Governance of Halal Logistics Compliance

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Received: 30 April 2022
Accepted: 12 October 2022
Online First: 23 December 2022

ABSTRACT

The sudden turbulence in the economy because of the pandemic in 2020 did not deter logistics operations. The ability of many logistics networks was put to the test when being overwhelmed by the impact of the COVID-19 pandemic. As an industry trying to realise the fourth industry revolution (4IR) with blockchain technology, challenges are perceived in terms of commitment among companies involved in the supply chain, mainly the logistics of small and medium enterprises (SMEs). Visualising itself as a leading global Halal hub, Malaysia needs to zoom in on the logistics SMEs to understand their readiness for halal compliance to support them in halal traceability issues possible to be solved with 4IR technology. Currently, only the manufacturer or producer of food is required to be awarded halal certification, instead of every company within the supply chain, bringing out doubts on how the transportation and movement of the products comply with the halal integrity and regulations. This study zooms into the operational level of logistics SMEs by performing qualitative research on a few logistics SMEs approachable during the pandemic year. Case studies on the responding companies are produced based on the interview survey and observations made on the business processes during the interview. The results from the interview survey
are summarised in terms of issues and challenges at ground zero that need to be considered for the governance of halal logistics compliance. The outcome of this study is the proposed framework of 3Es for the Governance of Halal Logistics Compliance.

**Keywords:** 4IR, Blockchain Technology, Halal Logistics, Halal Traceability, SMEs

**INTRODUCTION**

Regardless of the pandemic situation the world has experienced since 2020, logistics companies have never been out of business. The demand keeps increasing, causing unexpected bottlenecks in some checkpoints of the logistics process. If ensuring halal integrity and compliance is already difficult enough before the pandemic hits us, it is much more challenging during the pandemic. Visualising itself as a leading global Halal hub, Malaysia needs to understand the real issues at ground zero of the logistics operations before full halal compliance can be implemented across the whole supply chain. With the hype of technology today, such as blockchain technology and smart automation, it seems that the governance of halal logistics compliance can be implemented. However, the question is how and what could be the delay in this noble effort of using technology for halal logistics compliance. The answer is at the operational level of the logistics.

Looking from the aspect of halal compliance, new technology like blockchain is "known to provide opportunity in traceability across the supply chain" (Ismail et al., 2021), in which one trail in the chain involves and affects many companies. If the company is large enough to provide all services within its supply chain, traceability is possible for halal compliance. However, in most cases, logistics companies in Malaysia are mainly third-party logistics (3PL) small and medium enterprises (SMEs) with a limited number of services and limited capacity to adopt technology, not to mention the capacity to implement halal compliance. Third-party logistics companies often need to adopt multiple systems or software according to the preference of their client base. Hence, the complexity of performing traceability for compliance is inevitable.

Before any technology can be deployed for halal logistics compliance, there is a need to understand the perceptions of the SMEs towards halal integrity and its compliance process. Without the people accepting the concept and moving forward with the idea, the process will be impossible to be
This paper aims to present the findings of our investigation on logistics SMEs in Malaysia. An interview survey was conducted during the difficult times of the COVID-19 pandemic in 2021 to understand the perception of halal logistics among SMEs and significant issues within the logistics operations. The survey facilitates us in foreseeing the challenges in implementing appropriate technology for halal logistics compliance governance. In doing so, this paper suggests the important three Es for the governance of halal logistics compliance.

Halal logistics is said to be a value of service excellence for the stakeholders in the ecosystem. It becomes an approach accepted globally to improve the competitiveness and sustainability of companies (Karia, 2022). However, the value of halal in the real setting is not as expected in terms of ethics, standards and uniformity (Zailani et al., 2017). Halal logistics is expected to be integrated to comply with the Shariah law in the aspect of physical segregation in transportation, warehousing and terminal, and processes and movement of physical products from point to point, beginning to end, in a supply chain (Karia & Asaari, 2014). Regardless of the need to understand the situation further, little research was done from the perspectives of logistics service providers (LSPs) (Tieman et al., 2013), leaving a gap in research on how halal value can be created within and between LSPs in their ecosystem.

