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Review Analysis for Traceability System in *Halal* Food Supply Chain in Malaysia

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ABSTRACT

Halal and safety of food supply chain is among the critical issues reported, especially on the aspect of product recall. The industries seem to be lacking in terms of awareness, knowledge, and cost in implementing the traceability system inside food premises. This study aims to conduct an in-depth analysis on the concept of the halal food supply and halal traceability system and examine the challenges faced by the industry in the halal food supply chain. The study adopted the qualitative method where the data were collected through documentary and library-based review of both primary and secondary literature. The gathered data were analysed by using document and content analysis to review documents related to the research's objectives. The finding indicated that halal supply chain management does not only cover the aspect of the halal status of the raw material but also involves tools, machines, and logistics. It shows that a traceability system is adopted to ensure the information related to halal food and products is available and can be traced along the supply chain. It includes the information before the production, such as the sources and origin of the raw materials.

Keywords: *halal food, Malaysia, managements, halal supply chain, traceability system*

INTRODUCTION

Islam is a religion that profound a doctrine to govern the comprehensive way of life of human beings. *Al-Quran* and *Sunnah* are holy references for every Muslim to guide their worldly lives including in the aspect of food consumption. *Al-Quran* guides men to choose and eat *halal* and good things, Allah has clearly mentioned in Surah Al-Baqarah verse 168, which means,

"O mankind, eat from whatever is on earth [that is] lawful and good and do not follow the footsteps of Satan. Indeed, he is to you a clear enemy."

Based on the above verse, it is mandatory for a Muslim to find and eat *halal* and good food. The consumption of *halal* food is part of the requirements that Muslims must fulfil according to Islamic laws. According to Kamaruddin (2020), the term *halal* is defined as anything permissible or of no restriction, and the doing of which is allowed by Allah SWT. Moreover, the word *halal* is also connected to the word *toyyiban* which refers to safety, hygiene, and good quality. Thus, *halal* food is not merely referred to something that is permitted to be consumed according to Islamic law, but it is also in compliance with hygiene, safety, and quality criteria.

In food production, the *halal* requirements cover the whole process of the production, from receiving raw material until the finished product and distributed to consumer. During the food preparation, the process must be free from any unpermitted ingredients, either non permissible from the *shariah* aspect or in a hygienic condition. Throughout the supply chain of the food product, the application of a traceability system is very essential and must be practised by food manufacturers to ensure that any rejected product can be traced one step backward and one step forward.

The *halal* food industry has attracted more attention and is gaining acceptance from consumers of both Muslims and non-Muslims worldwide. This is due to their demand for wholesome, pure, healthy, and safe food. The number of Muslim populations worldwide increased that impacting the increased demand for *halal* products. According to the International Trade Centre, the global Muslim population is anticipated to reach 2.2 billion by 2030, expanding at twice the rate of the non-Muslim world, which currently stands at 1.6 billion (International Trade Centre, 2015). When the number

of Muslim populations increased, the demand for *halal* food products in the market will also increase as well. With the development, *halal* food products consequently can easily be available at every corner of the world. According to the *Jabatan Perangkaan Malaysia* (2020), Malaysia and United Arab Emirates (UAE) are among the seven countries that contributed to the highest export rates of *halal* products, and the demand for imported *halal* products worth about 34 billion annually. In addition, many organisations offer *halal* certification services to the industry players for certification and mark of *halal* logo that would attract more consumers to buy the products. The manufacturers also play an important role in safeguarding the *halal* integrity throughout the supply chain to ensure the products are *halal*, safe and quality for consumers' consumption.

The industry also faced obstacles, despite a vast opportunity in the *halal* market. Among the challenges are when the *halal* food industry is not given access to the crisis regarding non-compliance to *shariah* and health matters including food safety matters. Food safety needs to refer to information on sufficient amounts of safe and nutritious food, which is the crucial aspect in sustaining life and promoting good health. Unsafe food which contains harmful bacteria, viruses, parasites, or chemical substances causes more than 200 diseases, ranging from diarrhoea to cancer. It also creates a vicious cycle of disease and malnutrition, particularly affecting infants, young children, the elderly and the sick (WHO, 2022). Uncleaned food may contain hazardous compounds that can cause foodborne illnesses like food poisoning. Food hygiene and safety are critical aspects in the *halal* food industry to ensure that the products are safe for people to consume. To guarantee the product is safe, the food operators must ensure that the food premises are always clean. Besides that, the cleanliness requirements are also extended to the raw materials, the personal hygiene of the food handlers, and proper food preparation and storage.

