink which is clearly mentioned in the Quran. Second, Halal food that is contaminated with haram due to external factors. Third, any food that is harmful to the human body or health. Fourth, any food or drink filthiness which deteriorated its goodness and wholesomeness due to impurity.

Halal integrity

HDC (2008) states that the objective of the Halal network management is to ensure Halal integrity from origin to destination (consumer purchase). Meanwhile, Zulfakar, Jie and Chan (2012) mentioned that Halal integrity means that the condition of a product will remain consistently Halal from beginning to end, i.e. free from any contamination, whether on purpose or not. Hence, the Halal product quality is wholesome and pure all along the supply chain. On the other hand, Sungkar and Hashim (2009) defined Halal integrity as an instance in which the origin of Halal products (sourced, produced, processed, stored and distributed) is in accordance with Islamic values. In-addition, integrity involves applied modern and universal values of high quality and safety, produced hygienically with respect to animal welfare and traded fairly.

Food integrity

Safety and hygiene in food production is a top priority in ensuring food integrity to achieve customers’ satisfaction and confidence. However, the reputation of food integrity has tarnished food producers’ reputations due to various food scandals: namely, the horsemeat scandal in the UK and the Melamine milk scandal in China. With regards to the horsemeat scandal in the UK, the root cause of the problem concerning food integrity was multi-tier sourcing. This involved a complexity in supply chain as multiple products are used in the production, complicating the tracking of quality control. Globalization substantially increases the size of the supply chain as well as the complexity of Halal food integrity. This complexity in the global supply chain has resulted in challenges to the priority of ensuring food integrity. Hence, reliable relationships and integration along the supply chain toward safer food and better-quality product awareness should be more widely practiced. This could be addressed through standards, legislation, literature, practices and regulation. Furthermore, food consumed by Muslims must comply with the Islamic dietary code, and Muslim people must avoid food and beverages that are forbidden by the Quran and Sunnah.

Supply chain integrity

PricewaterhouseCoopers (2008) mentioned in the article “From vulnerable to valuable: how integrity can transform a supply chain” that integrity in supply chain must be encompassed in the two dimensions of operational and reputed. However, companies must adhere to all aspects of integrity in their supply chain management. Companies recognize that investments to enhance the integrity of supply chains not only are necessary to improve operations but can also set one apart from the competition (SupplyChain Brain, 2008). This will steer companies toward higher operational discipline and enhancement of cost savings. This is a desirable approach, but dramatic changes in the business environment are also absolutely necessary. The ability of the supply chain to meet objectives toward quality, productivity and financial performance is known as operational integrity. The supply chain ability to protect and enhance brand reputation, customer engagement and investor care, as well as legislation compliance, is referred to as reputational integrity. In addition, the executives are vulnerable to the risks in supply chain integrity, such as product safety; business ethics involving corruption, money laundering and bribery; condition of workplace; intellectual property rights; human rights and development issues on community; security; green environment (carbon footprint – climate change); economic development; purchasing; and the impact of the product on the environment (Price Waterhouse Coopers, 2008).

In summary, the process of Halal integrity must go through a few steps, as stated below: integrity is an ethical belief doing the right things. It covers both the organization and individual level. Organization culture ensures that standards are maintained throughout its structure, starting with positive leadership. Organization integrity also covers employee’s wellbeing and employee selection. Individual personality involves the willingness and readiness of individual to uphold trust and belief in individual character. Halal integrity is the act of keeping the entire supply chain process in accordance with the Halal principle. Integrity in supply chain is referred to as the ability to adhere to requirements in terms of objective, quality, productivity and financial performance.

Halal integrity in relation to the Halal management system

Understanding the importance of Halal integrity in relation to the Halal management system is crucial in offering an exceptional value, despite its complexity. Ensuring Syariah compliance in delivering a product or service efficiently from origin to final consumption at lowest operating cost results in the highest return on investment. The responsible authority and legal power JAKIM (the Department of Islamic Development Malaysia) is under the religious division of Malaysia’s Prime Minister’s Department. The Halal Industry Development Corporation (HDC) owned by Minister of Finance Incorporated reports to the Ministry of Finance (MOF), the authority responsible for the Halal industry in Malaysia. Among the list of JAKIM roles related to Halal are establishing the Malaysia Halal logo and implementing the Halal Certification System. Certification of Halal is issued by JAKIM, 2015 as the governing body for local and export markets (Figure 12.2).

	2008	2010	2015	2020
	Phase 1	Phase 2	Phase 3	
Development phase	Establish Malaysia as a global leader in Halal Integrity	Establish Malaysia as the preferred locations for halal-related businesses	Broaden geographic footprint or homegrown companies	
Strategy	Identify and develop industry leaders	Deepen capabilities	Broaden Geographic footprint	
Focus	• Consolidation • Development of anchor companies	• Increase industry standards • Increase innovation capabilities • Connecting to global supplier chain • Strengthening brands	• Outward investments of national champions • Lead some of the international industry development agenda or programs	

Figure 12.2 Master plan to achieve global Halal hub status by 2020.
Source: HDC (2008).

September 18, 2006, marked the establishment of the HDC and the task of coordinating overall Halal industry development in Malaysia, the frontline and entry or gateway to the world toward promoting the Halal industry and Halal knowledge enhancement for all. Halal is a global industry which will add value worldwide. Its development will lead to significant economic growth. Below are phases 1, 2 and 3 in the Malaysian Halal industry's plan to achieve global Halal hub status by 2020.

Below are HDC's three strategic trusts, including capacity development, brand development and Halal integrity. The first strategic trust, capacity development, is "ensuring the supply". As such, its facilitation occurs through the development of the Halal cluster, enhancement in the Halal production domestically and facilitation of investment in relation to Halal. The second strategic trust is brand development on "creating the demand". Hence, the promotion to industry on Halal value proposition, as well as the Malaysia Halal concept and the brand of HDC toward outreach and communication through strengthening the marketing. The third strategic trust is Halal integrity to ward "Protecting the eco-system" and campaigning toward world-class support in Halal through module development and enhancement of supply chain integrity.

Malaysian Halal standard (MS)

The objectives of the Malaysian Halal standard are to provide guidelines and awareness of the series of standards and their applications; to develop and provide guidance for organizations to establish and implement the Halal standard system within their organizations; to promote the opportunities and benefits embarking in the Halal Supply Chain; and to introduce HDC's Training Module on "Halal Supply Chain" – application and implementation on MS2400 series. Ensuring Halal integrity across the supply chain from origin to consumer purchase, avoiding contamination and guaranteeing that the product will be consumed or used.

The stakeholders in HFSC should be encouraged to understand the Halal standards structure, in addition to practicing Halal compliance accordingly (Figures 12.3 and 12.4).

Figure 12.3 HDC strategic trust.
Source: HDC (2008).

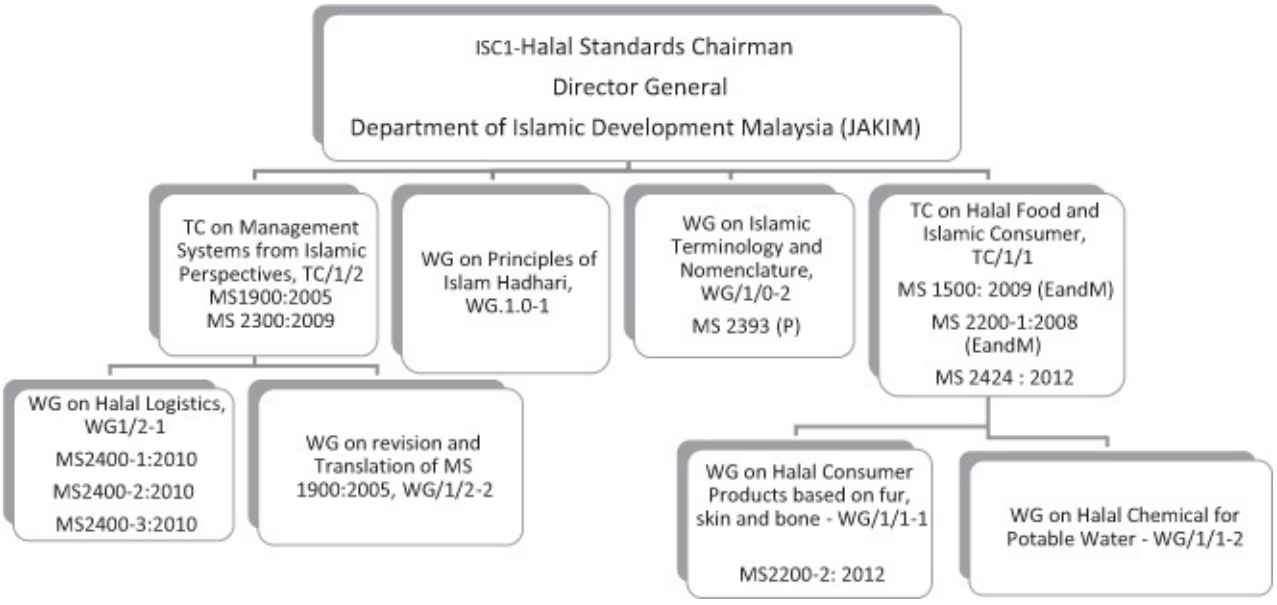

Figure 12.4 Halal standards structure.
Source: JAKIM (2012a).

As of today, there are five types of Halal standards available: first, MS1500: 2004 – Halal Food – Production, Handling and Storage. Second, MS1900: 2005 – Quality Management Systems. Third, MS2300:2009 – Value Based Management System. Fourth, MS2200:2008 – Cosmetic and Personal Care. Fifth, MS2400:2010 – Standard on Halal Logistics.

MS2400-1:2010: Halal Supply Chain –

Requirement for Transportation of Goods and/or Cargo Chain Services.

MS2400-2:2010: Halal Supply Chain – Requirement for Warehousing and related activities.

MS2400-3:2010: Halal Supply Chain – Requirements for Retailing (Figure 12.5).

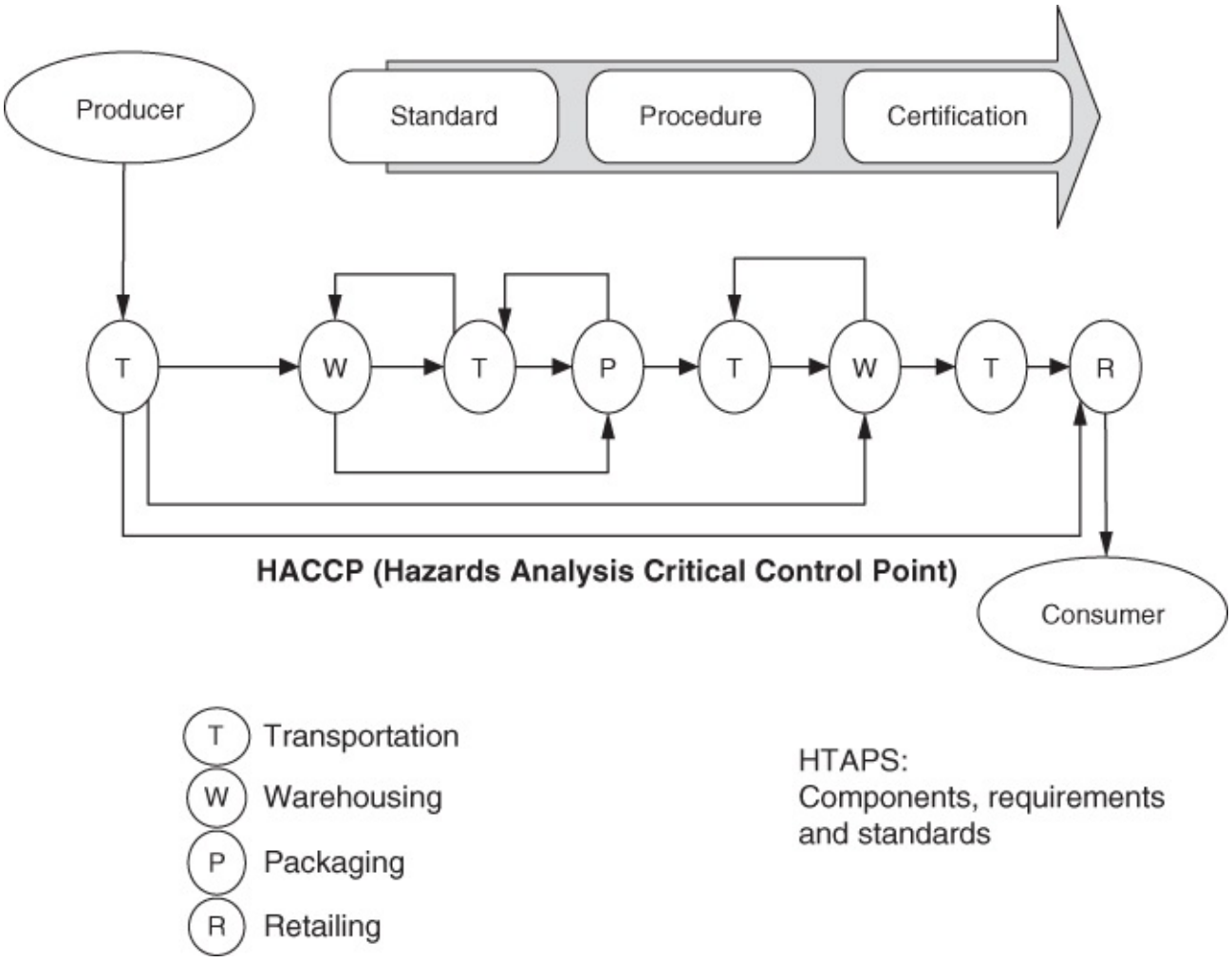

Figure 12.5 HTAPS: product handling process flow.
Source: JAKIM (2012b).

Summary of Halal integrity

An understanding of Halal integrity is necessary to manage Halal products as per the farm to fork concept of the supply chain. This is important in obtaining Halal certification. The reputation of Halal certification in domestic, and international Halal markets plays a major role in customers' perception. This will increase the confidence level of the consumer and lead to economic growth through an increase in the purchase order to manufacturers. This positive image of the country will strengthen the branding of Halal products and increase profitability toward business sustainability. Therefore, the need to train in Halal knowledge, especially the understanding of Halal integrity, is deemed crucial in line with Malaysia's aspiration to be the World Halal hub by 2020.

Discussion on Halal integrity issues and challenges

Research on Halal integrity has been gaining attention over the last decade. From time to time, they contribute to the literature with their empirical studies, adding more views, results and concepts to the topic. Among the topics covered are Halal integrity, Halal supply chain management, Halal control, Halal food supply chain integrity, and Halal food integrity from researchers and scholars with relevant expertise in these areas (Mohamad and Hassan, 2011; Tieman, 2011, 2012; Tieman et al., 2012; Zulfakar et al., 2014; Ali et al., 2017). The topic of research, however, received more attention as more researchers from all over the world started to conduct their research in the areas such as Halal integrity, supply chain, and food integrity as well as the process and standard required to establish a level of reference not limited to academics but including the industry as well.

Understanding the definition of Halal logistics service provider (LSP)

The clarification of logistics seems to assist stakeholders in logistics practices. Thus, it can help practitioners to avoid miscommunication and misinterpretation along the Halal supply chain. A dynamic level of communication can help maintain a good relationship in terms of networking and business collaboration. Therefore, good communication skills are paramount in building trust and commitment in supply chain management.

Logistics is the process of planning, implementing and controlling the efficient, effective flow and storage of goods, services and related information from point of origin to point of consumption while conforming to customer requirements. Note that this definition includes inbound, outbound, internal and external movements, and return of materials for environmental purposes.

Logistics management is the part of supply chain management that plans, implements and controls the efficient, effective forward and reverse flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers' requirements.

Halal logistics is a process of planning, implementing and managing the efficient, seamless flow and storage of Halal-certified products (raw materials, semi-finished or finished goods) from origin to final consumption, ensuring full Syariah compliance. Halal logistics service provider (HLSP) is required to be certified by JAKIM according to the Malaysia Halal Logistics Standards: MS2400-1-2010 Distribution, MS2400-2-2010 Warehousing and MS2400-3-2010 Retailing.

LSP is a company that manages the flow of goods and materials between points of origin and end-use destinations. The provider will often handle shipping inventory, warehousing, packaging and security functions for shipments.

HLSP roles are crucial in assuring Halal integrity in supply chain management. A prerequisite is to have better understanding of the roles and challenges of HLSP, especially in handling Halal food or products and ensuring Shariah and Halal law compliance.

Logistics services is a term that refers to a supply chain management process that plans, implements and controls the efficient and effective flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers' requirements.

The **main services** in this area are as follows:

- Warehousing, storage and inventory management services.
- Transportation services.
- Freight forwarding/customs clearance and shipping services.
- Integrated Logistics Services (ILS).
- International Integrated Logistics Services (IILS).
- Cold Chain Facilities.

(Source: MIDA, 2012)

Logistics service provider (LSP) roles

Logistics service provider (LSP) challenges

LSP roles include planning, implementing and controlling the efficient, effective flow and storage of goods, services and related information for warehousing, storage and inventory management services, not limited to packaging, labeling or re-packing, including offering transportation services from the farms to their destination using a selected mode of transport (Air, Land – Road or Rail, Sea – Vessel). The choice in mode of transport is based on the movement of goods pertaining to customers, demands; safe, cost-effective and punctual delivery; and correct quality and quantity of the commodity purchased (Tables 12.1 and 12.2).

Table 12.1 Scope of logistics service provider (LSP roles)

Parties involved:

- Farm/exporter
- Factories/manufacturers
- Trader/third parties/logistics
- Consumers/importers

Logistics services:

- Warehousing
- Storage
- Inventory management
- Packaging
- Labeling
- Labor supply

Logistics service provider acting on behalf of customer **Integrating operation:**

- Coordinate import/export booking
- Transportation (selection: sea/land/air)
- Cross-docking
- Shipping arrangement
- Customs documentation
- Port clearance
- Other government agencies
- Application of permit/fumigation/others

Source: Developed by the authors (2019)

Table 12.2 Literature review – qualitative research on critical issues in Halal logistics

Challenges	*Suggestion*
1 - General issues in Halal industry • No standard Halal guidelines • Lack of expertise and knowledge about logistics industry know-how • Too many Halal certification bodies/authorities • No model/example of successful implementation of Halal logistics as benchmark	One-stop Halal information center (uniformity) One-size-fits-all rules
2 - Integration issues among logistics service providers • Tractability and traceability issues along the supply chain • Lack of collaborative efforts among LSP in ensuring unbroken Halal chain • No dedicated Halal assets and facilities • Presence of haram or doubtful substance on product during logistics activities • Different procedure practiced by different LSP	Collaboration and coordination Sharing facilities
3 - Integration issues between Halal authorities and logistics service providers • Transition from HDC to JAKIM made certification renewal process more difficult and requiring more time • Standards set by JAKIM are difficult to abide by and not cost-effective • Lack of communication between JAKIM, HDC and LSP • Lack of integration between JAKIM and Halal logistics players	One team one aim concept toward positioning Malaysia as world Halal hub
4 - Financial issues and perception of implementing Halal logistics • Limited Halal products to be exported • Halal logistics is not cost-effective and involves large capital expenditure • Difficult to expand for private companies as this requires	Financial support and incentive Halal Shariah and law A compulsory not voluntary

substantial capital/investment
- Negative perception that Halal service adds in more costs

5 - Government's support and promotion issues

- Lack of government support and intervention
- Lack of promotion/understanding among Malaysian people regarding Halal and Halal logistics
- Limited Halal training, especially on Halal logistics
- Lack of information on Halal business and practices

Source: Talib, Hamid, Zulfakar and Chin (2015)

LSP roles are part of freight forwarding/customs clearance on documentation declaration using invoice, packing list and insurance as well as shipping services, which include ILS or IILS for efficient delivery or traceability to ensure preferred customers' satisfaction in their one-stop-solution center. For perishable goods or goods that require cold temperature storage, logistics operations do also offer Cold Chain Facilities.

However, LSP roles are not limited to the aforementioned services as LSPs are continuously upgrading their skills and knowledge to increase productivity in the dynamic competition to serve their customers with sustainability. In addition, LSPs should upgrade their skills and knowledge as they are required to execute services through the integration of the supply chain which involves the production, packaging, branding and distribution (Transportation and Warehousing) of agricultural products based on the "farm to fork" principle – beginning from the "farm gate" level and extending to the retail and export markets. Significantly, LSPs need to create value by collaborating with relevant government agencies, such as customs and supply chain players, with the aim of offering the flow of safe and top-quality fresh produce for healthier living, backed by their dedicated team. The more knowledgeable and efficient LSPs are, the more they will enhance their productivity by saving costs and boosting profitability.