Since it is highly believed that halal compliance can create value in the supply chain and gain companies' competitive advantage, intangible resources, i.e., skilled workers, halal training and education (Karia et al., 2015; Jhawar et al., 2014), and tangible resources, i.e., customised and segregated halal logistics and equipment (Talib et al., 2013; Zailani et al., 2017), should be taken seriously in governing the halal logistics compliance. Malaysia is claimed to be the country that has a developed halal supply chain system that is sensitive, robust and protective (Tieman, 2011; Ab Talib & Wahab, 2021), hence the vital need to ensure that the governance of halal logistics compliance covers every LSPs, big and small, including small and medium enterprises (SMEs).
Previous research suggested the role of government in halal logistics. The suggested roles are regulation, financial incentives, taxation, infrastructure, guidance and encouragement, and education and labour supply (Ab Talib et al., 2020). Studies in Malaysia have been made on halal logistics intentions (Lestari et al., 2018), challenges in implementing halal warehouse (Rahman et al., 2018), relationships between halal environment, traceability and supply chain integrity (Rashid & Bojei, 2019), strengths, weaknesses, opportunities and threats of halal logistics (Talib & Hamid, 2014), readiness factors to implement halal logistics (Tarmizi et al., 2014), and challenges and opportunities for firms to implement halal logistics (Zailani et al., 2017). Nevertheless, there is still room for improvement in understanding the logistics SMEs' perception based on their experience running operations at their level. Understanding their situation could help us determine how halal logistics compliance could be governed.

**RESEARCH METHODOLOGY**

This section presents the research methodology performed in this study. This qualitative case study approach generates an in-depth understanding of a complex issue in the real-life context of small and medium-sized logistics companies. This study started with gathering qualitative data from an interview survey and some observations allowed to be performed during the interviews. Since the survey was conducted during the pandemic year, there were some limitations in the extensiveness of the survey conduct. Three out of ten logistics SMEs responded to our call for interviews, and we approached them from 8 April to 22 April 2021. Four respondents represented these three companies and were interviewed for better insights into logistics business processes.

Two respondents represented the first company interviewed in this study, a freight forwarding company in Shah Alam, Selangor (referred to as Company PL). The second company is also a freight forwarder but owns some transports and warehouses in Petaling Jaya, Selangor, and it was represented by one respondent (referred to here as Company NS). Due to the strict standard of operations (SOPs) in a highly-secured area of Westports, the third interview was virtually conducted on a respondent from a warehousing company in Pulau Indah, Selangor (referred to here as Company BD). All respondents are positioned at the top management level of their companies, making them the decision makers and strategic planners of the logistics SMEs. The summary of these research settings is
shown in Table 1.

<table>
<thead>
<tr>
<th>Date</th>
<th>Company Code</th>
<th>Location</th>
<th>Type of Company</th>
<th>No. of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 8</td>
<td>PL</td>
<td>Shah Alam, Selangor</td>
<td>Freight forwarder</td>
<td>Two</td>
</tr>
<tr>
<td>April 21</td>
<td>NS</td>
<td>Petaling Jaya, Selangor</td>
<td>Freight forwarder (with transports and warehouses)</td>
<td>One</td>
</tr>
<tr>
<td>April 22</td>
<td>BD</td>
<td>Pulau Indah, Selangor</td>
<td>Warehouse</td>
<td>One</td>
</tr>
</tbody>
</table>

Figure 1 shows the phases this study has gone through, which further elaborates the research methodology conducted in this study. It started with an effort to approach the qualified respondents from companies that meet the criteria requirements of this study, i.e., small and medium-sized logistics companies, which were originally 82 companies in total. Ten out of 82 companies responded to our call, but only three companies agreed to be interviewed. The lack of response and willingness to be interviewed was mainly due to the busy schedule and the meticulous SOPs that the companies had to abide by, especially during the COVID-19 pandemic.

As shown in Figure 1, in approaching the respondents, appointments were set and offer letters were prepared to respect their willingness to be interviewed. As shown in Table 1, interviews were conducted and audio-recorded on the scheduled dates. The recorded
interview data were transcribed, and translation had to be made due to the mixed languages used during the interviews. After the pre-processing data stage, the transcribed and translated data was codified during the data analysis using software called NVivo. The final stage of this research methodology is preparing and presenting the reports.

This paper presents part of the reporting shown in Figure 1. Instead of presenting the codified version of the results, the results here are presented in the form of case studies. The case studies are presented in the next section, highlighting the issues that would affect halal logistics compliance brought up by the respondents from each responding company.

RESULTS AND FINDINGS

The results from the interview survey are summarised in the following case studies. These case studies also include the perception of halal logistics and issues worth highlighting, which would provide insights into the challenges foreseen if new technology is implemented for halal logistics.