Implementing a traceability system is crucial at every stage of the *halal* food production throughout the production processes from receiving the raw material to distributing and selling until the product arrives at the end consumer (Suhaiza, 2010). This system is implemented to ensure the product is traceable if there is any reported case of food poisoning, death by referring to the record of the batch of product. A traceability system is a system that has an ability to track and trace the product one step forward, and one step

back through all stages in the supply chain (Suhaiza, 2010). It is important to implement the traceability system in the procurement, production, storing, distributing, and retailing process so that the food premise can detect any misconduct during the process and make improvements to prevent things from happening again.

Food Hygiene Regulations 2009 is a regulation under the Food Act 1983 that embodied an infrastructure that can regulate and control the cleanliness of food premises and food safety to protect consumer health. The owner of the food premise must also provide a food safety assurance programme, as well as a food traceability system in the food manufacturing process that can identify where the food came and is distributed at any specified stage of the food chain from production to distribution (Food Hygiene Regulations, 2009). In Malaysia, the Ministry of Health (MOH) is one of the government authorities that is empowered to control food safety and quality. One of the agencies under MOH that is the Chemistry Department who's responsible for *halal* product analysis and traceability. The Food Safety and Quality Division (FSQD) oversees safeguarding the public from food-borne illnesses and fraud during food preparation, sale, and consumption.

As regards to *halal* compliances, the Department of Islamic Development Malaysia (JAKIM) is the competent authority empowered to oversee *halal* certification and safeguarding the interests of Muslims. JAKIM ensures the *halal* status of the product at every stage by inspecting the *halal* status of the raw material. In additions, the *halal* supply chain is guaranteed by JAKIM by conducting an official site inspection on the food premise (Department of Islamic Development Malaysia, 2020). JAKIM was given the authority to enforce the Trade Description Act (TDA) 2011 against any food establishment or individual who misused the *halal* emblem. The Trade Description Act 2011 and its associated legislation are enforced by the Ministry of Domestic Trade and Consumer Affairs (MDTCA). This Ministry also provides monitoring and enforcement to protect *halal* integrity (Maskom, 2020). Thus, every food premises should practise the traceability system according to the regulations and standards to guarantee the safety of food products to the consumer. Thus, this study aimed to conduct an in-depth analysis of the concept of the *halal* food supply system and *halal* traceability system and the challenges faced in the *halal* food supply chain.

METHODOLOGY

This study aims to conduct an in-depth analysis of the concept of the *halal* food supply system and *halal* traceability system and the challenges faced in the *halal* food supply chain. To achieve the objective, the study adopts a qualitative method where the research is conducted through document and library research. The data is gathered based on a review of primary and secondary literature. The data is gathered and collected from the in-depth study of relevant sources relevant to *halal* from books and journals, as well as secondary sources in the form of clippings from newspapers, magazines, and online media news. This review analysis is conducted to 18 current articles ranging from year 2016 to 2020. The gathered data is analysed using content analysis by conducting reviews on the existing text relevant to the *halal* traceability system in *halal* food. The analysis is carried out by making predictions or analyses related to the classified data. The research benefit from the theoretical aspect is to describe some of the concepts of the *halal* food supply system and *halal* traceability system and the challenges faced in the *halal* food supply chain. This study is beneficial from a practical aspect to advance knowledge and awareness of stakeholders of *halal* food industries to enhance their service and product, especially on the *halal* traceability management system.

RESULT AND DISCUSSION

Concept of *Halalan Toyyiban*

Halal is an Arabic word and defined as permissible or lawful by Islamic law based on the *Quran* and *as-Sunnah* (Ab Rashid & Bojei, 2018). In MS1500:2019, *halal* is a matter that is lawful and permitted in Islam based on the *shariah* and *fatwa* (Department of Standards Malaysia, 2019). Food is considered *halal* after derived from *halal* sources and do not contain of any *haram* things like pigs, carcasses, blood, and *najs*. *Shariah* explains that there are no restrictions on consumption. Most food and drink are *halal* except what is clearly mention of its forbidden in the *Quran* and *Hadith*. While the concept of *halalan toyyiban* is an Islamic concept related to the characteristics of the products good for human consumption. The need for

the practices of *halalan toyyiban* has been clearly stated in the Quran as below:

"And eat of what Allah has provided for you [which is] lawful and good. And fear Allah, in whom you are believers." (Surah Al-Maidah: 88)

"Then eat of what Allah has provided for you [which is] lawful and good. And be grateful for the favour of Allah, if it is [indeed] Him that you worship."