HLSP challenges in the logistics services

In warehousing, storage and inventory management services, all warehouse and transportation should be compliant with and inspected by JAKIM for the Halal logistics requirement. In addition, currently, the HLSP has limited products available for export, resulting in high investment cost. There is a need for Halal training since there is lack of skillful and knowledgeable staff who will help the company receive Halal certification from JAKIM. Hence, establishing Halal committee and Halal policy is vital to operate Halal business.

In transportation services, HLSPs are required to have dedicated assets and facilities, such as a truck/vehicle, to carry Halal products. In order to ensure Halal integrity, each truck/vehicle must receive Samak before the loading of Halal products. The usefulness of the

information technology system adds values to the supply chain as it allows for tracking and tracing in upholding Halal integrity.

In freight forwarding/customs clearance and shipping services, there is a dynamic competition between HLSP and the LSPs due to different schools of thought. Furthermore, additional documentation is required as there is a need to comply and to keep record of Halal logistics activities. Paramount for ILS or IILS is providing total customer satisfaction. However, proper Halal training for all employees is crucial to understand Halal logistics services. The enhancement of expertise and knowledge on the logistics industry is a life-long process. As in cold chain facilities, there are difficulties in expanding private companies as they require substantial capital and investment. Furthermore, after substantial capital/investment, there is a need for segregation and dedicated storage of Halal food and products in order to uphold Halal integrity.

Conclusion

Understanding of Halal integrity and Halal LSP is a prerequisite for avoidance of communication barriers between Halal food supply chain stakeholders. In order to guarantee that a product's condition remains Halalan-Toyyiban from its origin to its consumer, Halal integrity must be questioned and attended to at all times. Therefore, upholding Halal integrity is the responsibility of Halal stakeholders involved in the network for business sustainability. This collaboration determines the ultimate success of the Halal supply chain network. The process of implementing and controlling an efficient and effective flow in managing the Halal food supply chain could minimize cost and enhance profitability. Efficient logistics is critical to achieving trade competitiveness; therefore, HLSP needs to be innovative in servicing their customers. Innovation and creativity in LSP services are prerequisites for business sustainability. The contribution of this study will be beneficial to future researchers and stakeholders in the Halal industry.

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13 Training essentials for capacity building in the Halal industry

The importance of Halal logistics training

Abdul Manan Dos Mohamed, Mohd Azemi Mohd Noor, Nor Aida Abdul Rahman and Harun Sarip

Introduction

Past Halal-related studies have shown that there is a significant need for training to increase the awareness level and Halal knowledge among workers in any Halal-related organization. A human workforce is a key driver for success in any organization. Having a trained workforce will benefit the organization in terms of developing new skills and creating innovative ideas to improve organizational performance. In principle, having new and continuous knowledge and skills could also help to reduce errors in any activity inside the organization, such as production; improve operation efficiency; reduce production costs; and lead to a positive working environment. The Halal industry as well as the Halal ecosystem is developing worldwide. This is due to the growing demand for Halal food products due to the increasing Muslim population across the world. In Malaysia, the Halal industry is projected to reach RM50 billion in trade exports by 2020. More producers are targeting Halal market opportunities as the global Halal food and beverages (F&B) expenditure is expected to grow to US$1.9 trillion (RM8.09 trillion) by 2021 (Nor et al., 2016).

Essentially, the need for Halal knowledge is elevated not only because consumers prefer Halal-certified products but also due to the implementation of the Halal Assurance Management System (HAS) in food industries to guarantee the promised quality. Among consumers of Halal products, basic education and knowledge pertaining to Halal is important so they understand current Halal issues in the Halal industry and market. For human capital development in the Halal food industry, Halal training programmes are always needed to provide new skills in Halal management and “Shariah” knowledge. The spectrum of Halal training for Halal food manufacturers is not limited to Halal food training only but also extends to Halal packaging as well as Halal logistics and supply chain. The Malaysian Department of Islamic Development (JAKIM) has addressed issues on the duration, content and coverage of many Halal training programmes as well as Halal research and trainings performed by the universities and training providers as a result of the formation of Malaysian Halal Board in 2018. This leads to the development of certified and structured Halal training programmes offered by the Halal training providers.

JAKIM was established in 1982 with the responsibility to 'build' Halal awareness among food producers, distributors, importers, food premises, restaurants and hotels. After almost two decades, it, together with the Standards Department of Malaysia, also introduces Halal logistics and supply chain to monitor the Halal management process of products during transportation, at the warehouse and at the store. It is important for all Halal players to have basic knowledge or awareness of Halal logistics training. In general, Halal training started as early as 2004, with a focus on Malaysian Standard MS1500:2004 (Halal Food-Production, Preparation and Storage-General Guidelines). MS1500:2400 standards guideline and training was launched to provide a guide regarding Halal food. This standard, which is a basic requirement of the food production process, is the first Halal standard in accordance with ISO methodologies. Hence, it has been widely recognized and globally accepted by Halal certification bodies. The standard prescribes practical guidelines for the food industry on the processing, preparation and handling of Halal food, from when it is made up of raw materials until distribution and retailing activities. Further improvement on the standard was established, in 2009 and 2019, leading to the demand for certified and competent Halal executives and committee members. Thus, certified Halal training is vital for human resource development to support Halal economic growth in Malaysia.

Types and choices of relevant Halal courses for the public and workers in the Halal industry

Malaysian Food Act 1983 (act 281) and Food Regulations 1985, Kuala Lumpur: ILBS, 1996.

Malaysian Standard (MS1500:2004), Halal Food Production, Preparation, Handling and Storage, Department of Standard Malaysia, 2004.

Malaysian Standard (MS2200: 2008) Islamic Consumer Goods – Part 1: Cosmetic and Personal – General Guidelines, Department of Standard Malaysia, 2008.

Malaysian Standards (MS2424:2012) Halal pharmaceuticals – General guidelines, Department of Standard Malaysia, 2012.

Malaysian Standard (MS2400-1: 2010) Halalan-Toyyiban Assurance Pipeline – Part 1: Management System Requirements for Transportation of Goods and/or Cargo Chain Services, Department of Standard Malaysia, 2010.

Malaysian Standard (MS2400-2: 2010) Halalan-Toyyiban Assurance Pipeline – Part 2: Management System Requirements for Warehousing and Related Activities, Department of Standard Malaysia, 2010.

Malaysian Standard (MS2400-3: 2010) Halalan-Toyyiban Assurance Pipeline – Part 3: Management System Requirements for Retailing, Department of Standard Malaysia, 2010.

Training helps the organization to achieve its objective and gain a competitive advantage. Training is part of a capacity building effort to improve human skills, elevate workforce knowledge and brush up on related skills. In such a condition, the objective of Halal training in Halal-related industries aims to improve the current understanding of the staff regarding the standards and guidelines, policies handling and issues on the safety and security of Halal

products and substances. Appropriate trainings on Halal management will increase levels of knowledge among the staff, helping to meet Halal and human capital standards among the Halal industry players. This will ensure that the employees have increased levels of knowledge, skills, abilities and values which will lead to the employees' satisfaction and performance, and eventually improve firm performance as well. Earlier, the Malaysian government, through MITI (2006), highlighted the importance of Halal training. As emphasized by MITI, there are four main objectives of Halal training: namely, first, to provide knowledge and understanding on the "Halalan Toyyiban" concept, as defined by the Halal Development Corporation (HDC) Malaysia. "Halalan Toyyiban" refers to the two important elements in Halal: namely permissible and "thayyib". Permissible refers to the compliance of "Shariah" or Islam law, while "thayyib" refers to the cleanliness, wholesomeness, quality and safety of items to be used or consumed. Second, to provide knowledge on the process of Halal certification in Malaysia. The Malaysian Halal certification theme is divided into seven categories (see Table 13.1), Third, to provide training on Halal products and hygiene. Finally, to provide knowledge on the advantages of being Halal-certified.

Table 13.1 Halal certification scheme in Malaysia

Type	*Halal certification scheme*
1	Food product/beverages/food supplement
2	Food premise/hotel
3	Consumer goods
4	Cosmetics and personal care
5	Slaughterhouse
6	Pharmaceutical
7	Logistics

Source: Developed by the authors (2019)

As shown in Table 13.1, the Halal logistics certification scheme is among the recent developments in Halal regulation in Malaysia. Halal logistics was introduced to ensure that the Halal status of any product was maintained from farm until consumption. In other words, raw materials, material handlings, storage, warehousing and transportation used in any Halal-related business should comply with Halal concepts throughout the supply chain. The main reference for Halal logistics is MS2400 Halal supply chain standards. In Malaysia, Halal logistics standards, also known as Halal supply chain standards (MS2400), are developed as a top support for Halal transportation activity, Halal warehousing activity and Halal retailing activity. For an organization to be Halal, it is necessary for them to provide Halal logistics training to their staff as this will provide knowledge and shed light on the critical processes in which contamination might occur. Cross-contamination here refers to the situation in which the Halal product could become contaminated by Haram or non-Halal substances (Rahman et al., 2018).

In a recent development of the Halal industry, Halal companies and employees within the industry require scheduled and affordable training to increase their competitiveness and competencies. Halal training in Malaysia consists of multiple individual trainings, such as

Halal industry fundamentals, best practices for Halal industry in food, HAS, Halal internal auditing, Halal logistics, Halal packaging and many more. All types of Halal training are important as training is recognized as an aspect of developing human resources or capability. It is significant for any organization to strengthen their workforce knowledge as this, in turn, will lead to effective job performance. Halal training is vital for Halal-related business organizations. With a proper Halal-defined system, a company can obtain Halal certification for any Halal category application, such as F&B products. For instance, it is important that HAS employees are supervised, supported and guided by trained and competent Halal executives and Muslim production inspectors that ensure the Halal needs and standard requirements are fulfilled.

With the establishment of a Halal ecosystem, the following structured courses are suggested for a standard development of understanding for Halal application and continuous improvement once certified (see Table 13.2).

Table 13.2 Types and choices of relevant Halal courses for public and workers in Hal industry

Courses	*Public/consumers*	*Whole organization*	*General workers*	*Internal Halal committee*	*Internal audit team*	*Quality assurance*	*Halal executi*
Basic awareness (Basic "Shariah", basic Halal understanding)	/	/	/				
Advanced awareness (Ingredients, process, issues, introduction to HAS)	/	/	/				
Essential course				/	/	/	/
Malaysian standard (Ms1500:2004), Halal food production, preparation, handling and storage, department of standard Malaysia, 2004							
Malaysian standard (Ms2200: 2008) Islamic consumer goods – part 1: cosmetic and personal – general guidelines, Department of Standard Malaysia, 2008							
Malaysian standards (Ms2424:2012) Halal pharmaceuticals – general guidelines, Department of Standard Malaysia, 2012							
Malaysian standard (Ms2400 – 1: 2010) Halalan-Toyyiban assurance pipeline – part 1: management system requirements for transportation of goods							

and/or cargo chain services, Department of Standard Malaysia, 2010						
Malaysian standard (Ms2400 – 2: 2010) Halalan-Toyyiban assurance pipeline – part 2: management system requirements for warehousing and related activities, department of standard Malaysia, 2010						
Malaysian standard (Ms2400 – 3: 2010) Halalan-Toyyiban assurance pipeline – part 3: management system requirements for retailing, Department of Standard Malaysia, 2010				/	/	/ /
Manual procedure for Halal certification (third revision, 2014)*						
Malaysian protocol for the Halal meat and poultry production*						
Guideline for Islamic cleansing from Islamic perspective*						
Procedure of issuing the Islamic slaughtering authorization by state Islamic religious department throughout Malaysia*						
Malaysia food act 1983, food regulation 1985 Guidelines for Halal Assurance Management System of Malaysia certification (HAS)*						
Trade description act (revision 2011)						
[3] Www.Halal.Gov.My/EHalal						
Certified courses						/
Certified Halal Assurance Management System (HAS) course						
Certified internal Halal audit course						
Online Halal application						/
Halal file						
HAS file						
Halal logistics awareness	/					
MS2400 Halal supply chain (transportation)	/ /					

MS2400 Halal supply chain (warehouse)	
MS2400 Halal supply chain (retail)	

Source: Developed by the authors (2019).

* Relevance of Halal courses provided by Universiti Kuala Lumpur in Malaysia.

Basic awareness training

Basic awareness begins with an understanding on “Shariah” law, also defined as an Islamic law based on the Al-Quran, Al-hadith (Traditions of Messenger of Allah), “Ijma” (Consensus of Islamic Scholars) and “Qiyas” (Legal deduction or Analogy), according to Shafei or any of the Hanafi, Maliki or Hanbali Schools of thought (Qardawi, 1985). With the understanding of the definition of Halal food, a simplified classification of Halal and haram food in Islam and sufficient knowledge of how to manage Halal products in order to fulfil the objective of “Shariah” can easily be mapped. The concept of Halal products will be perceived as a benchmark for safety, hygiene and “Shariah” compliance. As there are numerous food products, a systematic classification of Halal raw material/products/derivatives for food is, as an example, simplified into six categories, namely animals, plants, microorganisms and mushrooms, drinks and beverages, minerals and genetically modified microorganisms (GMOs), where most are Halal except for few things. With the addition of understanding on “najs” and slaughtering according to “Shariah” law, basic knowledge on Halal and haram in food has been achieved. Thus, with proper training, one will be able to guide the public to understand Halal instead of prompting endless confusion.

In addition, it is also important to introduce Halal logistics training, which is more closely related to the Halal management system, to all manufacturers, retailers, logistics providers and other users. Halal logistics training aims to provide basic knowledge on the handling process during transportation, while in storage or warehouse as well as at the store. The aim of Halal logistics training is to spread awareness on the possible causes of cross-contamination throughout supply chain activity. There are five types of potential contamination in Halal logistics. As highlighted in Figure 13.1, they may come from the vehicle used in transportation, the equipment and tools, the storage or warehouse, the location or personnel or workforce. As such, Halal training is significant in that it helps companies to avoid and reduce the risk of cross-contamination. Table 13.2 lists several types of Halal training available for the public and staff in the Halal industry in Malaysia, including Halal logistics and supply chain training

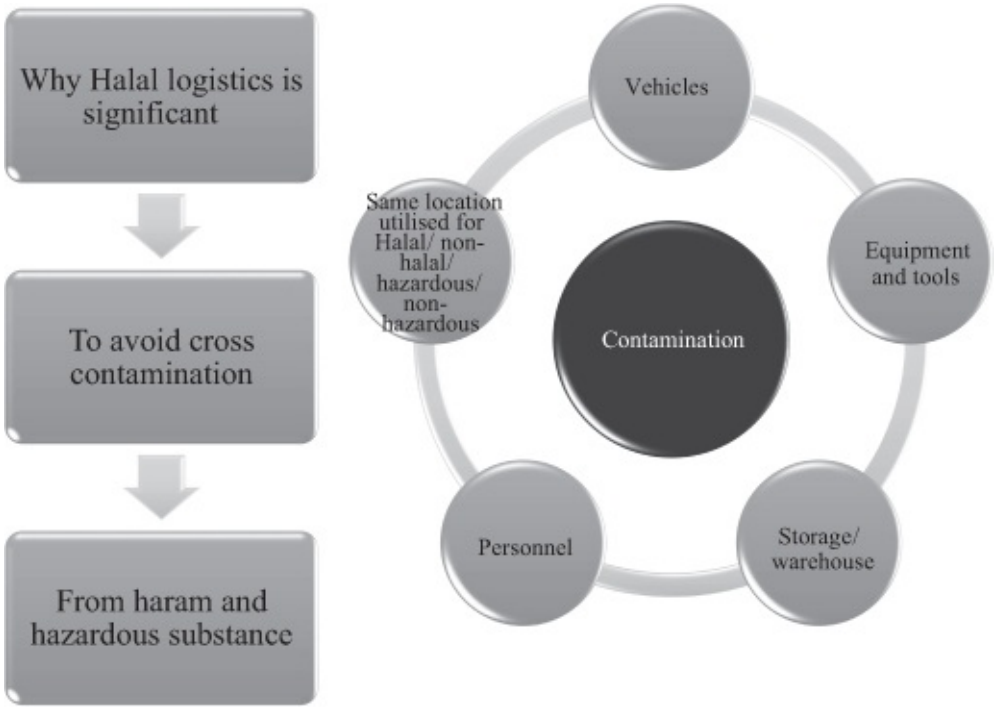

Figure 13.1 Potential of cross-contamination in Halal logistics.
Source: Developed by the authors (2019).

Halal logistics course – Halal transportation, Halal warehousing and Halal retailing

A Halal logistics course generally covers a quality control process throughout supply chain activity. It is about understanding the application of "Shariah" principles to supply chain activity. Risk of potential contamination will be discussed: for example, from vehicles used, pallet, container, equipment and tools, personnel and location. A Halal logistics course is normally provided by the Halal training provider, the university and Halal consultants. Essentially, Halal logistics training can be categorized into three different types of training: namely Halal transportation, Halal warehousing and Halal retailing.

Halal transportation training delivers the general requirements required to become certified in Halal transport. The main function of Halal transportation training is to shed light on the process or related requirement of "Shariah" with regard to transportation activity, such as parking premise and many more. The training may also cover preliminary steps to enable the risk management process in case there is a possibility of products becoming cross-contaminated. A Halal control point analysis worksheet may also be shared or discussed during the training session.

While a Halal warehouse course provides specific training on the requirements of warehouse certification, the main aim of the course is to familiarize participants with the Halal system inside the warehouse and identify critical points that can lead to cross-contamination. The flow of inbound and outbound Halal processes will also be discussed. Hala retail training provides specific training on general requirements for certification in

Halal retail. Retailers and workers need to be familiarized with the Halal process flow at retail as well as critical points in which contact with non-Halal or Haram substances may occur.

Advanced awareness course

Advanced awareness training includes Halal understanding, from raw material to derived and processed products. While F&B can be easily classified, formulated and processed, food that involves the addition of processed ingredients and additives needs to be screened and verified as Halal. Additives include colours, preservatives, oxidants, phosphates, antioxidants, thickeners, moisturizers, anticaking, stabilizers, emulsifiers, salts, flavour enhancers, glazing agents, sweeteners, agents for flour treatment, artificial starches and various other food additives. These are designated as E-numbers across the EU: code numbers used to identify food additives that have been shown to be safe and officially approved for use in food. With advanced awareness training, these ingredients can be easily classified as critical, semi-critical or non-critical in reference to Halal threat. The decision tree approach is employed for the identification of the Halal Critical Control Point in HAS (Kohilavani et al., 2015). A good understanding of the decision tree approach is required in the differentiation of food ingredients and additives into the critical, semi-critical and non-critical categories. Critical ingredients are related to, in particular, animal sources, alcoholic beverages, GMOs or the presence of some element of filth, according to “Shariah”. Although the non-critical category does not require Halal certification, it is encouraged if the product involves processing or treatment with processing aids and critical ingredients.

Issues on Halal are numerous and growing simultaneously with the emergence of new products, processes and methods of detecting non-Halal matters in food products. Hence, with appropriate advanced awareness training, understanding on the issues could be comprehensively simplified to raw materials – animal or plant origin/imported; slaughtering – according to “Shariah”/stunning; processing operations/equipment – x-contamination; packaging/storage/transportation (containers and vessels); food ingredients and additives; pig and its by-products (e.g. pork, lard, gelatin); enzymes (e.g. rennet); emulsifiers (e.g. E471 or mono- and diglycerides); alcohol (ethanol) biotechnology and GMOs (genetically modified organisms); and safety and quality aspects (aspect of “Toyyiban”).

Essential courses for the food industry and others

The earliest course offered in Malaysia is on MS1500:2009. This training is introduced to provide a deep understanding of MS1500:2009 and other relevant standards, transforming the “Shariah” objectives into standard guidelines (“Shariah”-compliant) for the production, preparation and storage of Halal food. While it is an advantage for food technologies, it is easily understood by scholars after awareness courses. Relevant input from the Manual Procedure for Halal Certification (3rd Revision) and Malaysian Protocol for Halal Meat and

Poultry Production will create a framework structure on the requirements of Halal certification.

Along with MS1500:2009, Malaysian Food Act (1983) and Food Regulation (1985) [6] and several other Halal standards need to be read together, such as Malaysian Standard (MS2200: 2008) Islamic Consumer Goods – Part 1: Cosmetic and Personal – General Guidelines, Department of Standard Malaysia, 2008, Malaysian Standards (MS2424:2012), Halal pharmaceuticals – General guidelines, Department of Standard Malaysia, 2012 [8], Malaysian Standard (MS2400-1 : 2010) Halalan-Toyyiban Assurance Pipeline – Part 1: Management System Requirements For Transportation Of Goods and/or Cargo Chain Services, Department of Standard Malaysia, 2010 [9]; Malaysian Standard (MS2400-2: 2010) Halalan-Toyyiban Assurance Pipeline – Part 2: Management System Requirements For Warehousing and Related Activities, Department of Standard Malaysia, 2010 [10]; and Malaysian Standard (MS2400-3: 2010) Halalan-Toyyiban Assurance Pipeline – Part 3: Management System Requirements For Retailing, Department of Standard Malaysia, 2010.