Case 1: PL – A Small-scaled Freight Forwarder

The case firm, PL, was established in 2013 as a freight forwarding company. PL has less than ten full-time employees: four based in the main office, two in Kuala Lumpur International Airport (KLIA), and two in Port Klang. As a freight forwarder, PL does not possess nor require any transportation or warehouse since they rely on third-party logistics (3PL) companies and their sub-contractors for product movement and storage services. PL's intention is in the pipeline to possess their transports in supporting their plan of providing packing and prime mover services for clients and factories. Having 3PL companies to support them is sufficient since the current types of goods handled by PL, for the time being, are medical products, food products (e.g., palm oil), dangerous goods (e.g., poison), cleaning products, machinery for medical purposes, items for oil and gas industry (e.g., shipping materials), glove and timber.

PL's perception of halal certification is positive, with a high intention of applying for it. They believe that the concept of halal should be made known to the world as it is good to ensure cleanliness, hygiene and product security. However, they could not plan to apply for halal
certification because they do not deal with or produce food products directly. In other words, PL is not tightly related to the food industry. In addition to that, logistics services involve many parties, making halal certification application complicated for them.

Regarding hygiene during the movement of goods, graded containers are referred to when the reservation is made for transportation. They need to declare the type of commodity to be transported during the reservation, e.g., medical products. From the type of goods, the 3PL company would know which grade of the container is required, e.g., Grade A for medical products. Knowing this, proper cleansing would be performed by the 3PL before being sent to the pick-up location. If the client is not satisfied with the quality of the container sent by the 3PL, they have the rights to reject it, and a new one will be made available. Other grades are B and C, which are differentiated in terms of cleanliness and hygiene, as well as the type of goods the containers are for. For example, if the type of goods is steel, then the container would not be as highly graded as Grade A, and the cleanliness would not be as good as that of Grade A. The grades are based not only on the hygiene criteria but also on how solid, firm or stable the container is. This is to conform with the aspect of the safety of the goods.

The halal status of food conditions is mainly based on trust. Clients may request the full-load container to transport their food products, but relying on 3PL does not guarantee this. In the transportation business, if the goods are not fully occupying the space in the container, it would be a loss in terms of money. It would also be a loss to the freight forwarder who rents the whole container for product movement. Under the category of loose cargo load (LCL), the client would not know if their goods are being transported together with other goods (i.e., food) in the same container. In an example of a 20-foot container, there may be 20 consignees or clients booking for transportation of their goods. Although packed, sealed and stacked on pallets separately, they are still confined and transported in the same container. The goods are tagged with the name or type of food being transported but not on the halal status of the food. There would not be an issue if everyone who uses the transport services declared their goods honestly and transparently. However, even if they tag correctly and honestly, saying that their product is non-halal, there is nothing much that can be done since the transport is shared. As long as there are spaces in the container, the transportation company will try their best to fill it up to full load.
PL brings up several issues in terms of the movement of goods, which would affect the implementation of halal logistics and supply chain:

- **Trust and transparency during tagging of goods.** Only those at the warehouse know if the product is halal or non-halal. The transportation service provider only picks up from the source, packs, moves, sends and puts the goods at their destinations.

- **Nobody can check the goods once packed and sealed and put into the transport to be moved.** This is a common scenario, especially when the goods are already built up to reach the maximum level of the container height. The only reference is the tagging on the packed goods, and like it or not, whatever is written there has to be trusted and believed as it is.

- **Suggestions for separating goods between halal and non-halal categories are highly rejected by other logistics companies that are more concerned with financial value.** A waste of small space in a container may result in a company losing tens of thousands of dollars (or ringgits).

- **There are no separate lanes for halal and non-halal products at checkpoints.** This is commonly observed at the depot and airport. For example, there is only one scanner for all perishable items, in which the items may pass the scanner one after another without going through any cleansing after each has passed.

### Case 2: NS – International Freight Forwarding SME

NS is a Malaysian-government-appointed international freight forwarder with Multinational Transport Operator (MTO) license, established in 2001. This company is also accredited with Quality Management System (QMS) ISO9000, International Occupational Health and Safety Management Standard (OHSAS) OHSAS18001 and Environmental Management System (EMS) ISO14001. NS is a logistics supply chain specialist catering to a multitude of freight services and requirements of government services as well as the oil and gas, energy and infrastructure industries.