(Surah Al-Nahl: 114)

The above verses highlight the commands of Allah to mankind to choose and consume foods that are *halal* and *toyyiban*. This indicates *halal* and *toyyiban* are two important elements that need to be considered for food. The selection on food and product do not only focus entirely on its sources, but it also must include the element of *tayyib* by ensuring the hygiene practices is implemented during the product making and the food also required to be good, hygiene and safe for human consumption.

According to the Department of Standards Malaysia (2019), the concept of *halal* is clearly defined and the criteria of *halal* food should meet seven conditions. In relation to the conditions, initially the *halal* food must not contain any part of an animal that is prohibited by *shariah* law and *fatwa* for consumption by all Muslims, or that is not slaughtered according to *shariah* law and *fatwa*. Second, according to *shariah* law and *fatwa*, *halal* food does not contain anything that is *najs*. Third, according to *shariah* law and *fatwa*, *halal* food does not intoxicate. Fourth, according to *shariah* law and *fatwa*, *halal* food does not contain any part of a human being or its yield. Fifth, *halal* food is not poisonous or harmful to one's health. Sixth, the *halal* food has not been made, processed, or manufactured with any tool that is tainted with *najs.* Finally, *halal* food has not come into contact with or been in close proximity to, any food that contains any part of an animal that is forbidden in Islam or anything impure during the preparation, processing, or storage. This definition indicates that *halal* is an aspect that meets the required element of *halal* and *toyyib* as it is also related to safe, quality, and hygiene practices.

Food safety is one of the requirements that had been emphasized for certification based on MS1500:2019, the standard is relevant and applicable for producing *halal* food. In addition, the MS1500: 2019 also regulates the management of food premises. The inspection of the raw materials before processing ensures the raw materials are safe before continuing with the production. The application of food safety in food premises is very important to prevent the physical, biological, and chemical contamination of food. The *halal* food which has been produced from *halal* raw material and processed under hygienic condition has fulfilled the aspect of *halalan toyyiban*. The implementation of traceability system is essential to meet the element of *halal* and *toyyib* as it is a guide or procedure which the food premises have developed to ensure the raw material used is *halal*, the working area is in safe and hygiene condition, the worker implement the good hygiene practice and the record and documentation are kept for the traceability process.

Concept of *Halal* Supply Chain Management

Supply chain management is a process of transforming raw materials into product and getting it to the customers (Ballou, 2007). The Evolution and Future of Logistics and Supply Chain Management states that the Council of Supply Chain Management Professionals has stated all activities in sourcing and procurement, conversion (i.e., production), and logistics management are included in supply chain management. According to Rasi *et al*. (2017), supply chain management is a process involving all parties such as suppliers, manufacturers, distributors, and customers which the ingredient received from the supplier will be turned into the finished product by manufacturers, and next to the distributors will distribute it to the customers. According to Ivanov (2018), supply chain covers the network of suppliers, manufacturer, production, distribution, and warehouses. Furthermore, the author explained that raw materials are acquired, transformed into the finished product and delivered to the customer through supply chain.

While *halal* supply chain management is the same as conventional supply chain management, it has been more focused on the element of shariah law. It not only covers the *halal*ness of the raw material but also involves the hygiene and non-contamination of tools, machine, and logistics with non-*halal* substance. Rasi *et al.* (2017) defined a *halal* supply chain as a supply network that pays special attention to and endorses products to

ensure *halal* integrity throughout the supply chain. According to Khan *et al.* (2018), *halal* supply chain is very beneficial to the company as it functions to ensure the *halal* status of the products to the customers. It starts from receiving various permitted raw materials and being spared from cross-contamination with *haram* products. The production, processing, storage, and logistics phase must be processed according to *halal* rule with integrity and honesty, follow the *Shariah* guideline, avoid cross-contamination and ensure segregation between non-*halal* products (Soon *et al.*, 2017). The differences between conventional and *halal* supply chain process are further illustrated by Figure 1 and Figure 2 below.