It is recommended that training begin with MS1500:2009, with sufficient hands-on exercises on the HAS before moving on to the Halal logistic standards. Instead of the HAS summary plan in the Halal food assurance system, in the logistic standards, the element of the "Halal Toyyiban" Management Risk summary plan is introduced.

Importance of Halal Assurance Management System (HAS)

After this stage, the HAS can be introduced as the relevance of the clause on premise, management responsibility, hygiene and sanitation in MS1500 is seen to be connected.

The six principles of HAS that need to be clearly understood include the following: determination of Halal critical points, development and verification of flowchart, implementation of control measures, development of corrective actions, documentation system and management of records, and process verification.

HAS allows and supports a systematic examination of all steps involved in the preparation of products/services, and the identification of steps that are critical to maintaining the "Halalan toyyiban" status of the finished products and services. HAS is able to reduce and eliminate the non-compliance Halal requirement and determine Halal Critical Control Points along the Halal supply chain, and thus ensure effective control and monitor activities to assure "Shariah" compliance in all production activities. Thus, adequate training is necessary to understand the principles of HAS; the formation of the Internal Halal Committee; the construct on of an HAS summary plan; and its implementation and adequate documentation, including the preparation of the compulsory HAS document file that consists of Halal Policy, Halal Guidelines, Halal Management Organization, Standard Operating Procedure, Technical References, Administration and Documentation System Training, Internal Audit, Corrective and Preventive Actions and Management Review. This task is done primarily by the Halal Executive and the Internal Halal Committee team. As part of the HAS requirement, a certified Halal Executive is required to be part of the Internal Halal Committee team.

Certified Halal Executives require training provided by JAKIM-certified trainers and must fulfil a minimum of 70 hours for the Certified HAS Course or 100 hours for the Certified Internal Halal Audit Course.

Halal online application

It is rather difficult to imagine how an online application is completed. Online hands-on training facilitates new applications or renewals, new products, new menus, and the easy addition of ingredients. Hands-on training also facilitates a smoothness and speed of application with a high chance of success. It is important to understand the procedures and requirements involved in Halal application. Application is easily provided along with the necessary information and documents. The Malaysian Halal certification scheme is divided into seven schemes: namely food product/beverage/food supplement, food premise/hotel, consumer goods, cosmetic and personal care, slaughterhouse, pharmaceutical and logistics. Applicants who are eligible to apply for the Halal certificate are categorized as manufacturer/producer, distributor/trader, sub-contract manufacturer, repacking, food premise and abattoir/slaughterhouse.

It is also essential to know about applications which are not eligible at an early stage to avoid wasted effort and money. This includes non-Halal products; any application without a standard reference/guideline; companies that produce and distribute Halal and non-Halal products; usage of similar branding for Halal and non-Halal products; a product/food premise which displays a negative view towards religion and social lives; natural products which do not involve any processing such as fresh fish, fresh vegetables, fresh eggs and the like; fertilizer and animal feed; crockery; paper; products which use the same names or synonymous names with non-Halal products or confusing terms; local and imported finished products which are relabelled without undergoing any processes in Malaysia; kitchen/food premise/food catering services which prepare haram cuisine as decreed in “Shariah” law; products which are in the early stages of research and development; products that can lead to deviation of Aqedah; superstition and deception; and products made in a hotel with a kitchen that prepares a pork-based menu (JAKIM, 2015).

It is also essential to train Halal executives on the preparation of necessary documents, which leads to the preparation of Halal files and HAS manuals or files. Although an application can be completed online, all necessary hard copy documents need to be submitted after the online application has been completed. Thus, preparation of the Halal file (Halal confirmation certificate file) and HAS manual not only greatly facilitates Halal application but also allows adequate pre-audit preparation or internal audit to be completed in an orderly manner. Practices to produce the required documents and relevant certificates, such as company profile; company/business registration; name and description of product/menu for certification; ingredients used; name and address of manufacturer/ingredient supplier; Halal status for ingredients; with Halal certificate or product specification for critical ingredients, type of packaging material; manufacturing process and procedure; other documents, such as

HACCP, ISO, GHP, GMP, TQM, etc.; and location map of premise/factory (JAKIM, 2015) facilitate the preparation of the required document.

Conclusion

With the establishment of Halal standards by the Standard Department of Malaysia and the introduction of compulsory courses and training to all certified Halal Executives in the food industry through the Halal Professional Board Malaysia (HPB), JAKIM, the dissemination of appropriate and adequate Halal knowledge, including knowledge on Halal logistics and supply chain, is vital to assure Halal compliance from farm to fork. This study educates the reader in three different ways. First, the chapter highlights the importance of Halal training in boosting the Halal industry. Second, the study provides the importance of having a trained and skilled Halal workforce to ease Halal-related business operation. Third, it provides a list of Halal-related training for reader reference. Even though this chapter is a general review, it has focussed on the Halal training that is essential to the readers. This chapter is very important as it is among the earliest chapters that has been written about Halal training related to capacity building in the Halal industry. Additionally, this study could be enhanced by empirical research on the efficiency of Halal training and how it affects Halal organizational performance.

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14 Successful Halal compliance factors for air cargo warehouse

Warehouse operator perspective

Muhamad Munzir Khairuddin and Nor Aida Abdul Rahman

Introduction

Malaysia is the country which exports the largest amount of Halal products worldwide; the most popular exported products from Malaysia are foods and beverages, cosmetics products and health-care products. These Halal products are certified by Jabatan Kemajuan Islam Malaysia (JAKIM) or the Department of Islamic Development Malaysia, which is a department created by the government of Malaysia to monitor and regulate Halal standards to Halal products in Malaysia. According to Statista.com (2016), the market value of Halal products was approximately US$45.3 billion in 2016 and is expected to reach US$58.3 billion in 2020. The factors which contribute to this increment are not only because of the growing population of Muslims throughout the world but also due to the stability of their financial sources, which leads to an increase in their purchasing power. According to Thomson Reuter's Global Islamic Economy Indicator (2017), Malaysia is a first-rank exporter, particularly in Halal products. This is an indication that the Halal products are in huge demand and hold a perception of quality and hygiene. Halal products have become popular among Muslim community members worldwide because they are trustworthy with respect to the quality, freshness and healthiness of Halal products which can guarantee their health. Halal products are not only consumed by the Muslim community but also by the non-Muslim community from Europe, who believe that Halal products are healthy and hygienic, and can contribute to a healthy body.

The concept of Halal

Recently, the attention on Halal has increased. This is due to the growth of the Muslim population all over the world. The total Muslim population has increased gradually from 17% in 1950 and is expected to increase to 26% by 2020, thereby increasing the demand for Halal products. Based on the previous literature, Halal products are becoming important due to their quality, cleanliness and safety, as fundamentally required by "Shariah" principle. "Shariah" is a law in Islam, which is derived from the Quran and Hadith as a moral guidance

to Muslims (Aziz and Chol, 2013). Halal is a part of “Shariah” law, which relates to activities in the daily life of Muslims, such foods, regular exercise and others. The term “Halal” originates from Arabic, though it is now used in English and other languages. It “Halal” means permitted, allowed, lawful and legal; the opposite of it is haram (Department of Islamic Development Malaysia, 2005). The concept of Halal is not confined to a narrow context; it most relates to dietary laws concerning meat and poultry, making it similar to the Jewish concept of “kosher”, called “kosher”. Halal also covers aspects of life, such as speech, dress, conduct and manner. This concept is used in permitting the Halal and prohibiting the haram product’s impurity and harmfulness (Al-Qaradawi, 2007).

Many researchers agree that the “Halal” standard is one which can be trusted (Anderson, 1994). As it’s Halal status may not be immediately visible, a Halal product must be examined with the help of a laboratory, expert or service provider. A product’s Halal status may appear on its label, which will help the consumer to select their purchasing and consumption choice (Morris, 2013). However, the manipulation of Halal logos and certificates in both Muslim and non-Muslim countries has been an alarming concern, coupled with the credibility of Halal food certified by unauthorized private auditors (Zailani et al., 2010).

Halal products can be used by everyone, regardless of their religion. Halal products, for example food and beverages, can be consumed, even by the non-Muslims, because of their safety and hygiene. However, Muslims cannot pick and choose which aspects of Halal they will follow. Business transactions, such as selling products that benefit the user, are categorized as Halal business implementation; if the products do not benefit the user, such as drugs and other personally harmful products, then the trade is considered haram. To ensure that the products consumed, such as food and beverages, are Halal, one must make sure that the ingredients are Halal so as to confirm that the Halal ingredients have not been manipulated. For a product’s status to be Halal, it must follow three basic criteria: (i) be free from having any substance or ingredient that is extracted from a non-Halal animal or source, like a dog or pig; (ii) use machinery, equipment and utensils that have been cleansed according to Islamic laws to produce, process, manufacture and store; and (iii) not come in to contact with, be in close proximity with or touch a non-Halal substance in its production, preparation, processing, making, manufacturing and/or storage.

In the logistics industry, the conventional logistics system stresses the cost reduction and operational efficiency, whereas Halal logistics focuses mostly on the Halal credibility of the products. The Halal concept must be followed every aspect of a Muslim’s daily life.

Acceptance of Halal in logistics

Logistics is about handling and moving goods from one destination to another via transportation. Halal, however, is a “Shariah” law regarding the status of the product. The new phenomenon of combining of Halal and logistics creates a new service known as Halal logistics. It consists of Halal transportation and Halal warehousing under the roof of the Halal supply chain. The integrity of Halal products is guaranteed if the entire moving and storage process is in line with Halal logistics. It is the new approach of service to capture the

Halal market, which continues to increase not only in Malaysia but also around the globe. Manufacturers of the Halal product will look to the standardized Halal status to transport their product in order to maintain its Halal integrity (Bahrudin et al., 2011). The innovation of Halal logistics is derived from the demand of Halal suppliers and manufacturers that the logistics operators ensure that the integrity of the Halal status in products is guaranteed (Tieman, 2013).

Halal logistics is about managing Halal products according to "Shariah" law. Halal products need to be carefully handled, and ensuring that those who handle them are familiar with the required processes is a sign of respect. These handlers should be Muslim and possess knowledge and experience in doing the task; the required process refers to dedicating tools and equipment, such as trolleys, pallets and forklifts specifically to handling the Halal products; a dedicated area, such as a cold room, must also be assigned. Any misconduct related to Halal products can raise questions about their Halal integrity. That is why Halal and non-Halal products cannot be mixed at any stage in the process, whether in load carriage or transportation, as stated in the hadith regarding this issue. Even in the cold room, there is a need to segregate products to prevent contamination.

In Halal logistics, sustaining the Halal status of a product requires the separation of Halal and non-Halal products. This segregation is objectively to (i) avoid cross-contamination, (ii) avoid making mistakes and (iii) ensure consistency with the expectations of Muslim consumers.

These three principles are the primary goal in handling the Halal product. Halal products cannot be placed in the same area or cold room or use the same transportation as non-Halal products, so as to avoid any potential cross-contamination. The smallest amount of a haram subject, whether liquid or solid, can lead to the abolishment the Halal status (Ab. Hamid et al., 2014), and the integrity of the Halal can be questioned. For this reason, it is very important to segregate both types of products as a way of preventing such contamination from happening. Beyond this, segregation's purpose keeps handlers from making a mistake. If products are mixed while in a warehouse or transportation, it is highly possible that a mistake will occur. For example, using the same tools to handle Halal and non-Halal products may cause cross-contamination. In order to prevent the occurrence of mistakes in such circumstances, segregating them is the best choice. Lastly, the consistency of the Halal status of the product must be ensured in order to fulfill the high expectations of Muslim consumers. At present, Muslims are not only looking for Halal products but are also aware of their process; therefore, expectations for the handling process of Halal logistics are very high.

In general, the Halal logistics process is similar to conventional logistics. It consists of core activities, such as transportation, warehousing, packaging, procurement and material handling. However, Halal logistics is concerned with following Islamic or "Shariah" law. Its main aim is to protect the integrity of Halal products. In other words, it aims to maintain the status of Halal at each point of supply chain activity. As mentioned by Tieman (2013), the implementation of Halal logistics also helps the operators to achieve a standard of quality and efficiency in their service. Furthermore, the Halal integrity of the product can be guaranteed since transportation and distribution are the most challenging parts of sustaining Halal status (Riaz and Chaudry, 2004).

The Muslim population is growing year by year, and it is the fastest-growing religion in the world, with 1.7 billion adherents in 2015 (National Geographic Magazine, 2017). This report shows that Islam is the second-largest religion by number of followers after Christianity, which has 2.4 billion followers (National Geographic Magazine, 2017). Muslim people are required to consume and to use Halal product. Quran and Hadith are the main references for the daily activities of Muslims that determine the type of consumption, worship time and so on.

Nevertheless, contemporary non-Muslims also believe that a healthy body comes from healthy consumption. Halal products are best for consumption because the ingredients in the products come from the source of Halal, such as meat from slaughtered animals, non-toxic chemical and seasoning and no ingredients are used from animals forbidden in Islam like pork, dog and inland carnivore animals such as tiger, rodents' family and others.

Demand is one of the key reasons why Halal products have become popular nowadays. It means a special request for the products from manufacturer, supplier and users. The growth of demand for Halal products can be explained by the increase in the Muslim population around the world (Adam, 2011). Consequently, the demand for Halal products is also greater in European countries, particularly for consumer food service outlets, because of Muslims travelers visiting Europe (Euromonitor International Report, 2015). Figure 14.1 shows the top Muslim countries' expenditures on Halal products, which indicate the purchasing power of Muslim consumers. The growing Muslim population and the trustworthiness of people in consuming Halal products result in the growth of and increasing demand for Halal products.

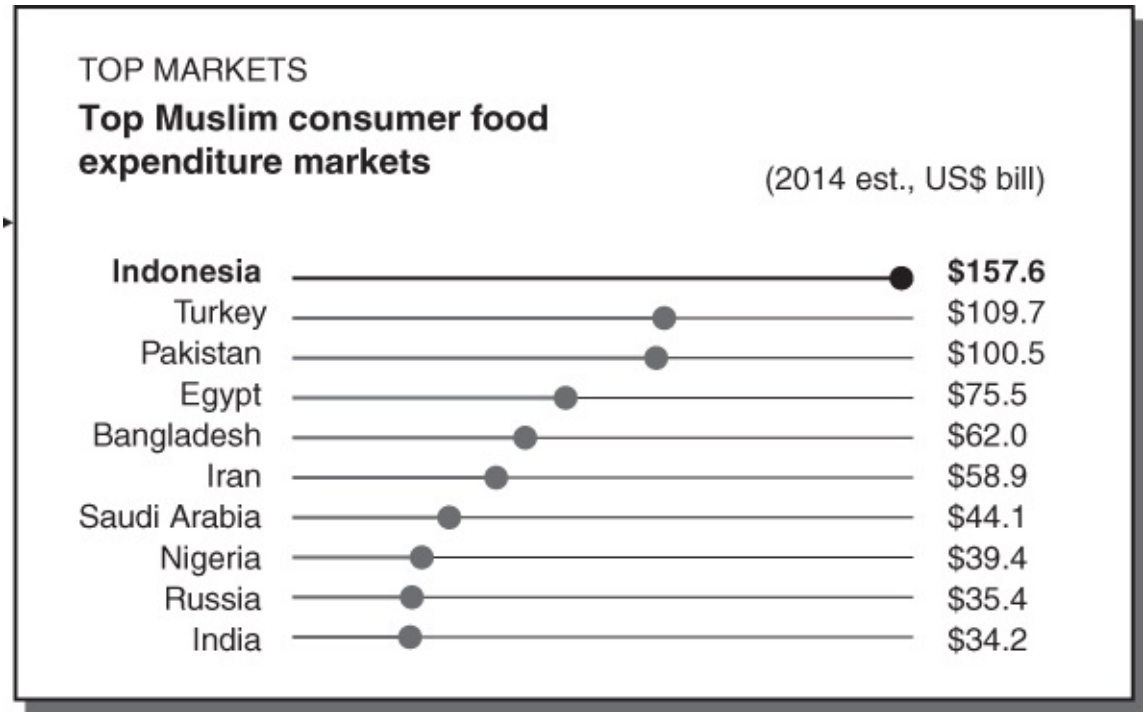

Figure 14.1 Top Muslim countries on Halal expenditure.

Source: Global Islamic Report (2015).

Conventional warehouse versus Halal warehouse

A warehouse is a place where a product is stored before it is distributed to customers, forming one of the essential parts in logistics (Radzi et al., 2016). A warehouse is the place where activities, such as receiving, storing and preparing of shipments, are done. These activities are significant in ensuring that the right products are prepared for delivery to the right person at the right time.

The process in both warehouses is the same, but the Halal warehouse is more stringent regarding the controlling of operations since the application of strict Halal guidelines aims to foster trust among consumers while eliminating doubts. Both warehouses start their operation processes with receiving, wherein the scheduled carrier will come to the warehouse and unload the cargo into storage, but before the workers load into the warehouse, they must first carry out an inspection for any damaged products. This is essential to ensure that the products are in good quality and hereby prevent any form of misunderstanding while a warehouse operator is handling the cargo. Meanwhile, for the Halal warehouse, the verification of Halal status is a value-added process (Teece, 2010), where the controlling process starts from the freight documents attached to the load. Usually, the Halal cargo is labeled and marked with "HALAL SUPPLY CHAIN" as a sign of product verification. In cases where there is no Halal verification document attachment and no presence of the HALAL logo, the cargo is not allowed to enter the warehouse. The stringent law must be applied to maintain the Halal status of the warehouse because in principle, the Halal warehouse cannot mix Halal products with non-Halal ones. The physical segregation, coding, marking and use of other identification inside the Halal warehouse are important to aid the operators in recognizing Halal products in the warehouse, as suggested by researchers (Tieman et al., 2012). After the cargo is inspected, it will undergo the warehouse process. This is the process stage at which the product inside the cargo is identified to ensure it has been correctly loaded. The shipment will be labeled in order to be easily recognized by the operators. Then, the identification of the cargo location will be confirmed, and the operator will locate the cargo in the designated area. Meanwhile, in a Halal warehouse, the label "REJECTED" is applied to Halal goods which are damaged, spoiled, broken or contaminated, or show other signs of breakage (Tieman et al., 2014). The operator will move them to a quarantined area for inspection. In a Halal warehouse both Halal and non-Halal products cannot be on the same pallet/load carrier. Both categories of warehouses will add the information into the system after the procedure is finished.

After the put-away stage procedure, the cargo is moved to the third-stage process: storage. In this stage, it will be stored in a specific area while waiting for shipment, but Halal warehouse cargo will be stored in a dedicated area known as storage zone or racks (Hamid et al., 2014). Halal products cannot be mixed with non-Halal products, even in vertical conditions or in the same cold room.

Another stage is the picking process, which involves retrieving the product ordered by the customer from a specific location in the warehouse. This process is the most laborious and comprises about 60% of labour activities in the warehouse. The same process occurs at the Halal warehouse, but the implementation of dedicated pallets and load carriers is also applied

(Ngah et al., 2014). The next process is shipping, where the customer order will undergo the process of packaging, labeling and stacking as preparation for shipping. The same goes for the Halal warehouse process, but the documents are marked and coded with Halal supply chain, in which the label of "HALAL SUPPLY CHAIN" must also be present in the cargo wrap (Tieman et al., 2014). Lastly, the scheduled carrier loads the orders to the carrier, including the bill of loading; for Halal goods there will be separate containers or transport. The transporter will dispatch according to the customer's demands along with their freight document. The difference between Halal and non-Halal cargo can be verified easily by marking "HALAL SUPPLY CHAIN" on the cargo wrap and in the freight documents.

The ongoing process of receiving until shipping will be updated as data into the system, recording the holding status of the cargo. In between those two types of warehouses (conventional and Halal), the Halal warehouse is more complicated to manage in order to sustain the integrity of Halal products. Areas such as the loading and unloading bay, packaging, storage and cargo consolidation remain the most critical in the warehouse. This is because in Halal warehouses they must be completely separated and designated in a dedicated facility. However, similar procedures and functions are being carried out in both. The only difference between them is that Halal warehouses require separate Halal-dedicated equipment or facilities (Hamid et al., 2014) (Table 14.1).

Table 14.1 Halal warehouse activities and principle

Warehouse type	*Activities*	*Principle*
Halal warehouse	Receiving	Cargo verification process- status and label.
	Put away	Separating process- separate pallet/load carrier.
	Storage	Dedicated area- storage/rack/cold room.
	Cross-docking	Designated buffer area-different pallet/load carrier.
	Value-added logistics	Repackaging, sorting and no mixing between Halal and haram on pallet or load carrier. Labeling.
	Order Picking	Locate in different pallet/load carrier.
	Shipping	Labeling "HALAL SUPPLY CHAIN", marked/coded on documents.