NS complies with halal-toyyiban standards that are halal in general, but they have not applied for halal certification, although they intended to apply for the halal certificate. The three certificates they have in hand give them an extra advantage for dealing with customers, especially in the oil and gas industries. All logistics and supply chain processes rely on those three certificates and standards of procedure (SOPs) that the company set up.
The case company does not own any containers but rents them from providers. The two categories of containers include carriers on the container (COC) and shippers on the container (SOC). NS is a non-vessel operating common carrier (NVOCC); hence they do not have any containers. During the pandemic, the demand for containers has increased with the increasing orders required for shipping, leading to an increment in logistics costs. If the number of containers is less, then they need to pay more for the warehousing of their goods until the containers arrive to ship the goods. In facilitating the movement on the ground, the company will hire the hauling services company to bring the containers, putting the responsibility for the containers' condition on the haulier. The hauliers and containers yard operator will inspect the condition of the containers for this purpose. Any dent and defect found on the containers will be remarked on to avoid possible customer issues. Since the containers do not belong to the company, they will not know whether the containers carry non-halal goods. They just received the containers, as how they were sent to them. Even if there are records on the goods carried by the containers, the company does not have any options to have halal containers or dictate that the containers should be carrying halal goods only. The hauling company will only check the external and internal conditions of the containers.

Packaging is another aspect of logistics operation. Since NS does not deal with raw materials, they will accept the goods, pack them into carton boxes, and adhere to all the packaging standards. For example, before loading the goods on the 5-tonne truck, they will inspect to ensure that the packaging follows the standards. The cartons will be loaded on a pallet in the truck that the same producers as in containers. Normally, the company only receives one order or one customer per truck, but it is different if in containers. There are two common types of containers, namely full container load (FCL) and less container load (LCL), with FCL having only one owner, i.e., the customer will load the container with their goods. In contrast, LCL will have more than one owner, so that the goods will be mixed from different customers. NS uses FCLs at Port Klang and only has LCLs when there are demands from customers to deliver goods to Kota Kinabalu (East Malaysia).

All records regarding the goods for shipment are in the delivery order (DO), which includes information on the safety of the goods. If the haulage company manages the containers at the port, the physical conditions of the containers will be checked. Most of the containers are sealed; any damage on the seal or any sign showing that the seal has been
broken will mean that someone has removed something from the containers during the movement or transportation process. All processes and remarks are manually recorded in the DO in hardcopy.

NS receives orders through emails, but traceability still depends on the methods of manual records, i.e., on paper. If a DO is missing, then they need to reprint the DO, and usually, they will make more than one copy of the DO. On the other hand, the customs department has a system to record all the goods arriving at the port. However, the logistics company still need to bring the hardcopy DO for the customs to stamp their approval of the shipment of the goods. Nevertheless, during the peak or end of the year, many customs officers are on leave, so the situation would be quite hectic in ensuring the smooth movement of the goods.

NS brought up several issues in terms of the movement of goods, particularly related to the containers:

- Nobody knows the status of the containers, whether it is carrying non-halal goods or not. Since the company does not own the containers, there is no way to know whether the containers carry non-halal goods.
- The halal and non-halal goods are mixed if LCL is used. Racks and pallets will only separate the goods in the container. The goods are received in sealed and packed conditions when loaded to be transported for movement.
- The companies are still using the manual record as DO. It is costly to get software for tracking systems. If the hard copy of the record is missing, they will have a problem. They need to be ready with multiple copies of the DO.

Case 3: BD – The Large-scaled Logistics Management Experience

BD is located at Pulau Indah, Klang, Selangor, and was incorporated in March 1997. The core business activities of BD are port operations, stevedoring, warehousing, transportation, freight forwarding and heavy equipment MRO (mainly for the construction industry) at various ports in Malaysia. (Note: MRO stands for maintenance, repair and operations or overhaul).

BD has 1 million square feet of eight warehouses at Port Klang, but the company still uses manual methods, i.e., non-robotic or high-level smart automation. For example, when they deal with clients who want the
cargo to be stored in their warehouse, they need to record all the identification document (ID) card numbers, which BD does not need a sophisticated system. They need more workforce and a forklift to do the operations work. Once they receive an order, the staff will start to move the goods, manage and scan the barcode of the goods to store the information and checks-in the goods in the warehouse. Hence, all information on the goods will be stored automatically in the inventory system.