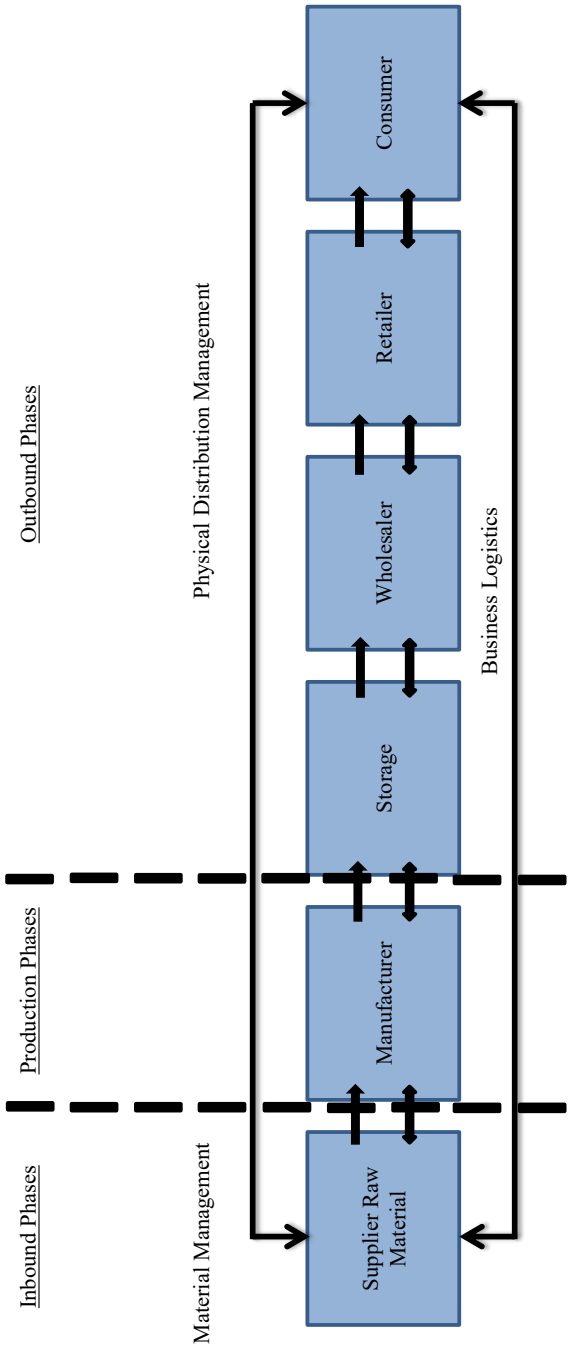

Figure 1: The Flows of a Conventional Supply Chain

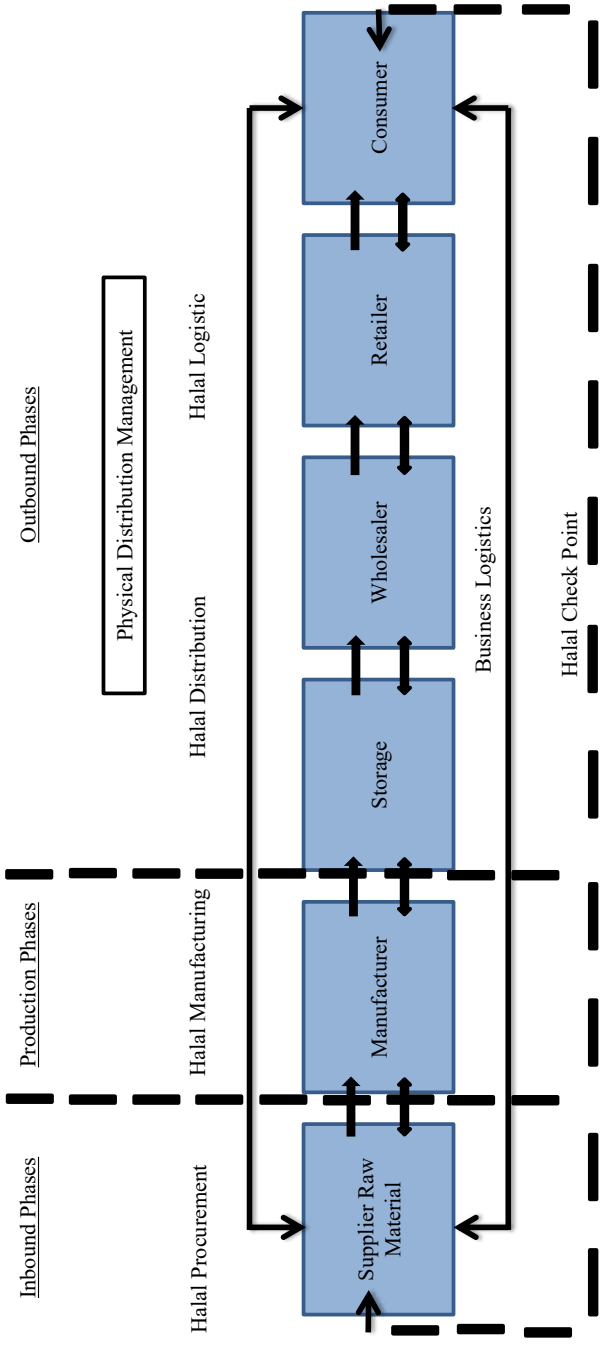

Figure 2: The Flows of a *Halal* Supply Chain Management

The above figures indicate the differences between the flows of a *halal* supply chain management and the flows of a conventional supply chain. The flows of *halal* supply chain management has *halal* assurance management system that assured the *halal* throughout the whole process of supply chain from *halal* procurement, *halal* manufacturing, *halal* distributions and logistic by practicing the *halal* check point. Thus, the *halal* industry players in the supply chain have to ensure *halal* compliance at any of the check points stated. The detail of the whole process is explained as below:

Halal procurement

Producers play an important role in ensuring the whole supply chain is *shariah* compliance state including the procurement stage. Producers should be able to track and trace the raw material used in producing the products to ensure there are no unsafe and non-*halal* materials entering the premises (Ab Rashid *et al.*, 2018). The responsible workers need to ensure all the detailed information of the ingredient received are clear and accurate. The ingredient used must also be stored in an appropriate area and should not be stored together with non-*halal* materials by following the shariah guideline.

Halal distributing and retailing

The transportation used to distribute the products must be free from cross-contamination and avoid mixing with non-*halal* material. The transportation used to distribute *halal* products must not be used to distribute the non-*halal* product. If the transportation is used for both i.e to distribute the *halal* product and then to distribute non-*halal* product, the *sertu* procedure must take place. *Sertu* refers to cleaning the limbs, clothes, locations, utensils, and equipment that come into contact with *najs mughallazah* seven times, one time using water mixed with soil. During the *sertu* procedure, the first soil water is used to wash the contaminated transport, and then followed by the wash of six clean water. In section iv under procedure 17 in *Manual Prosedur Persijilan Halal Malaysia Domestik 2020*, Department of Islamic Development Malaysia stated *sertu* procedure shall be carried out if the transportation is contaminated with *najs mughallazah*.

As regard to the retail shop for marketing of *halal* product, the retailer must monitor the shelf rack to ensure there is a segregation between *halal* and non-*halal* products. This is to avoid occurrence of cross-contamination