Source: Tieman et al. (2014)

The main concern of operators is operating cost, which should be lower (Wilson and Liu, 2010) when applying the right systems and procedures to handle the cargo in the warehouse, such as using a warehouse management system (WMS). Information and communication technologies (ICT) will help to manage the warehouse by creating an efficient operating environment to track and monitor packaging, transport and distribution processes (Tan et al., 2012), thus reducing the cost of warehouse operations.

Air cargo/air freight service in Malaysia

Logistics service is the key player for warehouses to sustain because it will supply cargo into the warehouse. After that the warehouse operator will keep the product safe by securing the cargo inside their warehouse. The cargo source may come from various types of logistics,

depending on the distance (origin to destination) and the size of the cargo. According to Harrisson and Van Hoek (2005), who discussed the challenges of international logistics with multiple freight modes and cost options, transportation comes in various types, allowing the shipper to choose the most affordable and efficient way for them to deliver their products.

Airline companies mostly focus on passenger and baggage movement, from origin to destination, but some also provide services such as air cargo shipment. This service is about moving cargo from point of origin to destination using a dedicated aircraft as their transportation. Fortunately, air freight service is an advantage to the industry since the introduction of new wide-bodied passenger jets creates a surplus capacity to carry more passengers and cargo at the same time (Jansen, 2012).

Previous literature stated that the airline and freight industry has flown over 3 billion passengers and 51 million tons of various types of cargo, including high-value cargo, such as pharmaceutical products, humanitarian supplies, consumer electronics, live animals and cut flowers, valued at over US$6.8 trillion around the world (IATA, 2015). Air freighters and air cargo aircrafts are transports made specifically for carrying in their fuselage. The fuselage does not have seats, a baggage compartment or in-flight entertainment but instead is clear for the purpose of transporting cargo. (Budd and Ison, 2016).

As for the air cargo company, it is usually owned by the airline company itself. Since the airline company is operating their own aircraft, their operation is more straightforward. The dedicated air cargo aircraft will be used if the cargo is huge in size and heavy in weight, or hazardous and requiring specialist consignments (Crabtree, 2014). Smaller, boxed cargo will mostly be delivered via the cargo hold in a passenger aircraft.

Unfortunately, since 2008, the demand for air freight service has decreased year by year, and over 500 freighters have been scrapped, and more than 350 have been placed in storage (Morris, 2013) since the choice of logistics is diverse. Additionally, the average load factor is only around 46%, if compared to the passenger load factor of around 80% (Gangwani, 2015). Therefore, in order to improve their service capacity, airline companies have ventured into warehouse services, which will also increase their customers by introducing new and unique services: for example, Halal warehouse. Since the customer demand is diverse, their service also needs numerous provisions. Thus, the customer can select their service based on what they want in order to sustain its quality. The initial idea of using an air freight service was to increase the speed of the delivery process since sea freight and ground freight have their own drawbacks. Hence, air freight is the best choice to ensure fast and efficient delivery to destinations. Air transport service is a key enabler for international trade and globalization since its operation is safe, efficient and affordable.

The integration of Halal process into their business through the establishment of Halal air freight warehouses is one way to improve their capacity. This is due to the globalization and competition faced by the aviation industry, thereby requiring alternative concepts to remain competitive in the market (Jellouli, 2014). However, airline freight companies face challenges when they share their warehouses with foreign airlines.

The solution is to have designated areas for Halal products and to provide dedicated tools and equipment. When Halal products are being transported within the aircraft, the same

question arises as to whether the products are contaminated by other goods inside the aircraft or not. Air freight is the fastest mode of transferring goods from an origin to a destination operated by airline companies. Air freight companies need a warehouse to manage their cargo, in which the operators will process the cargo before it is delivered to its destination, which includes receiving, put-away, storage, cross-docking, order picking and shipping.

Hence, the establishment of the International Halal Park in Malaysia will attract multinational corporations to choose it as their preferred Halal business destination since it is a pioneer in the Halal industry worldwide (Hamid et al., 2014). Therefore, the demand of Halal logistics via air freight and warehouse services in Malaysia will increase.

Data collection and data analysis: a case study approach

As highlighted earlier, the objective of this subtopic is to uncover the factors of Halal compliance in a Halal air cargo warehouse. This is exploratory in nature since not much is known about the issues and challenges in the Halal industry, specifically in Halal warehouses. This research approach uses multiple case studies since research on Halal warehouses in so critical. Case studies can be an important tool in building theories in new disciplines like Halal logistics. Additionally, as this research area is still fairly underdeveloped, qualitative study is considered the best choice to collect data, through a series of interviews and focus groups. This research applies purposive sampling or judgment sampling whereby the information gathered is from a series of interviews, conveniently available from a specific group of people. Our interview was conducted using semi-structured questions which are useful in exploring and explaining the factors and sub-factors of Halal warehouse operator. These questionnaires were given to individuals on a face-to-face basis. There was a list of questions that needed to be asked to encourage the interviewee to share their information in detail. Since there is a scarcity of studies in this area, questions were based on significant information related to the Halal logistics industry and past studies. The participants in this interview are individuals holding managerial positions in their respective companies who have vast knowledge and experience in the Halal industry, which is why they were selected. The focus of this discussion was on the factors of Halal compliance for warehouse.

In order to analyze the data, this study has opted for a thematic analysis. This has been performed with a two-cycle coding process. The purpose of the open coding process is to generate codes from the interview script as a first cycle in the thematic analysis, then place the codes which have same patterns into the same category. After the theme of this research was established from the category, the data was analyzed. The theme was then decided, and conversation was classified as saturated or ‘theoretical saturation’. These themes are taken as key findings from this research.

Findings on Halal compliance air cargo warehouse

This study found that there are seven factors emanated with regard to Halal warehouse compliance for air cargo/air freight warehouses. The seven factors are: organization/management team, comprehensive training, Halal standard adoption, supplier selection, standard operational procedure (SOP), documentation management and knowledgeable staff.

Organization/management team

An organization is a group of people working together to achieve the objective set by the company. The organization works as a team and divides its roles and responsibilities in order to increase the effectiveness of the company. It will be more productive if the team members support each other and contribute to the operation.

Inside Halal warehouse organizations, the objective is to be the best Halal warehouse. Based on the findings from the interview, most of the interviewees agreed with the categorization of these as main factors. In order to achieve Halal compliance, the concept must be adopted by the organization. It must willingly help its staff to understand about Halal processes because most of their workers are not well informed of what a Halal warehouse actually comprises. Moreover, most of them think that it only involves changes to a few documentation processes and operations because they require additional funds for implementation. As mentioned by an interviewee:

> Yes they are, the managing director and also top management ask for Halal logistics implement in this company.
>
> —Warehouse Operator

Hence, the management team must also play an important role in making sure that warehouse operation are not just Halal in theory but in practice as well; all the operators must be well trained with the standard and operation of the Halal warehouse. Companies can send their officers to a course or seminar to increase their understanding of Halal warehouse practices.

Comprehensive training

Training is a revision to activity related to a specific area to improve the efficiency level and hereby produce better operation quality. Training is very important because it will be increase the productivity of an organization. On a related note training is a must for staff because it will help them to work efficiently to conduct the Halal procedure better.

> As policy, we annually conduct samak (ritual cleansing) training, mock recall and other Halal related training as a revision on their responsibility and it is a preparation if the contamination happened.
>
> —Warehouse Operator

As we know, Halal food requires special handling, skills and knowledge since it is very susceptible to contamination. Contact with haram food, for example water from pork meat or stool, will regrettably change the Halal food to be haram. As a precaution workers who handle Halal food must pay special attention to this kind of cargo.

More than that, the traceability and quality of Halal food are in their hands. Trained workers are usually more aware of the environment that may affect the Halal product in order to assure the user of the Halal product's integrity.

Halal standard adoption

A system can be interpreted as a set of detailed methods, procedures and routines created to carry out a specific activity or solve a problem. The system will help operators to establish their positions in the industry. For example, in order to get validation from JAKIM, a Halal warehouse needs to adopt the procedures as decreed by JAKIM, known as the Halal product monitor and regulator in Malaysia.

> In the year of 2012, Jakim has launched their Halal logistics scheme, we applied for it and has been a success to certify as Halal JAKIM for warehouse and logistics firstly in Malaysia.
>
> —Warehouse Operator

However, the other choice in the industry is to get validation for their Halal warehouse by complying with the HACCP (Hazard Analysis and Critical Control Point), established by well-known international organizations, and by GMP (Good Manufacturing practice). These are the two choices of system in Halal management.

The success of a Halal warehouse also depends on the adoption of the system by the warehouses. The systematic adoption by the company must come from a rigid source with the best reference. The importance of the adopted system will lead to the standard quality of service provision, established by the authorities, such as JAKIM and other well-known organizations.

Supplier selection

A warehouse cannot be established for long without suppliers. These are the agents who provide material to keep in the warehouse for the purpose of storage or as a distribution place. The supplier is the key player who will sustain the credibility of the warehouse. To maintain the Halal condition of the warehouse, a relationship between the supplier and the warehouse must be established. The cooperation between them will reduce the hardship of the warehouse in sustaining their Halal credibility at their premises and directly sustain the credibility of their Halal products. The cost of maintaining the Halal warehouse will also reduce, if the only thing they handle is Halal food.

> In reality, it is hard to keep both products with different status in a warehouse compare to only focus on one product status which only Halal. Then the operation cost also a bit lower.
>
> —Warehouse Operator

A supplier who works as an agent for the warehouse must understand and know the rules and regulations of the warehouse. In order to prove that their product is delivered from Halal sources, they must supply certificates of Halal approval from the authority which certifies their product. As such, MAQIS (Malaysian Quarantine Inspection Service) is purposely established to ensure that the nation's agriculture is free from pest, diseases and contamination toward plants, animals and fish complies with the health aspects of human, animal, plant, fish and food safety. JAKIM also works hand in hand with FHCB (Foreign Halal Certification Body), which is a JAKIM-representative body, to monitor or verify the Halal status of the raw materials and products.

The credibility and sustainability of Halal products can be preserved if the collaboration between warehouse operator and supplier is established. The agreement between them to supply Halal-approved products to the warehouse will simplify the warehouse operator to guarantee their storage area and other products inside their warehouse.

Standard operational procedure (SOP)

The organization policy can also be related to the SOP. A warehouse without SOP is chaos because there is no reference to their service procedure.

In order to guarantee the quality of service provided, a Halal warehouse must have an SOP because it is a reference document for workers to use in doing their job according to a standard implementation in order to achieve high-quality service operation. Halal warehousing is in a critical situation because the Halal integrity level, mostly in this area, is low since most of the time Halal products are stored in warehouses with non-Halal products.

More than this, the implementation of the right SOP is important to prevent products from contamination. This is because most of the Halal warehouse will state in their SOP that they will only receive approved Halal products from a regulatory authority. This kind of procedure will ensure that the products inside the warehouse are really of Halal status.

Beyond this, SOP implemented by the Halal warehouse operator strictly states that Halal products must be received from their own transportation or approved vendors. This regulation can control the contamination that might happen during the products' transport to the warehouse since Halal transportation is always cleaned with "sertu" or ritual cleansing. Ritual cleansing or "sertu" is a way to clean a contaminated area with "najs".

The restriction of transportation use is also an SOP implementation for some Halal warehouse operators. The transportation is to deploy any cargo other than the approved Halal product. This restriction is useful in avoiding any contamination and in ensuring that there is zero doubt from the user.

> The application of sertu will applied to all trucks and Lorries serve in this company in order to maintain the integrity of Halal product and as following the SOP.
>
> —Warehouse Operator

Internal Halal committee

The Halal warehouse operator must establish an internal Halal committee, where this committee purposely focuses on the Halal product as it relates to their operation in the warehouse. This internal committee is responsible for any decision related to the operation of the Halal product: for example to establish an SOP of the Halal warehouse, renewal of the registration period, information update to the Halal status of the product and decision about Halal product handling.

> For the Halal system, there is its own Halal managements system: as such halalan toyyiban leader, Halal policy, sharia' officer, Halal advisor, ritual cleansing training, mock recall, Halal committee and Halal assurance.
>
> —Warehouse Operator

In order to perform a high-quality job as described in SOP, this internal Halal committee must be at a competent level regarding the knowledge, computer literacy and decision-making skills. This committee is important in ensuring the sustainability of the Halal warehouse with their accreditation from authority.

The internal Halal committee is also a representative reference in any matter related to Halal handling in the warehouse, ensuring that all decisions are made quickly and accurately.

Some companies worry about the cost of establishing these committees as they will require new staff. As such, as stated in MS2400, the organization which implements Halal at their organization needs to have a Halal committee and dedicated Muslim staff with an Islamic background. This will increase the efficiency of the Halal management committee.

Having this committee will improve their work efficiency since they will have reference materials that allow them to decide on matters concerning Halal in a timely manner. Therefore, the performance of the operation cannot be an issue, and traceability of the product cannot come under question.

Knowledgeable staff

Knowledge is an important factor in contributing to the Halal warehouse. Knowledge with regard to Halal product and operation is very important since it distinguishes between Halal and non-Halal. The knowledge and information regarding Halal must be kept up to date since the product must not mix with others. For example, the worker must investigate where the ingredients in the food came from.

> But I’m here; I need to know everything, not only regard to truck and lorry but also regard to products and also farms…
>
> —Warehouse Operator

This is because issues may arise when the operator receives food without any investigation of the ingredients it contains. If the product contains any haram ingredients, it may contaminate the product near it, leading to doubt or “shubhah”. “Shubhah” means the Halal integrity is in doubt. Therefore, knowledgeable staff is very important to investigate the product and thus reduce doubt in Halal products. Knowledgeable staff is a key success factor in achieving Halal compliance for the warehouse, which can prevent the Halal warehouse from operating confidently (Figure 14.2).

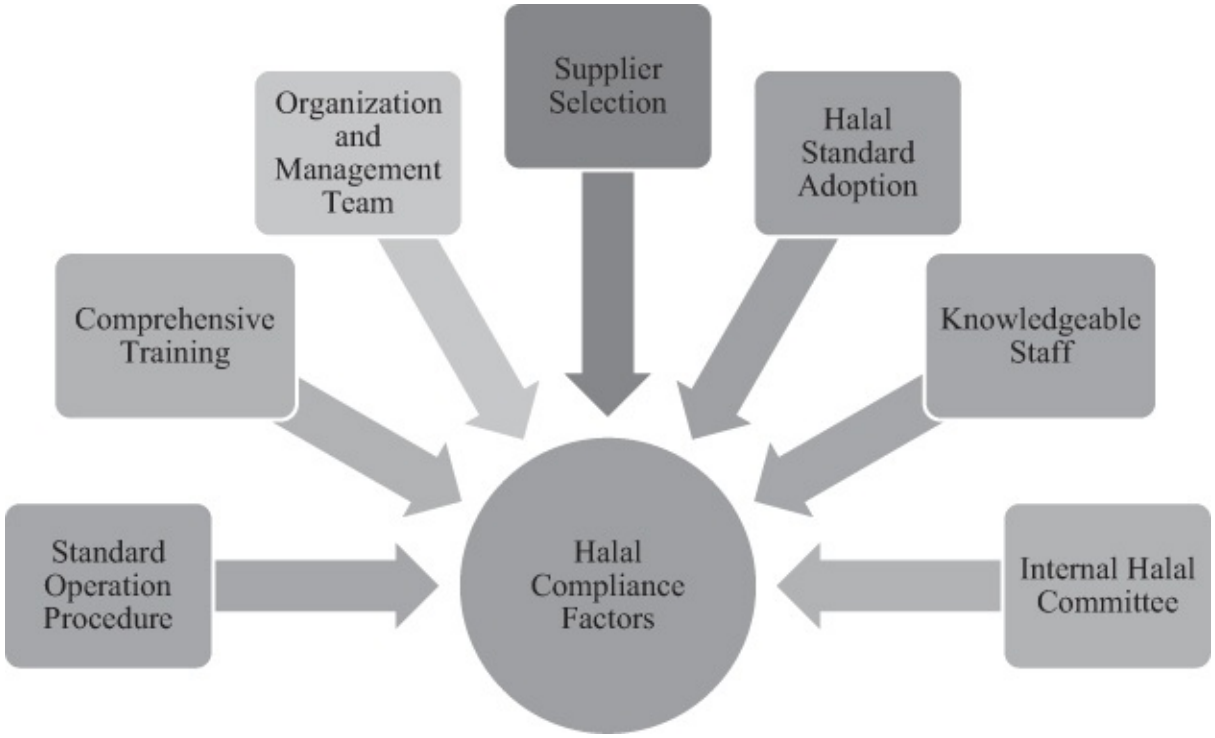

Figure 14.2 Halal compliance factor framework.
Source: Developed by the authors (2019).

Conclusion

In conclusion, the interviews and discussion show that Halal warehouses require several factors to achieve compliance. This cannot be achieved with only trial and error because this will increase the cost and time put in by the warehouse operators. Thus, the cost saved by the operation can be used to enhance the operation of the Halal warehouse, maybe further its investment with respect to equipment and facilities.

These factors will also help to increase the efficiency of operations and reduce mistakes and loss during the handling of the Halal products; thus, by securing the Halal products inside the warehouse, the Halal product status can be retained under the Halal standard

operation implemented by the management, and the trust of the end user of the Halal products can be increased.

In addition, this research has gathered information from warehouse operators, logistics service operators and regulators on the barriers to implementing Halal warehouses in Malaysia. This information may help future warehouse operators to focus on the areas which have been discussed by authors in order to implement Halal systems efficiently.

Lastly, regulators, warehouse operators and logistic service providers need to work together to harmonize the mission in sustaining the Halal status of the Halal product by providing better service following the standard provided by the JAKIM. Thus, the efficiency and effectiveness of Halal implementation cannot be questioned.

The warehouse operator and logistic service provider should also cooperate on providing information to JAKIM to reduce the problems faced by them in implementing Halal systems at their premises. Therefore, the relationship between operators and regulators may contribute significantly to the industry in creating an evolution of Halal warehouse operation as more demanding and well-known among Halal products manufacturers and Halal products distributors.

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15 Halal Knowledge Integrity Model (HaKIM) in intensifying the integrity of the Halal industry

Mohammad FakhrulNizam Mohammad, Rusli Abdullah and Nor Aida Abdul Rahman

Introduction

The size of the global Muslim population has been increasing. Based on the statistics in the year 2012, the total number of Muslims in the world population will be increased from 26.4% in the year 2030 to 30% by the year 2050 (Global Islamic Financial Report, 2019). Considering the total world population of Muslims in terms of region, Asia Pacific has recorded the highest number of regions with Muslims at 61.7%, followed by Muslims in the Middle East-North Africa at about 19.8%, as shown in Figure 15.1. The increasing number of Muslim populations exponentially increases the requirement for Halal products and services. The Halal industry is associated with a process of transforming the final permissible products according to Islamic law ("Sharia" law). Halal is no longer confined to a definition of food production that conforms to and complies with Islamic regulations, and other sectors, such as logistics, banking, manufacturing and supply chain.

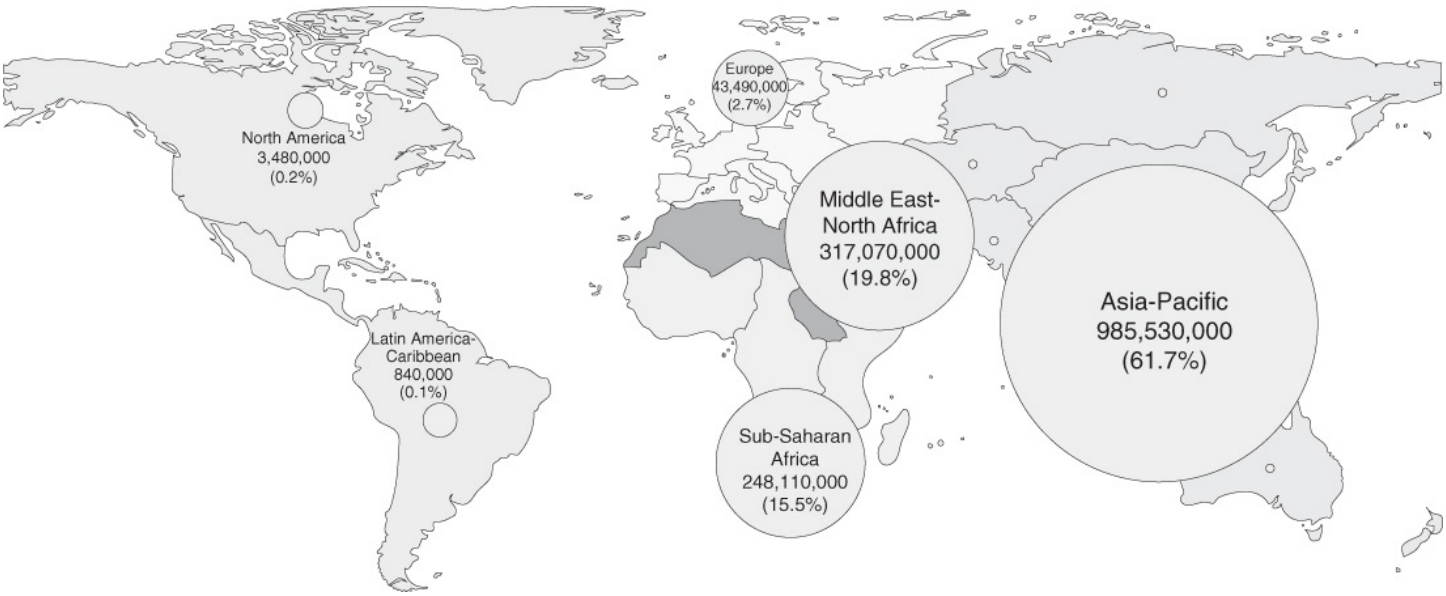

Figure 15.1 Regional distributions of Muslims as of 2010.