The case company does not have halal certification. However, when they receive halal food or product, they will store them separately from non-halal products to avoid any issues with the Department of Islamic Development Malaysia (JAKIM). About 60 per cent of the products they handle are steel, iron, and non-ferrous metal like aluminium, lead and copper. In their defence, they are still not halal-certified because if they receive fruits from customers for storage in their warehouse, they only need to scan the already packed in packages and hand them to the customers directly. In other words, there is no direct contact with the products. Nevertheless, the warehouse located at West Port for fruit storage is halal-certified and owned by the customers. The halal certificate is required to be applied by the customers themselves, and BD only needs to prepare a place to store the products.

BD owns warehouses located at the halal hub duty-free area that only receives and stores halal products. This will ensure separation from non-halal goods on a large scale. In these warehouses, radio frequency identification (RFID) is highly useful. The staff only need to scan the pallet, and all information on the movement of the pallet can be stored directly in the system. The supervisor needs to check the pallet numbers to verify that they are tallied with the information in the system. BD has different warehouses for storing other goods and goods that contain foods. For example, food warehouses need to have a racking system, and the warehouse management system will manage the goods' costs.

Before storing the goods in such warehouse, they need to ensure that the warehouse is clean. The cleaner will be kept running to ensure that the warehouse is clean. For example, they need to clean all garbage of rotten fruits and boxes. All the processes of throwing away rotten fruits and items must be declared to customs. It is highly important to keep the warehouse clean, including ensuring that it does not have any pests, rats and ants. They will do the pest control regularly, and all of these activities are recorded manually. The records are presented during the audit session.
The cleaning processes follow the standards of procedure (SOPs), and the team in charge will make sure that the processes comply with JAKIM's requirements. The employees are trained weekly to ensure that they follow the SOPs and safety regulations.

This case company highlighted one issue for the benefit of this study: *There is no halal tracker to trace the halal logistics in supply chain management.* However, the company will advise customers to choose a suitable warehouse management system for traceability. For example, if the customer wants to use Oracle, then they will use Oracle to manage their goods; if the customer wants to use an ordinary system, they will follow the customer's request. The company uses a system called MERSLOCK, but it does not cover everything in the logistics operations because it is only basic software.

**DISCUSSION**

**Leveraging Appropriate Technology for Halal Logistics**

To visualise and realise the governance of halal logistics compliance, we need to look at a few important angles: required measures for halal logistics, appropriate operational areas and technologies, the impacts of halal logistics, and the challenges and limitations foreseen in the governance of compliance. A proposition follows this to the governing bodies, which could be taken as a guideline to form a standard or policy in realising halal logistics. With these proper means, companies will be more prepared to anticipate appropriate technology being introduced for full-scale implementation by the governing bodies.

Many requirements need to be measured and evaluated, according to the guideline from JAKIM, when developing, implementing and improving the effectiveness of controlling halal purity and genuineness throughout the supply chain. In order to apply for the halal certificate, the logistics company need to know the halal procedures to ensure that they can maintain halal integrity policies, which will then ensure the enforcement of halal policies and standards stated in the guideline by JAKIM. The halal regulations by JAKIM must be closely adhered to to ensure the hygiene of the transportation and warehouses is guaranteed. Cargo loading and unloading procedures must segregate non-halal packages to avoid cross-contamination. For this activity, sealing, packaging and inspecting must be evaluated carefully to avoid mistakes.
during documentation. The packaging materials will affect the halal-ness of the product because there are many issues with the certification of the packaging, the way of handling and the traceability of the packaging (Ab Talib, MS, & Mohd Johan, M.R., 2012).

Since there are many issues with handling the packages, a traceability system could be the best solution (Ab Talib, MS, & Mohd Johan, M.R., 2012). The traceability system will monitor the whole system, including inventory management, digital documentation, digital system for seal evaluation, warehouse management, transportation and route evaluation system (i.e., containers stop point tracking), and environmental management system. In order to apply the traceability system, the company needs to prepare a session of training to accept and learn how to use the system effectively. We received feedback from the companies through our interview survey that the digital system is pricey, making them use the manual method to record all processes in logistics. In terms of operational areas, the dedicated halal containers (i.e., large, medium and small), hygienic transportation and storage hub is very important to ensure that all procedures follow the halal guideline. The server system will be centralised to monitor all procedures; therefore, the company must have advanced trackers, cleaners and gadgets (i.e., tablets, devices, applications) to have a full traceability function of halal logistics compliance. Companies must upgrade their systems, and the workforce must be trained frequently to fulfil the halal guideline and the technology adopted.