of non *halal* product with the *halal* as well as to preserve the *halal* integrity of the product.

Concept of Traceability System

Traceability is the ability to trace any food product one step backward and one step forward at all stages of production starting from receiving raw material until finished product and the traceability can be either using paper tagging or electronic devices. The application of the traceability system is to control and avoid wider disruption such as food safety problems, risks associated with *halal* food, and to reduce the potential of product recalls. The traceability system implemented in the *halal* food supply chain ensures that the raw material or ingredients used in producing the product are *halal*, wholesome, and safe. In addition, the production practice also must be in a hygienic manner and the distribution of the product must be separated from the haram sources to avoid cross-contamination.

Traceability, as defined by the International Organisation of Standardization (ISO), is the ability to track a product's history, application, or location through a sequence of recorded identifications (Mohamad *et al*., 2016). Traceability is defined by the Codex Alimentarius Commission as the ability to track and trace the movement of food or products across the supply chain (Aung & Chang, 2014). On the other hand, traceability is the ability to access or trace any or all information linked to the object under examination, using documented identifications, over its full life cycle (Schuitemaker & Xu, 2020).

Mohamad *et al.* (2016) has summarised several purposes of traceability from different authors. The purpose of implementing traceability is to increase transparency in the production chain. Consumer trust will increase if the information of the product is more transparent. Besides, it is also important to provide a safer food supply chain and reduce the potential for product recalls. According to Aung and Chang (2014), the objective of implementing a traceability system in food manufacturing are improving supply management, easier trace back for food safety and quality, and marketing foods with undetectable quality attributes. All these objectives help the company to reduce the recall expenses and to have lower-cost distribution systems. The application of a traceability system also can help to increase the confidence level of the consumer towards the products.