Source: Cornell University Library Map Collection (2016).

Since 1974, Malaysia has been very aggressive, becoming the major Halal centre in the world, specifically in the Asia region. Based on the statistics regading travellers from the Organisation of Islamic Cooperation (OIC) countries to Malaysia and Singapore in the year 2013, the majority of the travellers have selected Malaysia as a particularly attractive destination. Although there are no details of religion indicated, it is assumed that travellers from OIC countries are majorly Muslims (Henderson, 2016). Based on the statistics shown in Table 15.2, the total number of travellers from OIC was 25,720,000 in Malaysia; meanwhile, 15,600,000 travellers went to Singapore. The higher number of travellers from OIC countries (the majority of whom were likely Muslims) creates a spillover effect for Halal products and services requirements. Japan, for instance, has been drafting policies and programmes to promote Halal tourism to cater to and attract Muslim travellers to their country since the year 2012 – these efforts were undertaken by the Japan Tourism Agency (JTA) and the Japan National Tourism Organization (JNTO).

In relation to the above, logistics and supply chain have been regarded as important drivers in the Halal industry. They have become the backbone of the Halal industry; if there are leakages within the system, it will affect the whole Halal ecosystem and lead to contamination. Contamination and leakages have an adverse effect on the industry. Thus, the integrity of the Halal industry shall be attentively looked at in terms of the definition and capabilities needed in developing a strong platform within the industry. In addition, the focus of the Halal industry has always been channelled to the Asian region – this could be due to the fact that the largest Muslim population in the world resides in this region. Similarly, transporting and delivering Halal products has extended beyond a single country to all places. For example, the global Halal food market size, by region, had a total sales volume of USD 661.6 billion in the year 2010, an increase of 4.3% from the year 2009 (see Table 15.1).

Table 15.1 Global Halal food market by region size

Region/Year	*2009*	*2010*	*% change*
Africa	150.6 billion	155.9 billion	3.5
Asia	400.0 billion	418.1 billion	4.5
Europe	66.6 billion	69.3 billion	4.1
Australia/Oceania	1.2 billion	1.6 billion	33.1
Americas	16.1 billion	16.7 billion	3.6
Total Size of Halal Market	634.5 billion	661.6 billion	4.3

Source: Salama (2011)

One of the major factors in ensuring the genuinity of Halal products and services is to maintain the integrity of the product and its services. The process of transporting Halal products needs to be looked at as it is important to protect the transportation processes from any risk of contamination. The definition of Halal integrity can be best described as an assurance given for a safer, good-quality product, free from unlawful components, from the farmer (producer) to the consumer (Soon et al., 2017). In assuring the integrity of products

and services, the roles of Halal certification bodies are highly important in regulating the industry and ensuring that the handling and implementation process conforms to the guidelines or “Shariah” laws. Not only are Halal certification bodies responsible not only for the local market, but the main certification bodies in the countries are responsible for certifying and managing imported products from foreign countries (Table 15.2).

Table 15.2 Statistics of travellers from OIC countries into Malaysia and Singapore

Country	*Malaysia*	*Singapore*
Bangladesh	134,663	119,337
Brunei Darussalam	1,238,871	64,129
Egypt	21,053	5113
Indonesia	2,548,021	3,112,414
Iran	78,316	13,532
Iraq	27,869	N/A
Kazakhstan	19,840	N/A
Kuwait	N/A	8,482
Malaysia	–	1,030,824
Oman	26,601	N/A
Pakistan	81,397	24,984
Saudi Arabia	94,986	14,790
Turkey	12,775	21,726
UAE	19,830	17,761
Uzbekistan	11,591	N/A
Total arrivals (all countries)	25,720,000	15,600,000

Source: Henderson (2016)

Therefore, foreign manufacturers intending to export Halal products to other countries can also verify and validate their products using their local Halal regulator. In Malaysia, regulating Halal activities falls under the responsibility of JAKIM (Department of Islamic Development Malaysia), which is imperative to assuring the purity and genuinity of the products produced and delivered.

Halal integrity process

Assuring the integrity of Halal products and services in the industry is definite; the goal of supply chain is to deliver products from source to consumer by fulfilling the concept of “from end to end, from farm to fork and from grass to glass”. The product needs to be handled within Halal processes, delivered by Halal services and finally consumed with Halal status. It indicates the importance of adhering to compliance set out by regulators in preparing, delivering and serving the products. In accommodating the Muslims needs globally, Halal products that are exported from manufactured countries (exporter) need to be certified by their local Halal certification bodies, which are authorized by the importing

countries, (receiver) Halal certification bodies. Hence, the established Halal certification process (specifically for exported or imported products) needs to be in place. The bird's-eye view of the global Halal supply chain process from exporter to receiver is shown in Figure 15.2.

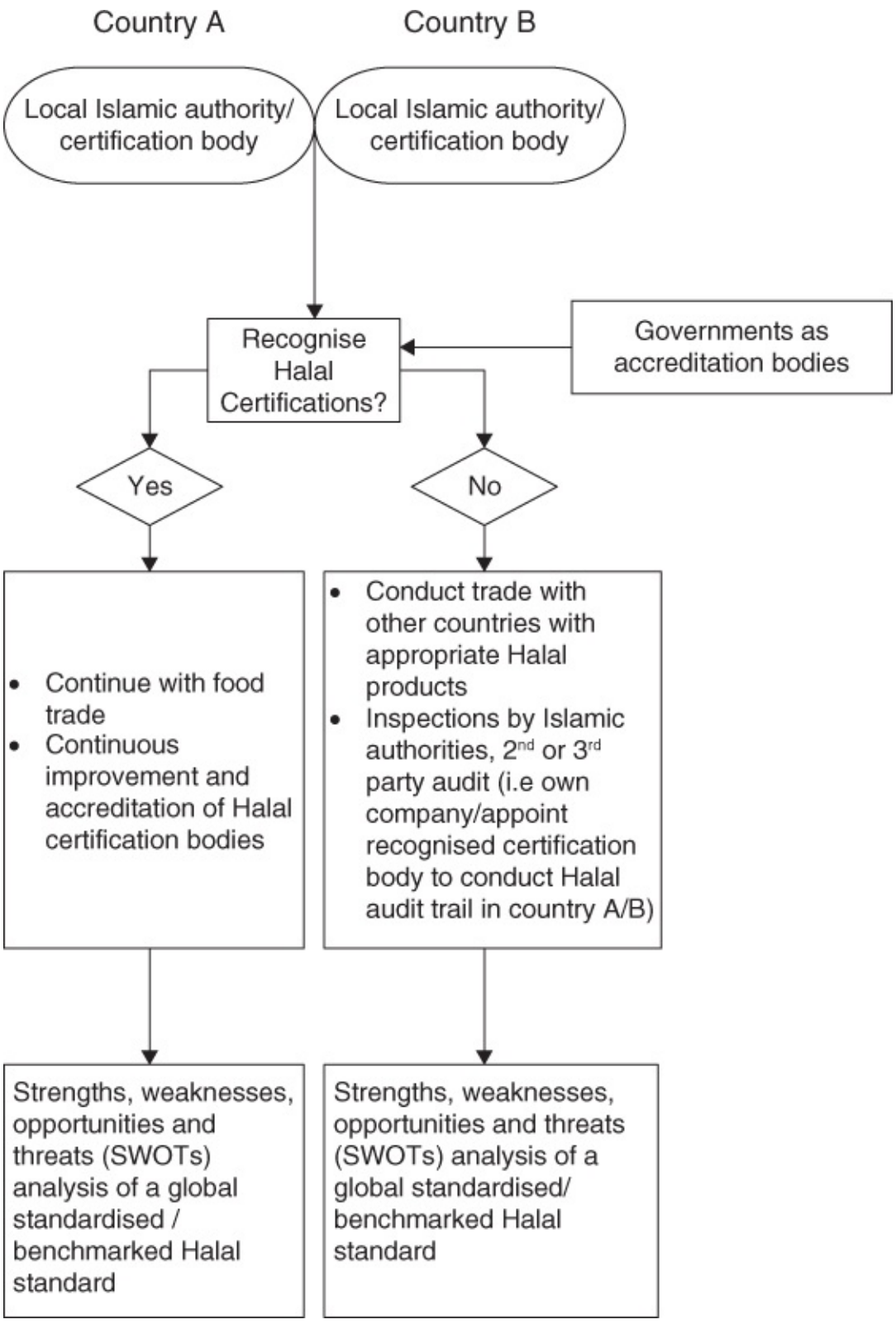

Figure 15.2 Assuring global Halal integrity process.

Source: Adopted from Soon, Chandia and Regenstein (2017).

Global Halal integrity process

Based on Figure 15.2, the process of exporting Halal products starts with the application made by the Halal provider or manufacturer to their local Halal certification bodies. Their local Halal certification bodies must be certified and approved as a strategic partner in implementing the Halal certification process followed by the importing country. Products that are already certified with Halal by the local certification bodies can be traded and exported to the importing country. Along the process, continuous improvement and regulations are conducted to ensure that the products, as well as the foreign certification bodies, are observing and monitoring the genuinity of the Halal products.

In analysing the suitability and conformance of products to Halal standards, a SWOT analysis (strength, weakness, opportunities and threats) is used to identify the integrity of the Halal products in the supply chain (Soon et al., 2017), the competitiveness of Halal logistics in Malaysia (Talib and Hamid, 2014) and the competitiveness of the Halal food industry within the business environment in Malaysia (Bohari et al., 2013). The list of Halal certification bodies in their respective countries in South-East Asia is shown in Table 15.3.

Table 15.3 List of Halal certification bodies in South East Asia

Agency	*Country*	*Scope*
Department of Islamic Development Malaysia (JAKIM) http://www.islam.gov.my	Malaysia	Responsible for upholding Islamic affairs, such as planning for Islamic development & activities, education, training, assessment of Islamic activities and assistance on reviewing Islamic rules & regulations.
Islamic Religious Council of Singapore (MUIS) https://www.muis.gov.sg	Singapore	Administration centre for Halal certification and other Islamic religious matters, such as *zakat*, endowment, pilgrimage affairs & religious rulings.
The Indonesian Council of Ulama (MUI) http://www.halalmui.org	Indonesia	*Halal certification body and centre for information and education.*
Lembaga Mengeluarkan Permit Halal http://www.kheu.gov.bn	Brunei	Issuance of *Halal* certificate and permits for operating *Halal* operator/provider
Halal Certification Agency Vietnam (HCA) https://halal.vn/en	Vietnam	Provides certification for *Halal* products for companies exporting products and goods, and customers in need.
The Central Islamic Council of Thailand (CICOT) http://www.cicot.or.th	Thailand	Issuance of Halal certificates, document translation, Islamic affairs matters and promotion and publication

The agencies listed in Table 15.3 act as Halal certification bodies in their respective countries in order to certify Halal products and are responsible for monitoring, observing and ensuring the genuinity of Halal products exported and imported from their local markets to other foreign countries, and other Islam-related matters. From the aforementioned list, JAKIM, as one of the renowned Halal certification bodies in the region, plays roles not only in focussing on the issuance of Halal certification to the local market but also in approving and certifying foreign Halal certification bodies (FHCB) as their partners in certifying the products and goods to be exported to Malaysia

Malaysia Halal certification process for foreign Halal certification bodies (FHCB)

In Malaysia, certifying the status of Halal products at the national level and foreign certification bodies is the responsibility of JAKIM, while other state-level religious departments (“Jabatan Agama Islam Negeri/Majlis Agama Islam Negeri”) are eligible to certify products in a local market (Ahmad et al., 2017, 2018). Therefore, when it comes to certifying imported products, JAKIM plays an important role in ensuring the products’ Halal status.

As a certifying body for imported Halal products in Malaysia, JAKIM has established a guideline for the approval and accreditation of FHCB. Once accredited, the FHCB are eligible to act as gatekeepers in the issuance of Halal certificates for products to be exported in their respective countries. Figure 15.3 shows the detailed dropdown flow of the application, inspection, and certification and approval processes adopted by JAKIM in certifying FHCB. FHCB that have been approved as certified bodies by JAKIM are able to certify Halal products in their local markets, subject to the following validities: first, the appointment as foreign-certified Halal bodies with JAKIM is for a period of two years; second, the appointed FHCB shall be listed on JAKIM’s website for easier reference by consumers; third, the appointed FHCB are obliged to submit annual reports to JAKIM; and finally, an audit exercise shall be conducted after the expiration for the purpose of review by JAKIM.

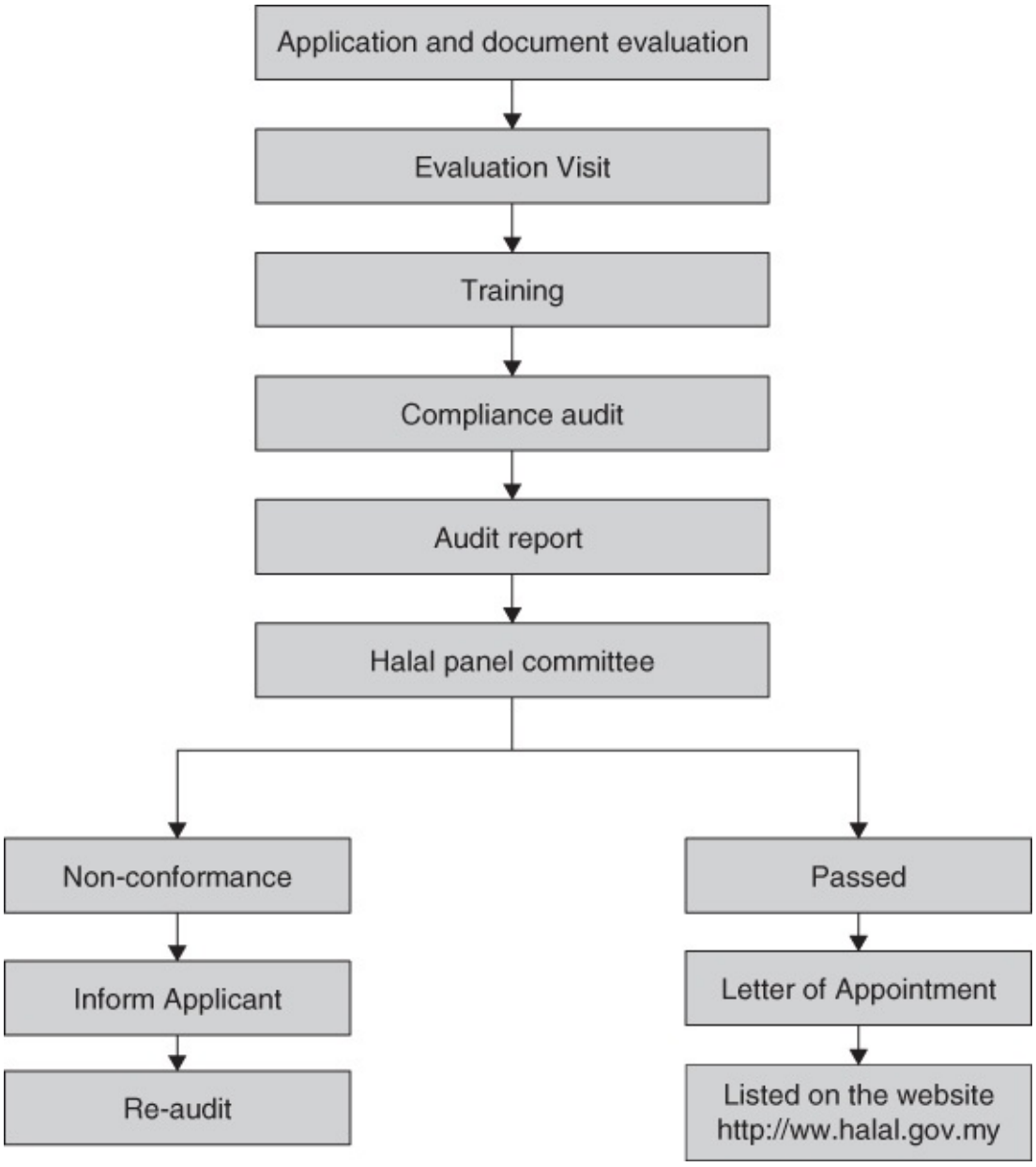

Figure 15.3 Flowchart for the appointment of foreign Halal certification bodies.
Source: Jabatan Kemajuan Islam Malaysia (n.d).

Halal food supply chain integrity

One of the most important parts of maintaining a product's Halal integrity is ensuring that it complies with Halal standards throughout the supply chain process. In a global Halal supply chain process, as shown in Figure 15.3, the local Halal certification bodies (such as JAKIM for the Malaysian market) rely on the Halal certificates issued by the appointed FHCB, as listed on JAKIM's website. JAKIM, as the certification body conducts continuous inspection, reviews and audits the process of appointed FHCB to ensure the integrity of imported products.

The integrity of the Halal food supply chain can best be described by the enhanced conceptual framework developed by Zulfakar, Anuar and Talib (2014), as shown in Figure

15.4. The conceptual framework of Halal food supply chain integrity describes seven components that build up the integrity of the supply chain in Halal food, which is explained in Table 15.4. As described in the table and the conceptual framework, it is notable that the integrity of the Halal supply chain emphasizes the integrity of the delivery process and interconnected activities that link all the components required for the recognition.

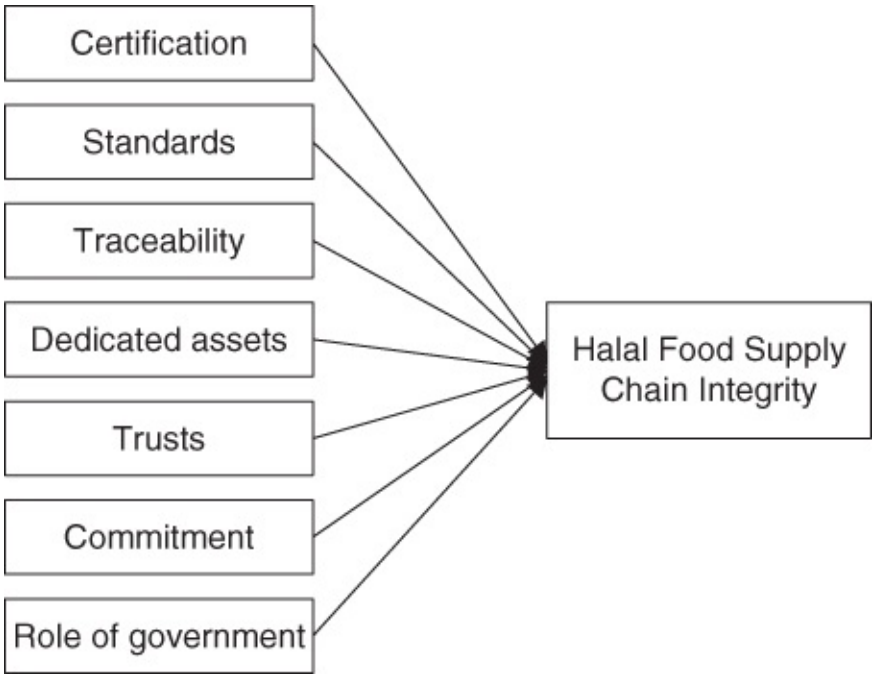

Figure 15.4 Enhanced conceptual framework on Halal food supply chain integrity.
Source: Zulfakar, Anuar and Talib (2014).

Table 15.4 Components of Halal food supply chain integrity framework

Components	*Description*	*Author*
Certification	Halal certification issued by the Halal certification bodies to mark the Halalness of the products	(Majid et al., 2015)
Standard	Guidelines issued by the Halal certification bodies need to be adhered to by the Halal operators or providers.	(Yasuda, 2017)
Traceability	Capabilities to trace the status of Halal for each product starting from the source till it reaches the final consumer.	(Samsi et al., 2012)
Dedicated Assets	Total separation of Halal products from other non-Halal products in terms of physical assets (such as transportation and storage) and dedicated workforce handling Halal products.	(Zulfakar et al., 2014)
Trusts	Transparencies between partners within the supply chain such as sharing of information such as planning, production, costs, volume of sales and information on the handling processes.	(Zulfakar et al., 2014)
Commitment	Each party is willing to invest their effort in the partnership.	(Zulfakar et al., 2014)
Role of government	Initiatives and directive from the government in supporting the Halal certification from the aspects of planning and policies.	(Samsi et al., 2012; Zulfakar et al., 2014)

Knowledge activities in the Halal integrity process

Halal integrity is essential in assuring the trusts of consumers. Lack of trust in the genuinity of the products and services is an important issue, especially to countries with a majority of Muslims. Cases of Halal certificate frauds are quite widespread and have become a concern in Europe (Tieman and Ghazali, 2014). This issue needs to be seen not only in the concerted demand of local people but also in the number of Muslim travellers visiting the other countries to accommodate their needs.