According to Ab Rashid *et al.* (2019) and Ma'rifat *et al.* (2017), traceability is a tool to assure the information related to *halal* food and products is available and can be traced along the supply chain. It also includes the information of pre-production such as the sources and origin of the raw materials. Khan *et al.* (2018) highlighted that the efficient and effective implementation of a traceability system can reduce and eliminate the risk related to *halal* products. It is imperative to ensure the raw material receiving, procurement, production process, storage until distribution and retailing of the products is preserved from any non-*halal* elements. Thus, traceability also plays an important role in safeguarding *halal* integrity along the supply chain and the success of *halal* supply chain management (Khan *et al.*, 2018).

Traceability Tools and Technology Solutions

The application of a traceability system relies on technologies to ensure the product can be tracked and traced along the supply chain. The use of tools like bar code and RFID for scanning and recording the product codes, lot numbers, and others information in a quick and short time.

Barcode

Barcode is one of the most popular traceability technology tools. It is made up of 12 numeric digits that are assigned to each food item individually. It can retain information such as the product's kind, manufacturer, and country of origin (Dey *et al.*, 2021). If the consumer would like to know more about the product, they just need to scan the barcode using a mobile phone application and able to obtain the information available in online database.

Radio frequency identification (RFID) and wireless sensor networks (WSNS)

Radio Frequency Identification (RFID) is one of the tools and technology which has been widely used to track and trace the products in various supply chains. The tool has been implemented in many areas such as for food products, dairy products, fresh vegetables, and others. RFID technology combined with embedded sensors that enable the creation of temperature tracking systems for feeding logistics (Urbano *et al.*, 2020), which is particularly useful for perishable products. It is made up of passive electronic labels that are attached to items. RFID is a system that transmits

the identity of the product, in the form of a unique serial number wirelessly and using radio waves (Alfian *et al*., 2017).

According to Urbano *et al.* (2020), several authors integrated RFID with several technologies such as the Wireless Sensor Networks (WSNs). The combination of these two tools can trace the product and provide environmental condition information. It also can ensure the requirements are met during the delivery and storage process. Besides, the use of the RFID is to monitor the temperature of perishable food product quality the use of wireless sensor networks is crucial (Alfian *et al*., 2017). Sensor nodes having sensing, processing, and communication capabilities make up WSNs. It has the ability to collect environmental data, convert it to digital format, and send it to a base station via a gateway. The use of WSNs can ensure that perishable food is delivered to consumers in good condition and is safe for human consumption.

Challenges in Implementing Traceability System

There are several challenges in managing procurement in the food grains supply chain. According to Mogale *et al.* (2019), traditional procurement procedures can make the supply chain more expensive and time-consuming due to a lack of timely information, excessive complexity, and ineffective practices.

In addition, according to the International Trade Centre (2015), there are several challenges in implementing traceability systems in food products which are costs, skills and implementation, multiple requirements, and traceability within the framework of food safety management systems. Cost is one of the challenges in implementing traceability. The services and technology implementation used in a company and training incurred a lot of money. The high costs incurred for implementing a traceability system might cause burden to the company especially to a small-scale company in

Reports by Panni Management (2021) highlight that globally, there are many overlapping and conflicting demands from national regulators with a varying degree of food policies and regulations on handling, storage, inspections, and safety standards for allergens, trace elements, pesticides and many more. Nowadays, worldwide food sourcing and different time zones

significantly affect an organisation's response times. With global sourcing, while visibility and verification of raw material sourcing and handling are already of great concern, food fraud and market substitution for economic gain are also additional challenges for importers (Panni Management, 2021). In addition, Panni added that another challenge is the lack of unifying requirements. Current internal systems do not provide a means for reliable and rapid response to trace back data across the food chain. Additionally, data can be challenging to analyse into relevant decision-making formats.

Implementing a traceability system also must be within the framework of food safety management since it requires an effective safety control system. According to Chhikara *et al.* (2018), the traceability system is necessary for all organisations according to the EU's General Food Law. It also required all food companies to execute the traceability frameworks. One of the principles suggested is one up one down, which needs to be implemented by each company in a supply chain, as illustrated in Figure 3 below.

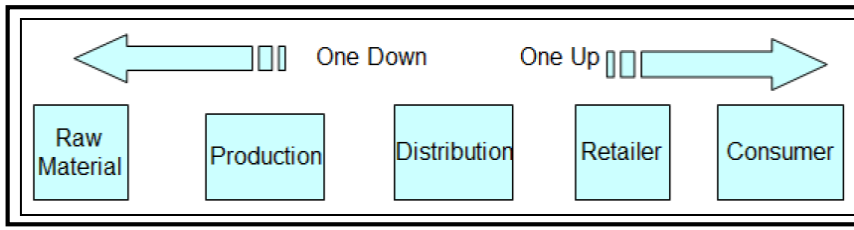

Figure 3: Principle of One Up One Down

Traceability in a Food Supply Chain: Safety and Quality Perspectives, the Bioterrorism Act of 2002 has stated that the record needs to establish and maintain by the person who manufacturers, processes, distributes, or imports the food (Aung & Chang, 2014). Other than that, the Hazard Analysis Critical Control Point (HACCP) has been recommended as the most effective system in maintaining food safety in the supply chain.

Furthermore, according to the study of Abdul Rahman and Abdul (2017), that focused on the implementation of traceability systems through the *Halal* Assurance System (HAS) in *halal* food manufacturing in Malaysia. The study has reviewed several similarity components of HAS, HACCP, and ISO22005:2007. The result of the study shows that HAS is one of

the mechanisms to control, monitor, and prevent any non-compliance in all *halal* food production. This system has been set up based on three concepts which is no *haram* ingredient and material should be used in the production, no *haram* product should be produced, and no disadvantages risk should be taken by the producer. This study has revealed that HAS only provided the basic guideline for the producer, so the integration with another system such as HACCP, ISO22005:2005, and another quality management system must be referred to. According to the Malaysian *Halal* Management System (MHMS) (2020), micro, small, medium, and large industries must implement the traceability system in their food production. For micro and small industry, the Internal *Halal* Control System (IHCS) should be implemented. The IHCS consist of three elements includes *halal* policy, raw material control and traceability system. However, the medium and large industry is required to implement HAS that focussing of ten elements includes *halal* policy, establish the internal *halal* committee, *halal* internal audit, *halal* risk control, raw material control, *halal* training, traceability system, lab analysis, sertu and HAS review. Even though the implementation of HAS can give additional value to the company, if a company avoids practicing the HAS system consistently, it would affect the operation of the company (Abdul Rahman & Abdul, 2017).

Complaints from the customer is a signal to the company that the problems or failures in internal processes occurred that consequently require quick recovery especially on the *halal* and the quality aspect of the product to avoid any dissatisfaction among other customers. However, according to Filip (2013), only a small percentage of customers have submitted their complaints after experiencing bad or negative consumption. Bateson and Hoffman (1999) claimed that for every complaint received by a company, 19 other dissatisfied customers did not make the complaint (Filip, 2013). Based on the customers' complaints, the company has an opportunity to solve their problem regarding the quality of the product and learn to improve their products. On the other hand, the other challenge in management support is cost. Implementing the system requires a lot of money, including improving the system. Dessureault (2019) states that traceability requiring investment but did not contributing to the profit of food premises. Golan *et al.* (2004), determined that there are two costs associated with traceability which are the cost of record-keeping and the cost of product differentiation.

CONCLUSION

The concept of *halalan toyyiban* is an Islamic concept related to the characteristics of the products for human consumption. The application of food safety in food premises is very important to prevent the physical, biological, and chemical contamination of food. The *halal* food which has been produced from *halal* raw material and processed under the hygienic condition has fulfilled the aspect of *halalan toyyiban*. The implementation of traceability system is essential to meet the element of *halal* and *toyyib* as it is a guide or procedure which has been developed by the food premises. The system might ensure the raw material used is *halal*, the working area is in safe and hygiene condition, the worker implement the good hygiene practice and the record as well as documentation are kept for the traceability process. Traceability is the ability to trace any food product one step backward and one step forward through all stages of production to control and avoid broader disruption such as food safety problems and risks associated with *halal* food including to reduce the potential of product recalls. Implementation of traceability system in the *halal* food supply chain is to ensure the raw material or ingredients used in production is *halal*, wholesome, hygiene and safe. The distribution of the product throughout the supply chain also must be separated to avoid any cross-contamination between *halal* and non-*halal* product.

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