The process of developing and sustaining the integrity of Halal products and services requires ongoing commitment and input from all parties involved, and a platform to support the process. There are immediate needs for the development of a traceability system in supporting the Halal industry since the purpose of the traceability system is to provide a platform for parties involved with information and communication along the supply chain process (Zailani et al., 2010). Furthermore, the Halal standards issued and used are different in nature (Zulfakar et al., 2014). The development of an effective traceability system requires diverse inputs from all parties involved, such as: first, knowledge of the person responsible in the production process (not only must they know how to do; they also need to conform their practices to the standards required by the guideline), and second, comprehensive knowledge about logistic providers' processes, systems, standard operating procedures, track records, lessons learned and best practices to minimize contamination.

It is also accepted that all parties involved in the Halal industry come from diverse backgrounds and some limitations, such as lack of knowledge about the industry, technology used and proper use of input from the Halal industry. All information and knowledge on the details about Halal products and services need to be shared and disseminated among industry stakeholders – therefore, all relevant developments are able to utilize the information to improve the process and their activities to gain trust. Briefly, the development of knowledge-based systems can support the establishment of a more effective traceability system (Samsi et al., 2012).

On top of the non-standardization of Halal guidelines and the importance of knowledge as an input to support integrity, introducing the Halal industry as a tourism attraction creates some uncertainties among Muslims travellers, especially in non-Muslim countries. For example, in developing the Halal guidelines to promote Japan as a Muslim and Halal-friendly country, some guidelines have drawn criticism as impractical. The major issues occur due to the fact that Halal knowledge is embedded in the mind of the knower; meanwhile, the country has developed guidelines based on input from consultants who come from a diverse background and practices (Yasuda, 2017). However, issues of difficulties in merging tacit and explicit knowledge can be addressed with the establishment of knowledge management system (KMS) architecture (Chua, 2004).

As a result, the tourism industry in Japan has started to realize the importance of a specific platform to consolidate tacit knowledge of Halal and its interaction with the developed standards guidelines on a shared social context. As highlighted in the study, one of the major driving and pulling factors for the demand of Halal is Muslims' consciousness of what they eat and what they wear. The development of the knowledge-based platform will be able to

support the interaction of the Muslims' consumer knowledge and the consultant knowledge, in the form of documented guidelines on the best practice in contributing to Halal integrity. It is agreeable here that there are difficulties in merging tacit and explicit knowledge (Kaziliunas, 2012) that will make the process of intensifying the integrity a bit more difficult; however, the nature of a Halal industry that requires the consolidation of stakeholders' knowledge and standardized guidelines is more crucial.

In a study conducted by Othman, Shaarani and Bahron (2016), it was discovered that effective establishment of Halal policy can be achieved through the involvement of management with the industry. As the global leader in the Halal industry, the initiatives of Halal activities in Malaysia come from the national initiatives, making them much easier to implement, beyond the higher demand from the consumer. The roles of governments in assuring the integrity of Halal products and services come from the directive of the government in establishing agencies on Halal and collaboration among agencies within the government (Zulfakar et al., 2014). As shown in Table 15.3, JAKIM is an established Halal certification body in Malaysia; meanwhile, other countries in South-East Asia also have local certification bodies responsible for handling and managing the Halal issues and matters in their respective presence.

At the international level, commitment from the appointed FHCB is sought, especially in assisting local certification bodies, such as JAKIM in Malaysia, in authorizing the Halal certificate process. Requirements for reliable and reputable FHCB are essential since the responsibilities of the accredited partner or representatives of JAKIM in other foreign countries, among others, are to observe and assure the integrity of Halal status, such as the use of raw materials, handling practices and monitoring that will not affect integrity.

Therefore, to assure that all certification bodies are getting transparent information and proper guidance in dealing with some issues that may occur (especially for exporting products), the establishment of a platform that can support the transparent sharing of information as well as seamless knowledge interaction between the accreditor bodies and their partner is needed. In fact, the major key to enhancing Halal integrity at the international level includes transparencies as well as continuous efforts from all stakeholders, such as the supplier, policy makers, certification bodies and research institutions (Soon et al., 2017). Establishing a platform to consolidate and manipulate Halal knowledge among the community of practice will lead to an enhanced and improved quality of services in the Halal industry (Abdullah, 2014).

Knowledge management in the Halal integrity process

Managing knowledge in an organization is essential as it has been regarded as a powerful intangible asset for an organization in achieving competitive advantage. This knowledge management allows the organization to achieve its business objectives. Earlier studies focussed on upholding Halal integrity have addressed the importance of knowledge in the development of knowledge-based systems to support effective traceability systems (Samsi et al., 2012) and consolidate tacit and explicit knowledge in social contexts for more successful

development of Halal tourism in Japan (Yasuda, 2017). Meanwhile, Bohari, Hin and Fuad (2013) feel that there is still a lot more to do, especially in enhancing the knowledge of the involved parties in the industry as close as possible to the requirements, as spelled out in the guidelines or as guided by “Shariah” law. Furthermore, a study by Tieman and Ghazali (2014) confirmed that one of the failures in the successful implementation of the Halal supply chain is due to the lack of understanding of the concept of Halal.

The importance of knowledge

Knowledge is information that is coupled with perspective, lesson learned and interpretation. It is different from information or data. Knowledge can be segregated into two types: tacit knowledge and explicit knowledge (Nonaka, 1994). Tacit knowledge refers to information, experience or understanding that resides in the minds of people (Davenport et al., 1998; Nonaka and Konno, 1998), combined with their perspective or interpretation (Chikati and Mpofu, 2013). Managing and measuring tacit knowledge is a complex process. On the other hand, explicit knowledge is a type of knowledge that is commonly found in a readable form, such as documents, forms, written policy and books.

In an organization, the activities of creating knowledge; archiving and storing the knowledge; and disseminating, applying and using information (Alavi and Leidner, 2001; Ch et al., 2009) are known as knowledge processes or activities. Properly aligning knowledge activities with the organization objective will create and develop competitive advantages for organizations among the customers (Chikati and Mpofu, 2013). Hence, the existence of knowledge and the activities of creating the knowledge and measuring and monitoring the knowledge within the whole ecosystem remain important. According to Wiig (1997), the roles of knowledge strategy can be seen in five types of strategies: first, knowledge as a business strategy; second, knowledge as a management strategy; third, the importance of personal knowledge as part of a responsibility strategy; fourth, the creation of knowledge; and fifth, the transfer of knowledge strategy.

In a global market, the inflow and outflow of products and goods from one country to another are part of economic trade. In the Halal industry, intensifying the process to assure the integrity of products and goods from other countries is a significant area to be looked at. There is a strong justification for a specific platform to support the process of assurance (Halal integrity) among the stakeholders. In addition, the development of a technology platform disseminates the knowledge and acts as a repository in responding to the compounding issues and repetitive questions from consumers. Combining KM and Halal integrity is increasingly essential as the process of developing and assuring Halal integrity itself requires a lot of input, process transformation, a call for past information and much more.

Need for knowledge management systems

Social context, economic aspects and technological factors are some of the requirements for implementing KM activities in organizations (Chua, 2004). The existence of technology is panacea to facilitate KM activities, such as acquisition, production, storing and dissemination of knowledge (Alavi and Leidner, 2001; Ch et al., 2009; Kuo et al., 2011; Talebi et al., 2012), known as KMS.

The purpose of KMS is to provide a central repository for knowledge knowledge accessibility and sharing of knowledge, and support communication in organizations through collaboration, enhancement and management of the knowledge that is regarded as highly valuable for the organization (Abdullah et al., 2005). The positive impacts of KMS lie in its ability to capture, archive, disseminate and apply knowledge among the stakeholders or refer to a community of practices in a knowledge environment. The process of establishing the integrity of the Halal industry involves many activities. For instance, the process of obtaining certification by FHCB, as described in Figure 15.3, involves five major phases, including putting in an application, an evaluation process, training, auditing and review. All five phases generate a number of activities and information that require the incorporation of experiences, procedures and accepted processes while conducting the certification process. The process of certification is important for Halal food providers and worth consideration of integrating both inspection and certification (Majid et al., 2015).

As such, the integrity of products, goods and services produced in the industry needs to be monitored and assured from end to end. In such a situation, the development of ICT is needed to cater to knowledge activities and the business model in Halal industry (Bohari et al., 2013). Development of KMS is the right strategy for organizations that are dealing with consultants and technologies (Chua, 2004). Since the Halal industry involves not only normal business activities but a lot of compliance activities, auditing, regulations and producing guidelines by regulators and consultants, development of KMS is the proper strategy for the industry in bridging and consolidating processes within.

Knowledge management studies in the Halal industry

A review of several studies relevant to the inclusion of knowledge management in the Halal industry is summarized in Table 15.5. Based on the list, the majority of the studies emphasized the importance of knowledge in ensuring Halal integrity practices. Especially with the appointment of FHCB, the foreign counterparts of the local certification bodies in other foreign countries indicate the importance of diffusing knowledge and its transparency to minimize any issues that may affect the integrity of Halal products. In fact, studies by Bohari, Hin and Fuad (2013), Samsi, Ibrahim and Tasnim (2012) and Yasuda (2017) addressed the needs for the industry to establish a platform that can support the aggressive movement of knowledge that will lead to a strengthening of the integrity of the Halal supply chain and products.

Table 15.5 Knowledge management studies in the Halal industry

Authors	*Halal context*	*Description*	*Findings*

(Yasuda, 2017)	Halal Tourism	Development of Halal Knowledge Platforms for Halal Tourism in Japan	It is important to develop an IT platform to support sharing of social context knowledge among practitioners.
(Tan, Ramayah, and Popa, 2017)	Knowledge sharing attitude among employees	KMS self-efficacy, KMS quality, expected reward and subjective norm: investigating knowledge sharing attitude of Malaysia's Halal industry	KMS self-efficacy, quality of KMS and subjective norm are significant constructs to deliberate the knowledge sharing attitude of employees.
(Abdullah, 2014)	Halal Knowledge Sharing	Halal Knowledge Grid Model for Promoting Knowledge Sharing Among Their Community of Practice	Development of an IT platform for Halal knowledge sharing benefited community of practices.
(Bohari et al., 2013)	Evaluation of knowledge, Halal quality assurance practices and commitment of food industries in Malaysia	Assessment on knowledge level, quality assurance practices and commitment of stakeholders in implementing Halal.	Level of knowledge, quality assurance practices and commitment are good.
(Samsi et al., 2012)	Halal Traceability	Knowledge Management as a Tool for Effective Traceability System in Halal Food Industry Supply Chain	Effective Traceability System needs to be developed in view of traceability's criticalities for global Halal industries.

HaKIM – Halal Knowledge Integrity Model

The main intention of the proposed HaKIM is to provide a knowledge-based IT platform to accommodate and facilitate processes occurring within the Halal supply chain model, especially in dealing with export and import activities. It is understood that the global Halal supply chain in Asia involves an active participation from both certification bodies (from the exporting country and the importing country). In relation to the post-certification by the importing country certification bodies, FHCB are given with a limit of two years certificate validity. On top of that, rigorous review activities such as auditing, training and consultation, are conducted throughout the period. At the same time, a lack of standardized guidelines and the nature of the Halal knowledge that mostly resides in the minds Muslims created the significant demand for the establishment of the model that combines the KM process within the industry.

Knowledge processes

Knowledge processes comprise knowledge activities performed by related parties in achieving the integrity of the Halal supply chain. In the interaction of processes within the Halal supply chain, there is lot of information and knowledge moving around and being documented, retrieved and archived. For example, the established Halal standards and guidelines are developed to provide a guideline for all parties involved in performing their duties according and conforming to Islamic rules and regulations. At the same time, regular and continuous auditing and review are conducted, especially of FHCB, to ensure that their

processes and practices are complying with the established standards issued by the certification bodies of the importing country.

The cycle of knowledge in Figure 15.5 shows the proposed knowledge processes that occur in the Halal supply chain, including knowledge creation, knowledge retrieval, knowledge reuse, knowledge sharing and knowledge storing. Types of knowledge creation activities in the Halal ecosystem are defined by the four major components of the SECI model, which include knowledge socialization, knowledge externalization, knowledge combination and knowledge internalization (Nonaka and Konno, 1998) (Table 15.6).

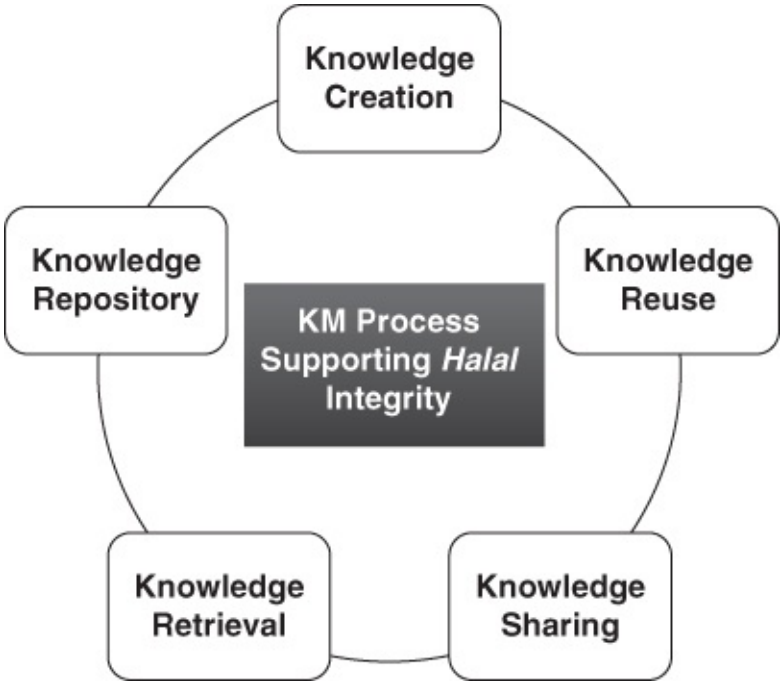

Figure 15.5 Knowledge management process in supporting Halal integrity.
Source: Developed by the authors (2019).

Table 15.6 Knowledge processes description

Knowledge process	*Descriptions*
Knowledge creation	
- Socialization	Creation of tacit-tacit knowledge mostly happens among parties involved, such as transfer of information during discussion, idea brainstorming and forums.
- Externalization	Creation of tacit-explicit knowledge mostly viewed as complicated process, especially in transferring human knowledge into written documents.
- Combination	Process of consolidation of documents (internal or external) into the established standards or guidelines.
- Internalization	Activities of converting explicit knowledge into tacit knowledge, such as the needs for training and review of policies.
Knowledge reuse	Activities of using internal knowledge and external knowledge more than once.
Knowledge sharing	The activities of diffusing and disseminating information to other parties in the ecosystem (known as community of practice). Sharing of knowledge is essential in view of the non-standardization of Halal practices as well as assuring conformance with Halal standards and guidelines.

Knowledge repository	Storing and archiving information and knowledge.
Knowledge retrieval	The activities of retrieving knowledge from documents, database, websites, written policies and guidelines.

Source: Developed by authors

Knowledge management system architecture

KMS architecture shows the structure of a system that is required in managing knowledge within the organization. A brief review of past KMS architecture development, as shown in Table 15.7, indicates that KMS is a system facilitating knowledge management in an organization which comprises several layers, combining both technical and non-technical aspects. Tiwana (1999) developed seven layers of KMS architecture based on the seven OSI layers (Open Systems Interconnection) that emphasized the technical requirement of a system. Meanwhile, the KMS architecture developed in a study by Meso and Smith (2000) defined three major functions in the system, comprising three components that include a technology component, functions component and knowledge component. This KMS model is one of the earlier models managing the knowledge process, such as acquiring, sharing and creating knowledge. In fact, the KMS model can be the basic architecture for intensifying Halal integrity.

The next KMS model was developed in a study by Chua (2004) by bridging consultants and technologies, who had proposed similar components of KMS comprising technology, knowledge and interface components. The KMS basic architecture model, developed in a study by Williams (2015), much more closely resembles the basic requirement and components of KMS in an organization that is not only managing and processing knowledge in the organization but also involves heavy interaction of tacit-tacit or tacit-explicit-tacit knowledge.

HaKIM architecture

The main purpose of HaKIM is to intensify and uphold the integrity of the Halal supply chain and products or services in the Halal industry. It was acknowledged in the earlier discussion that in an effort to intensifying integrity, it is important to address the inclusion and consideration of knowledge in the whole process supported by KMS. The HaKIM model for Halal integrity services has five layers, as shown in Figure 15.6, which include actors, system interface, the knowledge layer, database/repository and source of the knowledge. Tables 15.7 and 15.8 briefly illustrate this study.

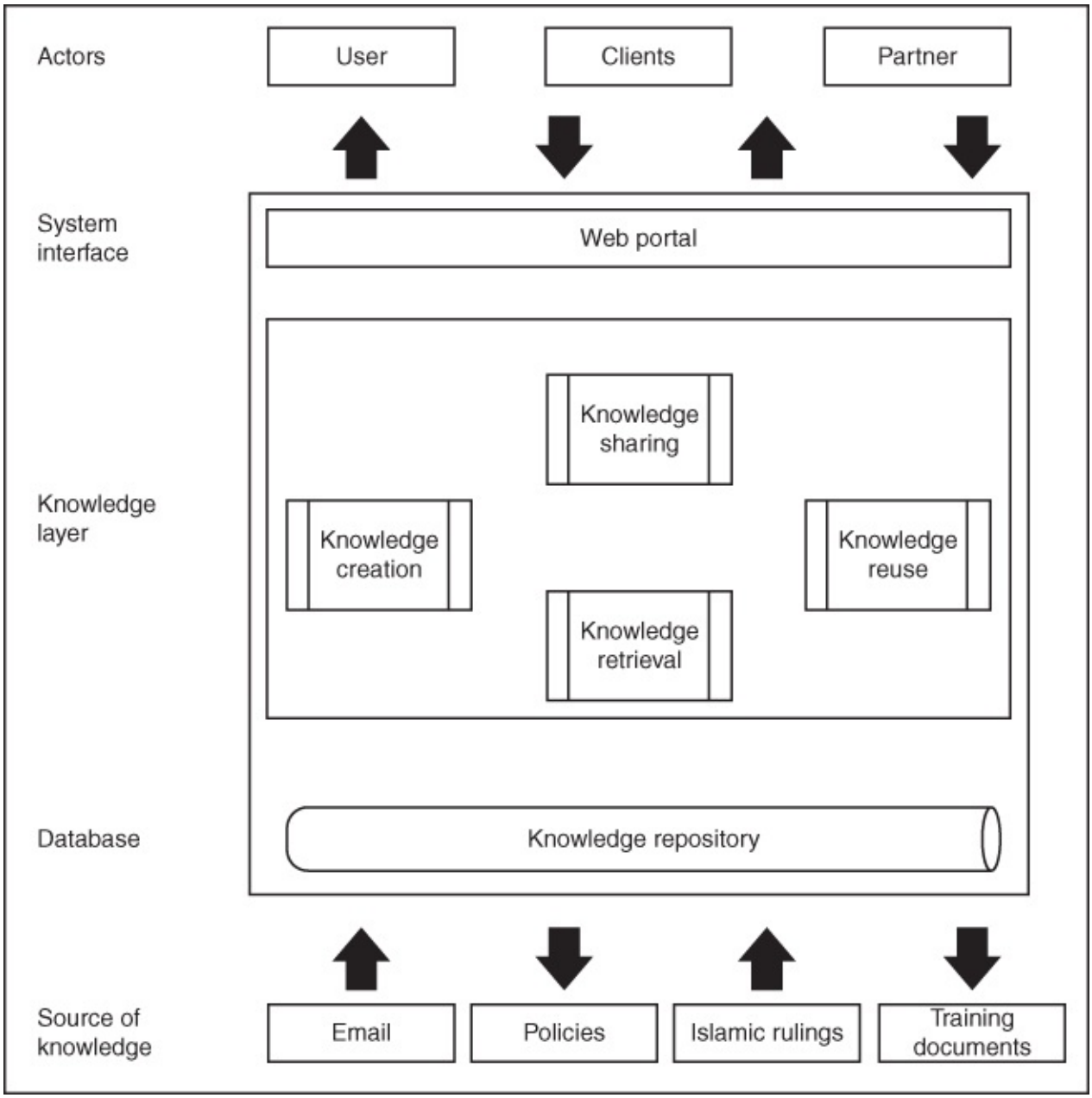

Figure 15.6 HaKIM architecture.

Source: Developed by authors (2019).

Table 15.7 Summary of past KMS architecture components

Authors	*KMS components*			
(Tiwana, 1999)	**Interface layer** Browser	**Access and Authentication layer** Authentication, recognition, security, firewall, Tunnelling	**Collaborative Intelligence and Filtering** Intelligent agent tools, content personalization, search, indexing, meta-tagging	**Application layer** Skills directories, Yellow pages, Collaborative work tools, video conferences, Digital white boards, Electronic forums, Rationale capture tools, DSS tools, GDSS tools

Transport layer Web and TCP/IP Deployment, Streaming Audio, Document Exchange, Video Transport, VPN cote, Electronic Mail and POP/SMTP support	**Middleware and Legacy Integration layer** Wrapper tools (TCL/TK / scripts to integrate legacy or cross-platform data)	**Repositories** Legacy, data warehouse, discussion forums, document bases, others		
(Meso and Smith, 2000)	**Technologies** Computer-mediated collaboration, electronic task management, messaging, video conference and visualization, group decision support, web browsing, data mining, search and retrieval, intelligent agent, document management	**Functions** Using knowledge, find knowledge, creating knowledge, packing knowledge	**Knowledge** Know-how, know-what, know-why, self-motivated creativity, personal tacit, cultural tacit, organizational tacit, regulatory asset	
(Chua, 2004)	**Presentation services** Personalization, Visualization	**Knowledge services** Knowledge creation, Knowledge sharing, Knowledge reuse	**Infrastructure services** Storage, communication	
(Williams, 2015)	**Strategy** Problem, Purpose/objective, Policy, Governance, Culture, Risk	**Actors** Owner, Source/Creator, Target / users / clients, managers, custodian, facilitator, enablers, boundary spanners, networks and communities, champions and advocates.	**Delivery interface** Mode, facilitation, style, technique, access control, accessibility, personalization, tailoring	**Functionality, security, techniques and logic** Logic, business rules, security, stewardship, review, disposal, transformation, integration, admin, reporting, procedures, content management
Knowledge source Source, authenticity, reliability, sufficiency, currency, taxonomy. catalogue	**Infrastructure** Facilities, equipment, repositories, instruments, software, networks, hardware	**Continuous improvement** Feedback, performance management, review and audit, return on investment, Benefits realization, action		

Table 15.8 Halal certification body in Malaysia and Indonesia and foreign Halal certification bodies

		Malaysia (JAKIM)	*Indonesia (MUI)*
General validity of the recognition		Validity of appointment for two (2) years. Appointed bodies shall be listed on JAKIM's website as Recognized Foreign Halal Certification Bodies. Annual report needs to be submitted to JAKIM. JAKIM shall carry out audit exercises after expiration for review purposes.	Valid for two years from the appointed date.
Zone	*Countries*	*Halal bodies certified by JAKIM **	*Halal bodies certified by MUIS*
Central Asia	Kazakhstan	Association Halal Industry of Kazakhstan (AHIK)	Information not available
	Uzbekistan, Tajikistan, Kyrgyzstan, Turkmenistan	Information not available	Information not available
East Asia	China	Shandong Halal Certification Service China Islamic Association ARA Halal Certification Services Centre Inc. Linxia Halal Food Certification Centre (Gansu)	Information not available
	Japan	Japan Muslim Association Japan Halal Association (JHA) Japan Halal Unit Association (JHUA) Japan Islamic Trust (JIT) Muslim Professional Japan Association (MPJA) Nippon Asia Halal Association (NAHA)	Muslim Professional Japan Association (MPJA) The Japan Moslem Association (JMA)
	South Korea	Korean Muslim Federation (KMF)	Information not available
	Taiwan	Taiwan Halal Integrity Development Association (THIDA)	Taiwan Halal Integrity Development Association (THIDA)
	Hong Kong	Information not available	Asia Pacific Halal Council Co Ltd (APHC)
	North Korea, Mongolia, Macau	Information not available	Information not available
South-East Asia	Brunei	Lembaga Mengeluarkan Permit Import Halal Bahagian Kawalan Makanan Halal Jabatan Hal Ehwal Syar'iah	Lembaga Mengeluarkan Permit Import Halal Bahagian Kawalan Makanan Halal Jabatan Hal Ehwal Syar'iah
	Philippines	Islamic Da'wah Council of The Philippines (IDCP)	Halal Development Institute of the Phillipines (HDIP)

		National Commission on Muslim Filipinos (NCMF) The Ulama League of The Philippines Halal Development Institute of The Philippines Islamic Advocate on Halal and Development	
	Indonesia	The Indonesian Council of Ulama (MUI) Lembaga Pengkajian Pangan Obat-obatan dan Kosmetika	
	Singapore	Islamic Religious Council of Singapore (MUIS)	N/A
	Thailand	The Central Islamic Council of Thailand (CICOT)	The Central Islamic Council of Thailand (CICOT)
	Vietnam	Halal Certification Agency Vietnam (HCA)	Halal Certification Agency Vietnam (HCA)
	Malaysia		Islamic Religious Council of Singapore (MUIS)
	Myanmar, Cambodia, Laos, Timor-Leste,	Information not available	Information not available
South Asia	Bangladesh	Islamic Foundation Bangladesh (Baitul Moqarram National Mosque)	Information not available
	India	Halal India Pvt. Ltd. Jamiat Ulama Halal Foundation Jamiat Ulama-l-Hind Halal Trust	Jamiat Ulama Halal Foundation Jamiat Ulama I-Hind Halal Trust
	Maldives	Ministry of Islamic Affairs	Information not available
	Pakistan	Jamea Markaz Uloom Islamia Mansoora (JMUIM) Punjab Halal Development Agency (PHDA)	Information not available
	Sri Lanka	Halal Accreditation Council (Guarantee) Limited	Halal Accreditation Council (Guarantee) Limited
	Iran Afghanistan, Nepal, Bhutan, Maldives	Information not available	Information not available
	Turkey	KAS Uluslararasi Sertifikasyon Göz. Tek. Kont. Hizm. Ltd. Şti. (Kascert International Association For The Inspection Certification Of Food And Supplies (GIMDES)	HAFSA Halal Certification and Food Imp and Exp Ltd
West Asia	Syria,Jordan, Azerbaijan, Israel, Lebanon, Palestine, Oman,	Information not available	Information not available

	Kuwait, Georgia, Armenia, Qatar, Bahrain, Cyprus, Iraq, Saudi Arabia, Yemen		
	UAE	Emirates Authority for Standardization and Metrology (ESMA)	Information not available
	List of countries : http://www.worldometers.info/geography/how-many-countries-in-asia/ List of Foreign Halal Certification Bodies. (“The Recognised Foreign Halal Certification Bodies and Authorities”. Retrieved from http://www.halal.gov.my on 18th January 2019) (“List of Halal Certification Bodies”, 2018)		

Source: Developed by the authors

Conclusion

Without a doubt, HaKIM establishment within the Halal industry is expected to circulate knowledge within the industry to conserve the integrity and quality of knowledge among certification bodies. Establishment of KMS within the Halal industry is significant in assuring the integrity of Halal products and services, especially in Malaysia and the Asian region. Its roles are important, especially to sync and link the industry regulators. This topic will cover the practicality and reality of KM within the industry, and connect its importance in assuring the genuinity of Halal products and services. Strong justification lies in the nature of processes involved in ensuring Halal integrity – which is the heart of the industry that has been constantly building up trust and confidence among people at large with the genuinity of certification through its rigourous standard and process of auditing, reviewing and certification. Halal certification bodies may consider the development of HaKIM to formulate and govern the knowledge within the circle of the certification process to ensure that the seamless data and information are delivered to all stakeholders.

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16 Digital innovation, Halal industry and the Fourth Industrial Revolution

Mohd. Iskandar Illyas Tan and Zuhra Junaida Ir Mohamad Husny

Introduction

The next wave of technological revolution is upon us in the form of the Fourth Industrial Revolution (4IR). The previous industrial revolution already not only influences the industry and businesses but also has a huge impact on society as a whole. With so many new innovation and technological advances in the area of information and communication technology (ICT), such as artificial intelligence (AI), Internet of Things (IoT), robotics, autonomous vehicles and many more, we have already seen the application of these innovative solutions in developed countries. How do we utilize this technology in the Halal industry? What kind of solution is suitable? What impact will it have for the key stakeholders in the industry? Will it improve productivity and efficiency, not only for the Halal producers but, more importantly, for the Halal authorities? This article discusses the potential of 4IR for the Halal industry and explores the possibilities it has to increase the efficiency, effectiveness and productivity of Halal operation. Although the Halal industry is slow to respond to the latest innovations, several digital projects have been implemented with positive results. This chapter will explore an innovation which has been introduced to the Halal industry and analyze its outcomes.

Background

The Department of Islamic Development Malaysian (JAKIM) can be considered the most established and recognized Halal certification system in the world. Malaysia is the only country where Halal certificationand enforcement is controlled and monitored by a government agency. It has the most comprehensive Halal standards, guidelines and manuals, and was the first country in the world to introduce a Halal logo in 1971 and the first Halal standard (MS1500) in 2004 (Standard 1500: 2004 – Halal Food: Production, Preparation, Handling and Storage – General Guidelines [1st Revision], 2004). This portrays Malaysia's commitment to being the world leader in the Halal industry. Currently, Malaysia has 13 Halal standards across seven industry categories. On top of that, there are other related documents, such as Halal manuals, guidelines and procedures. Halal products and services display the

highest quality of products and services. Sungkar, Othman and Hussin (2008) stated that Halal integrity means that the Halal products are being sourced, produced, stored and distributed in a manner consistent with Islamic values, where these are in line with modern and universal values, such as high quality and safety, hygienic production with respect to animal welfare and fair trade. This also means that in order to achieve Halal status, products and services not only need to comply with “Shariah” law but also need to pass the other quality accreditations, such as MeSTI, GMP, HACCP and ISO. Although all these quality documentations are important to the integrity and quality of Halal products and services, to read through, understand, identify and compile the related clauses and develop the appropriate checklists are very tedious and exhausting. A finding from a preliminary study shows that complying with JAKIM Halal certification is perceived as costly, tedious and time-consuming (Husny et al., 2018).

This article focuses on technology as a part of the solution to overcoming the mentioned problems. The importance of digital technology has increased and has rapidly become the most important factor in productivity and cost reduction (McFarlan, 1984; Parsons, 1983; Weston, 1993; Kangan, 1994). Weston claimed that digital technology could act as a feedback mechanism to users who are keen on measuring productivity. This may refer to the acquisition of rapid and accurate information and improved communication links. Technology should also be friendly enough for users to feel at ease in performing their tasks. In order to change the industry’s unhealthy perception of the process of acquiring Halal certification, and at the same time promote the industry’s adoption of Halal, information technology can be proposed as the best solution to current problems.

Halal industry and the Fourth Industrial Revolution (4IR)

A technological revolution is a period in which one or more technologies are replaced by another technology in a short amount of time. It is an era of accelerated technological progress characterized by new innovations whose rapid application and diffusion cause an abrupt change in society. Each cycle of revolution increases the industry’s productivity and efficiency. The term 4IR was introduced by Klaus Schwab, the executive chairman of the World Economic Forum (Schwab, 2015). The emphasis of 4IR includes (but is not limited to) technologies that combine hardware, software and biology (cyber-physical systems), and emphasizes advances in communication and connectivity. Schwab expects this era to be marked by breakthroughs in emerging technologies in fields such as robotics, AI, nanotechnology, quantum computing, biotechnology, the IoT, the industrial Internet of things (IIoT), decentralized consensus, fifth-generation (5G) wireless technologies, 3D printing and fully autonomous vehicles (Schwab, 2015).

Up until now, the Halal industry has still been behind in implementing and adopting the latest technologies available due to lack of research, development and commercialization from the academic, industrial and Halal authorities. Although few have been introduced to the market, few have been successfully penetrated and fully utilized by the Halal industry and consumers. Most of the technologies are travel-oriented mobile apps that assist

consumers in identifying and locating Halal premises specifically in Muslim-minority regions and countries (e.g. Haloodie, Zabihah and Meembar). Others, like Verify Halal, and Scan Halal help users to identify ingredients and sources which are Halal. Innovations that focus on Halal compliance, auditing or education, which is very important to improve the productivity and quality of the services, especially industry and authorities, need to be further explored. 4IR technologies have the potential to improve Halal operations more effectively and increase the efficiency of Halal supply chains. The following section discussed some examples of how 4IR can help improve the Halal industry.

One area of 4IR that can benefit Halal operations is the IIoT. IIoT, an extension of IoT, can revolutionize the Halal industry by enabling the acquisition and accessibility of far greater amounts of data, at far greater speeds and far more efficiently than before. With IIoT, the digitization of the Halal supply chain, from farms to warehousing to food distribution and retailing, enables Halal producers and regulators to leverage technologies that monitor and analyze the entirety of the process. IIoT has the potential to address various Halal industry challenges, including product quality, timeliness of delivery, waste, spoilage and recalls. Leveraging sensor technologies and real-time data analytics has allowed manufacturers to precisely monitor incoming ingredients through the adoption of track-and-trace techniques.

Blockchain is another technology in the 4IR that can influence the Halal industry. Blockchain, the tamper-proof, cryptography-based record-keeping system behind Bitcoin and other cyber-currencies, can be used to ensure the Halal integrity of the global food safety distribution chain. If implemented carefully, the Halal authority can issue Halal certificates with blockchain technology that can include production and distribution records from Halal producers. Blockchained Halal certificates cannot be falsified without leaving an evidentiary trail, which allows Halal producers and regulators to quickly trace products back to their source, allowing for fast recall and removal in case of contamination or fraud.

Another interesting 4IR technology that can benefit Halal operations is smart logistics. The main objective of smart logistics is to ensure that Halal products are stored and moved safely and efficiently. With the right combination of technology, smart logistics can improve Halal traceability, route planning and connectivity, helping to ensure that Halal retailers and consumers are confident in the safety and quality of their products. Recently, Tesla announced the Autonomous Semi Truck, which will change the landscape of the food industry. According to the study by McKinsey, huge economic gains from $100 to $500 billion per year can be achieved by 2025 from driverless vehicles in the U.S. trucking industry. The bulk of this windfall will come from the elimination of truck drivers and their wages. We are already witnessing the digitization of package delivery systems with drones and UberEats but the effects will become more prevalent in Halal industry when autonomous vehicles are the norm.

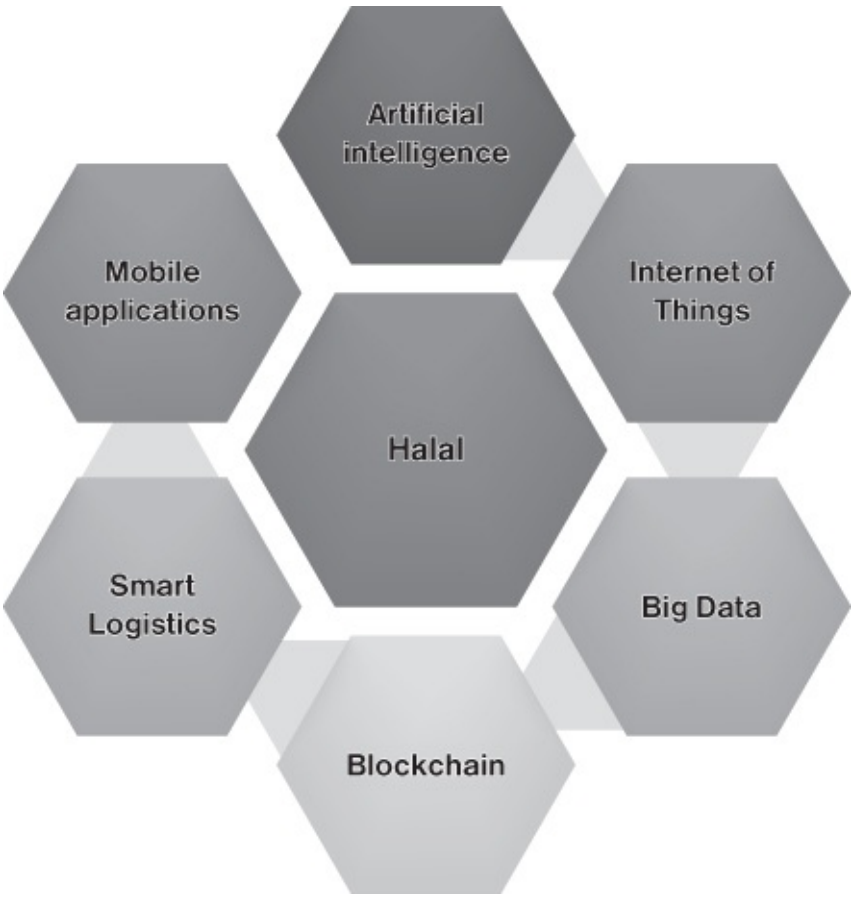

Figure 16.1 Fourth Industrial Revolution and the Halal industry – Halal 4.0.
Source: Adapted from the Internet and developed by the authors (2019).

There is no question that big data, through better predictive analytics, is already paying huge dividends for many professions, but does this apply to the Halal industry? IBM describes big data with four key aspects: first, the volume of data; second, the speed at which data is generated; third, the aggregation of distinctly different data types; and fourth, the validity and security of data. These aspects are known as the four "Vs": volume, velocity, variety and veracity (IBM, 2014). One aspect of big data application in the Halal industry is in Halal audit and inspection. Historically, Halal executives and auditors have relied on Halal audits or inspections to determine if a food establishment is in compliance with Halal standards and regulations. However, at best, Halal audits are a snap-shot of an establishment's condition at a single point in time. Wal-Mart Stores Inc. is leveraging big data for food safety purposes. Wal-Mart utilizes handheld information technology, Bluetooth communication and state-of-the-art temperature-measuring devices to check the internal temperatures of every batch of rotisserie chickens cooked, ensuring a safe internal temperature. Leveraging big data and the information it provides appears to be an innovative and effective way to enhance Halal regulatory compliance and track compliance with desired Halal standards.

Can AI improve the Halal industry? One area of AI application in Halal industry is object and pattern recognition, in which a researcher from Universiti Teknologi Malaysia (UTM) successfully developed a "syariah"-compliant automated chicken processing system (SYCUT). This system is built to ensure that the trachea and esophagus of chicken are

completely cut and Halal to eat. The system uses high-speed cameras and was developed by the Artificial Intelligence and Robotics Center (CAIRO), UTM. These high-speed cameras will record the slabs of the chicken slaughtered before the pictures are processed by the software, whether the chicken was slaughtered or not. If the slaughtered chicken does not follow “syariah”, the alarm system will sound, and it will be isolated. Following a trial at a slaughterhouse near Semenyih, SYCUT is 100% ready for use. Another example of AI application in food safety compliance is the solution developed by KanKan, a subsidiary of Remark Holding, to provide Shanghai’s municipal health agency with facial and object recognition. Their AI technology is currently being used in 200 restaurants but will soon expand to 2,000 facilities. Cameras in the kitchen or food facility watch to make sure that individuals are wearing masks or hair protection when required by safety regulations. Violations can be caught and corrected in near real time.

Many of the benefits of using mobile technology in the Halal industry center on improving organization communication. Smartphones keep businesses and employees connected with each other and customers both at the office and on vacation. This gives individuals the ability to communicate instantly and respond quickly to business situations. One area of mobile application which can benefit the Halal industry is audit compliance. Halal audit mobility, driven through smartphones or tablets, has become a game changer. Tablets with e-signature facilities can help collect and securely process voice data, images, videos and even GPS coordinates as electronic evidence. Mobile Halal auditing allows for pictures to be captured by Halal auditors on the field with a camera-enabled tablet. Earlier, these cameras had to be synchronized with records in the database. However, today, audio recordings can be transcribed to text automatically. Thus, Halal auditors can do away with the tedious task of entering additional information after returning from the field to the office.

Technology and Halal logistics

Digital technology has the potential to conduct Halal supply chains more effectively, provide better organization of supply chains as well as increase Halal performance at the destination (Tieman, 2009). Comprehensive container management enables manufacturers, distributors and third-party logistics providers to achieve complete visibility and control of the movement of inbound containers and inventory in order to maintain the Halal status of products or goods while they are being delivered. Many companies are using manual, paper-based methods to manage the free time of containers; poor visibility into what inventory is in which containers and where the containers are in transit increased the risk of Halal integrity being compromised. Halal logistics is the next big thing to be implemented as Malaysia strives to be a world-class Halal hub. There is a possibility of Halal goods becoming Haram while they are being delivered. Issues such as sharing containers and lack of visibility – the inability to see what is happening across an entire supply chain includes poor container identification, flow tracking during distribution, managing returnable containers, history of immediate suppliers, history of maintenance and most importantly segregating allocation space between

Halal and non-Halal products in the same container (for contamination avoidance) – increased the risk of Halal integrity being compromised.

Several technology solutions have been proposed to eliminate these deficiencies, and the container traceability system (Halal-TraCs), an automated system using radio frequency identification (RFID) technology, was one of them. The aims of the system are to automate track-and-trace Halal control during container's movement in order to achieve total business visibility that saves on labor costs, increases profit and reduces human errors while maintaining the integrity of the product at the point of consumption (Husny et al., 2012). RFID technology has been accepted as a new technology for a well-structured traceability system on data collecting and human, animal and product tracking (Sahin et al., 2002). Applying RFID technology to track the location and monitor goods as they move through the supply chain has the potential to conduct Halal control in transportation. Ngai (2007) presented the development of an RFID prototype system that is integrated with mobile commerce (m-commerce) in a container depot to, first, keep track of the locations of stackers and containers; second, provide greater visibility of the operations data; and third, improve the control processes. Yong-Dong, Yuan-YuanandWei-Min (2009) agreed that RFID technology is the best choice for tracking the container and the plate. They explained the containers' transporting and using process – the key link is tracking management; preventing the loss, larceny and damage of the containers; and increasing turnover so as to promote use efficiency.

Case study: digital innovation in Halal auditing process

Application of Halal certification from JAKIM will involve three main phases: namely, application process, audit process and approval process, as shown in Figure 16.2. These stages involve both parties, companies as applicants and JAKIM as the certification body (JAKIM, 2011).

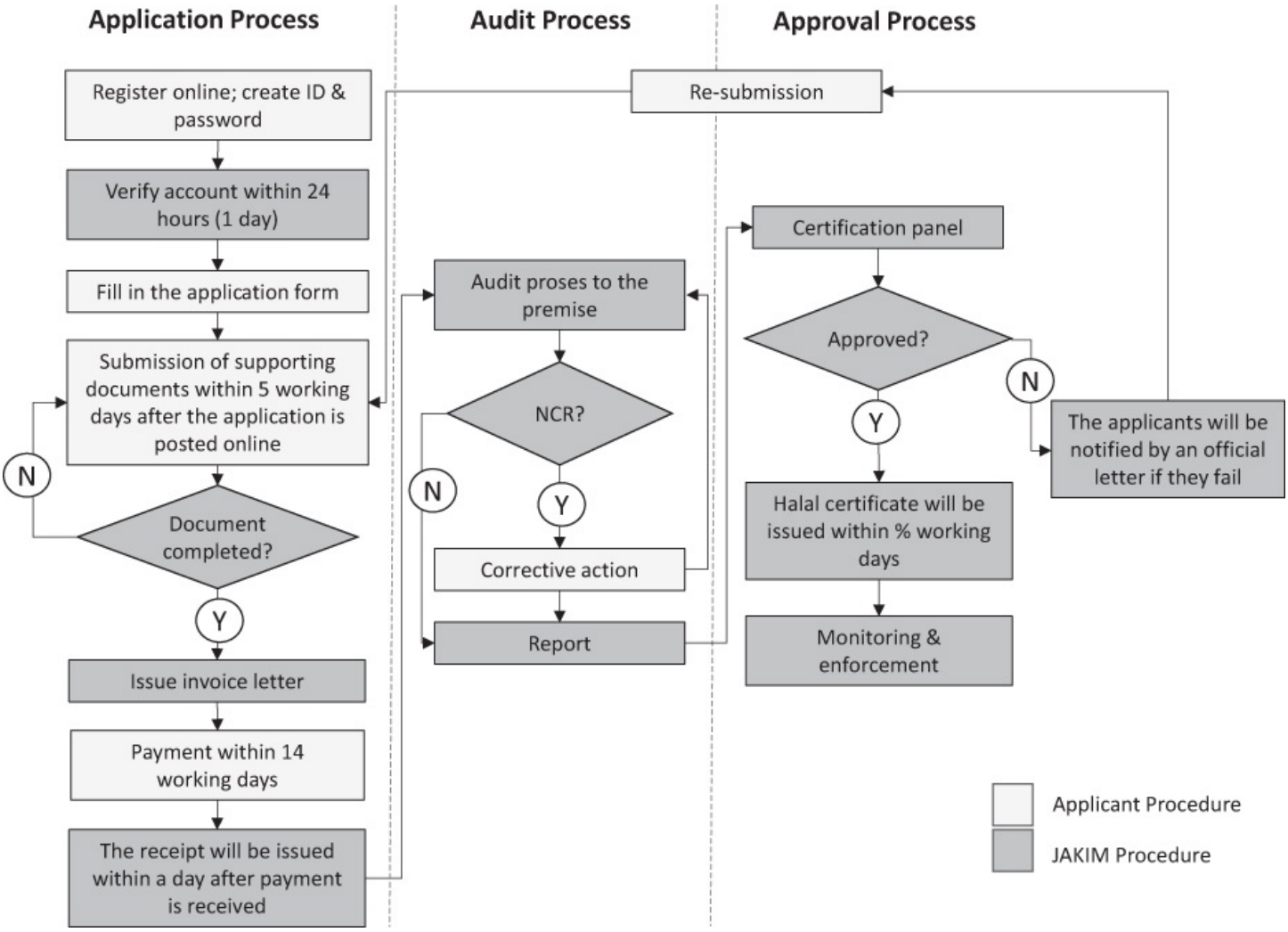

Figure 16.2 Process flow of JAKIM Halal certification.

Source: Developed by the authors (2019).

Among these processes, the most critical and complex is the audit process. The audit process is divided into two parts: document audit and site audit. Document audit will be done after the applicant submits the online application form, followed by all relevant supporting documents within five working days. Failing to do this will cause the application not to be processed; the application will be reset, and a new application form will need to be re-submitted. If all documents are completed, JAKIM auditors will conduct a site audit at the applicant's premises. According to JAKIM auditors, most of the applications failed due to the un-readiness of the company in terms of providing supporting documents as evidence that they have fulfilled the Halal standard requirements. Furthermore, the company also needs to prove that they have a Halal monitoring system incorporated into their business process (JAKIM, 2014). Understanding the requirement, standards and procedure of Halal certification is very challenging and overwhelming to some companies, especially first-time applicants. This situation has impeded the motivation of companies to pursue Halal certification, particularly by small medium enterprises.

Halal auditing process

Halal audit is one of the most important activities in Halal certification (Taylor and Todd, 1995; Thompson and Panayiotopoulos, 1999; Vallerand, 1997). Similar to other types of organizational audits, it involves internal and external Halal audits. The internal Halal audit involves a Halal executive, an auditor, a compliance officer, quality assurance, etc. The external Halal audit involves auditors from the regulators, like certification bodies officers, etc. The Halal audit process is slow, complex and expensive. The activities include planning, auditing and reporting. Audit planning includes activities such as preparing a checklist, scheduling the audit and designing a non-compliance (NC) report template. Preparing a Halal audit checklist is time-consuming since the auditor needs to understand the Halal certification system requirement set by the Halal authority. In the case of the Malaysian Halal certification scheme, there are seven categories of Halal certification schemes that a company can apply to: food and beverages, food premises, cosmetics, pharmaceuticals, consumer goods, slaughterhouse and logistics. To prepare audit checklist for each of these schemes, the auditor needs to refer to different standards and manuals. There are 13 different Halal standards produced by the Malaysia Standard (MS) (e.g. MS1500:2019, MS1900:2014, etc.) and a Manual Procedure for Malaysia Halal Certification 2014 (MPPHM) developed by Malaysia Department of Islamic Affairs (JAKIM). Once the checklist and NC forms are ready, the documentation and site audit can be performed. The auditor will go through each of the checklist items to identify any NC. There are three types of NC: minor, major and serious. The types of NC refer to the Halal standards and manual. The auditor needs to collect evidence (photos, audio or video) to support each audit finding. Finally, once the audit is completed, a report will be produced to highlight the issues that need to be corrected by the auditee in order to fulfill the requirements of Halal certification. Up until now, all three activities have been done manually, using paper and pen. Sometimes, the auditor will bring the standards and manual in order to refer to the clauses for each checklist. They may also bring a camera to capture the evidence and take notes to record their findings. Depending on their level of experience, the process will take between three weeks and eight months to complete.

QuikHalal©: a cloud-based mobile Halal auditing app

According to Tariq (2017), audit mobility, driven through smartphones and tablets, has become a game changer. Tablets with e-signature abilities can help collect and securely process voice data, images, videos and even GPS coordinates as electronic evidence. The features of tablet-based field and offline audit systems are manifold (Table 16.1).

Table 16.1 Features of Halal auditing mobile apps

Planning	*Auditing*	*Reporting*
Predefined checklist according to Halal certification schemes and	Built-in GPS device that helps capture geospatial co-ordinates at the field location	Preview the non-compliance report

type and size of company	where the auditor is, thus providing accurate data related to the audit	
Up-to-date checklist, which is automated if new standards were introduced or existing standards were updated	List of current on-going audits and completed audits	Halal audit analytics – types of non-compliances
Checklist link to Halal standards that shows the references (source of standard/manual, page and clause number)	Save and resume anytime, anywhere	Generate report automatically and instantly
The non-compliance status for each checklist (e.g. minor, major, serious)	Collect evidence – capture photos, record audios and videos	Different types of report format – auditee (corrective actions), auditor (monitor), committee (progress)
Memo to inform user of any announcement, updates, etc. from the authority	Multiple forms of evidence for each checklist	Acknowledgment and signature of auditor and auditee
Preset date and time of audit	Evidence should sync with the checklist	Storage for report ranging from on-device or cloud
	Annotate photo evidence that highlights the issues	

Source: Developed by the authors (2019)

Besides the features highlighted earlier, next-gen Halal audit tools should also support audit on-the-go, which can be used anytime, anywhere. It should also focus on the performance of devices that are responsive and quick with no lags. In order to improve efficiency, the device will require minimal inputs from the user with less typing and more task completions. This can be achieved by optimizing the UI/UX design that is not only interactive but simple and straightforward. The device can also be used offline and operated in a stand-alone mode in case of the unavailability of Internet services.

A good example of an innovative auditing tool that fulfilled the aforementioned criteria is QuikHalal, a cloud-based mobile Halal auditing app that is developed by HOLISTICS Lab Sdn Bhd, a spin-off company of Universiti Teknologi Malaysia. Until now, it has been used and tested by several multinational companies as well as Halal authorities, such as Halal Management Department and Jabatan Hal Ehwal Agama Islam Pulau Pinang (JHEAIPP). As Halal auditing becomes more dynamic and occurs in real time, mobile audit solutions, such as QuikHalal, will no longer be just an option but an imperative tool. QuikHalal can be used to assist in the completion of both external and internal auditing of organizations' Halal products and services. The checklist that has been extracted from the Halal standards is developed by Standard Malaysia and customized into QuikHalal. Once completed, users can use QuikHalal to assess their respective organizations in terms of their readiness toward Malaysian Halal certification compliance. QuikHalal can assist users in performing audit assessment based on the checklist of various Halal standards. It can also collect evidence (photos, comments, notes) during the audit assessment (Halal documentation, premises, equipment, cleanliness, staff appearance, etc.), which is important to measure the readiness of the organization. QuikHalal can provide performance statistical data that measures the compliance of each organization. Compliance and non-compliance status (Minor, Major or

Serious) will be presented to show various areas within the organization that can be improved (e.g. management and personal responsibilities, trainings, documentations, facilities, etc.). Finally, a report will be generated to provide documentation records to management. This report can serve as the performance assessment tool to evaluate an organization's readiness in terms of Halal compliance. QuikHalal is available in both Android and iOS operating platforms, and can be accessed at www.quikhalal.com.

Implementation of QuikHalal© in the Halal industry

Since it was first commercialized in 2017, QuikHalal has been implemented in several Halal industry development programs and adopted by a few companies in Malaysia. This section discusses the adoption of QuikHalal by three different groups of users: first, Halal professionals who attend Malaysia Halal Professional Board (HPB) training programs; second, Muslim-friendly hospitality services (MFHS) operators; and third, Gerbang Alaf Sdn Bhd (McDonald's Malaysia).

Malaysia Halal Professional Board

Malaysia HPB, JAKIM, was established on December 15, 2014, after being approved by the National Council for Islamic Religious Affairs Malaysia (MKI). HPB is one of the five initiatives of the Malaysian Halal Council Secretariat, JAKIM, under the Department of Innovation and Professional Development. HPB's main functions are the development of the policy and implementation of Halal professionalism and skill development programs. HPB has developed two Halal training program modules – first, the Halal Executive training module and, second, the Internal Halal Auditor training module – to ensure that the integrity of the Halal supply chain is secured at the industry level. JAKIM is in the process of enforcing compulsory courses and training to all Halal Executives in the industry in Malaysia through Malaysia HPB. This is to ensure that they have the same knowledge and are not left out from developments and activities of the Halal authorities (Abd Mutalib, 2018).

A study was conducted to evaluate the usability and effectiveness of QuikHalal among the participants of the Professional Certificate of Halal Executive training program in 2018. Fifty respondents were chosen to use QuikHalal at least twice: first after completing the eight-day training program and then during the one-month period after completing the course. The respondents were chosen due to their being involved directly in the Halal auditing process in their organization. They were asked to use QuikHalal in their organization during the one-month period to explore it potential, benefits and associated challenges in assisting their internal Halal audit. A five-point Likert scale was used to allow respondents to express how much they agreed or disagreed with statements in the questionnaires. The study identified important characteristics of technology features that the industry needs to look for in helping them to comply with Malaysian Halal certification and quality requirements. The seven factors are speed, convenience, integration, auto-report, customization, cost-effectiveness and

transparency of data. All seven characteristics from the previous study are explored to identify the benefits and challenges of QuikHalal in facilitating the Halal audit process except for transparency of data. Overall, the findings acquired from the data collected show that the majority of the respondents strongly agree with the six factors for all industry segments. This shows that the majority of the respondents are in agreement that all characteristics evaluated are important to them in choosing technological solutions. Cost-effectiveness, technology integration and customization function are the other important factors that Halal industry players look into when considering technology to support their operations. The respondents in this study also highlighted the integration (systematic process) and customization (easy to customize) functions that QuikHalal provides to their existing Halal audit activities. QuikHalal provides planning, auditing and reporting functions in one single platform that did not exist before. This integrated functionality, which helps users to choose their preferred audit checklist to use in directly conducting documentation and site audits, enabling them to collect evidence straightaway from their mobile devices, provides a significant step in systematizing the Halal audit process. The customization feature provided in QuikHalal, in which an audit checklist can be custom-made and updated according to user preference anywhere, anytime, is another important factor highlighted by user. The final characteristic that is important to QuikHalal users is cost-effectiveness. In this situation, users perceived cost as a minor issue as long as they were able to get the job done quickly.

Muslim-friendly hospitality services

Another big opportunity for the Halal industry is Muslim-friendly hospitality services (MFHS). The number of Muslim tourists is expected to grow to a total of 180 billion visitors by 2020, with a receipt of USD 212 billion from 116 million visitors in 2014 (Islamic Tourism Centre, 2015). The number reflects on the demands of MFHS, which include various categories, such as hotels, restaurants and food premises as well as tour guides that are consistent with Islamic values and principles. In order to provide guidelines to these services operators, Malaysian Standards (MS) has introduced MS2610:2015, a standard that consists of criteria and checklists that can be used to help operators to deliver their services according to the requirements of Muslim tourists. Although it is not compulsory for these operators to comply with the standard, it will provide a huge competitive advantage. In order to comply, they will need to conduct an internal audit to assess their readiness for the criteria in the standards. Digitizing audit activities will allow organizations to make audit activities more efficient. Employing digital technology will allow auditors to perform internal audits on a monthly, weekly and daily basis, providing management with live visibility of the entire organization (Husny et al., 2018). Having team members engaged with digital technology will allow managers to become involved in the discussion and future advancement of the organization. It also allows users the opportunity to respond quickly to NC. Digital technology allows the organization to not only operate efficiently but also to adhere to MS2610:2015, legislation and laws that are vital to creating a safe environment.

To explore the effectiveness and efficiency of QuikHalal© in the Islamic tourism industry, a workshop on the Compliance of MFHS (MS2610:2015) Standard was conducted in September 2018 in Pulau Pinang, Malaysia. The project aims to increase the efficiency and productivity of MFHS auditors. By providing centralized audit tools, Halal auditors can now assess each MFHS (hotels, restaurants, bed and breakfast, etc.) in the country with the same standardized processes (MS1500:2009, MS2610:2015). Creating a centralized MFHS audit activity platform will facilitate the auditing process between auditors and MFHS locally and worldwide. In order to investigate the effectiveness of mobile audit technology in this study, the Unified Theory of Acceptance and Use of Technology (UTAUT) model has been adopted. At the end of the workshop, the participants were given a questionnaire to complete. The questionnaire covers the demography of the participants, their understanding of the concept of MFHS and the effectiveness of mobile technology (QuikHalal) in complying with MS2610:2015. A descriptive statistical analysis recapitulates the frequencies and corresponding percentages for the users' perceptions with respect to performance expectancy. Results show that the participants agree that QuikHalal is a useful and productive tool, able to assist them in conducting the audit process. Users' perceptions regarding effort expectancy show that users agree that QuikHalal is easy to understand, easy to become skillful in and easy to use. Moreover, they also agree that QuikHalal will make the process of capturing photo evidence during audit effortless. The descriptive analysis for behavioral intention shows that the users agree that QuikHalal is useful and could assist them in giving their company a better chance of achieving MFHS status. The users tend to strongly agree that they would potentially use QuikHalal in the near future.

Gerbang Alaf Sdn Bhd (McDonald's Malaysia)

McDonald's Malaysia (Gerbang Alaf Sdn Bhd) was the first fast food restaurant to be Halal-certified by JAKIM in the early 1990s. To ensure continuous commitment toward Halal compliance, the Department of Halal Affairs was established, and the Internal Halal Committee was introduced in McDonald's Malaysia. The main objective of the committee is to investigate, evaluate and improve the Halal standards of McDonald's. Until now, there have been nearly 250 McDonald's outlets all over Malaysia. The Halal certificates given to these outlets expire every two years, and each outlet has their own individual Halal certificates. In order to make sure that they continuously comply with the latest standards set by JAKIM, the committee performs Halal audits at least once a year for each of the outlets. This task is very challenging due to the complexity of the McDonald's operation and the locations of each outlet. QuikHalal has been identified as one of the potential solutions to McDonald's Malaysia problems. In order to assess and validate the effectiveness of QuikHalal in assisting internal Halal audit activities, a field test was conducted by the internal Halal committee together with the representative of restaurant operations department. The test was conducted for three months, the results were evaluated and a business case was presented to the top management for their approval. Among the findings from the test sessions was significant improvement in terms of audit time reduction, from eight hours

down to three hours when using QuikHalal. Beyond the increase in speed, QuikHalal also helps McDonald's to prepare a better audit report that not only covers the Halal and "toyyiban" aspects but also other compliance criteria, such as management responsibilities, employee awareness, transportation, product safety and other areas which need to be performed in different audit activities. The previous audit was performed manually, and the documentation was not organized accordingly. QuikHalal helps McDonald's to coordinate the Halal audit in a more effective way by providing a simple and systematic approach to conducting audit from mobile devices. The findings from the test show that the audit conducted using QuikHalal is more accurate, and the documentation of Halal reports and outcomes is more organized. In 2019, McDonald's Malaysia implemented QuikHalal to assess, evaluate and monitor their Halal audit activities for all their outlets nationwide.

Conclusion

This article discusses the evolution of technologies and how this can benefit the Halal industry as a whole. The significant contribution of this article is to identify the technology features that the industry needs to look for in helping them to comply with and monitor Malaysian Halal certification and quality requirements. Technology developers can use these research findings to develop technologies that really suit the industry's need. Another significant contribution of this study is its encouragement of future research on multifarious dimensions and the contribution of technology design and development specifically to the Halal industry (e.g. the application of 4IR). Exploratory and explanatory research can be conducted on the application of IoT, blockchain, smart logistics, robotics, big data and 3D printing in Halal supply chain processes. Although all of these technologies are still far from being implemented in the Halal industry, a case study that looked into the adoption of mobile technology (QuikHalal) in Halal operations was discussed. This study has succeeded in stipulating evidence that shows success in implementing innovation in the Halal industry. Speed and convenience are the top two desired characteristics for a Halal operation. This explained that in the current business situation, industries are always looking for the fastest ways which are convenient to use in their work. Cost is not a major issue as long as they are able to get the job done in the quickest time. To conclude, innovation that can increase speed and that is at the same time is convenient and easy to use may be more desired by the industry, regardless of the cost. Besides that, understanding the desired characteristics of a technology is necessary in promoting the Halal industry. Finally, this article provides a major contribution to future innovation in technology applications in the Halal industry by providing evidence of successful adoption of digital technology (QuikHalal) that assists Halal industry stakeholders.

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