If the traceability system is used in halal logistics, it will positively impact overall. The company can access the documents twenty-four hours a, reducing the probability of damage to the documents. This will also prevent fake documentation, e.g., the declaration of the packages. Since all the traceable information is digitally recorded, the manual procedures will be replaced from paper to table. It is easy to track the halal and non-halal products without bias. The workers also will have stress-free workload handling because they use an advanced digital process handling and tracking. The system could detect fraud and scams and prevent the package from being lost because the cargo status is available twenty-four hours. The safety of the products is guaranteed, and reliable payment transaction is secured with the use of the system. It will also ease communication with different authorities, especially since everything is handled digitally, thanks to the pandemic of COVID-19. Having said this, the traceability system is still useful in any situation, including post-
pandemic.

Based on the qualitative analysis, there are many challenges in logistics related to halal operations within and among SMEs. The most highlighted challenges are practical implementation, constraints for halal management, enactment consequences, implementations of the barriers, merchandise terms and conditions, parcel on hold, posting issues, tracking problems and boundaries and margins for halal endorsement. A small-scale freight forwarder mainly highlights these challenges. Other challenges are also mentioned by the international freight forwarder regarding cargo booking process circumstances, manual and endless documentation, practical implementation, high cost to adopt an advance digital system and challenges in maintaining halal integrity. These challenges are faced by the two case companies and the large-scale logistics company, in which they stated the same issue on how to maintain halal integrity and adapt to the advance digital system. They are aware that they need to follow the SOPs for halal integrity. However, the demand for cargo and goods is crucial during peak season or peak hours because they must prepare the cargo and staff following the demand. Sometimes they face challenges with goods declaration that will influence the handling of the goods when the declaration on paper differs from the item in the package, leading to different ways of handling the products. The goods might be damaged if the way of handling is incorrect for the goods.

Limitations in implementing halal logistics include insufficient knowledge of the halal process. Training is necessary to educate the staff with knowledge and SOPs of halal to start the ball rolling. The lack of halal assurance resources leads to the limitation of halal logistics compliance. The segregation of warehouse, transportation, packaging and others is a must to be fulfilled for the halal standards. The monitoring of halal logistics compliance is foreseen to require several staff within the workforce. However, we could overcome this issue if there is a digital system known as product traceability.

The 3Es for Governance of Halal Logistics Compliance

This section presents our proposal for the governance of halal logistics compliance. With proper means based on the discussed issues above, companies will be more prepared to anticipate appropriate technology being introduced for full-scale implementation by the governing bodies.
Enable Logistics SMEs with Traceability Capacity

Knowing the fact that the current practice at the logistics operational level in Malaysia is still based on manual and physical documents, this part needs to be tackled first. Understanding that the companies' concern is the trust among the companies across the supply chain, we should enable them and the companies with clear guidance and direction on how to prepare themselves with traceability capacity. Number one in mind is the technology itself; logistics SMEs need to be equipped with standardised software to reduce the manual processes, which will soon be extendable for traceability features.

Traceability could be performed if all the files and documents are in digital form and all parties within the supply chain use a standard coding system. Hence, the policy to be developed should provide the requirements, including a standard coding system, to prepare the logistics SMEs to be traceability-ready. This should be extended to other parties involved in the supply chain, including the Customs Department and other related governing agencies of concern.

Equip the People with Sufficient Knowledge

An awareness campaign to educate people on the significance of halal logistics could be the starting point for this effort. Logistics SMEs could benefit from the government's intervention if they know the importance of halal, hygiene and cleanliness. "Training" is just a word to summarise the effort that could be executed, but it is not limited to halal certification training. We should provide more than just "training" because the purpose of equipping the people is to change their behaviour into accepting and embracing the belief of halal logistics, which could make them feel committed to implementing it. Educate them so they will feel assured about the concept, which will slowly turn into a positive change of norm.

Put change management into practice here, as the concept could guide further on how to move forward. Suppose there is a set of the standard coding system and standardised features in software for the logistics SMEs to use (i.e., upgrading affected companies to "traceability-enabled"). In that case, technical training on halal traceability features could be implemented. If the companies require installations of new devices, then we could fund the service-providing vendors to install them at the logistics companies' locations. This depends on the technology
determined for the country's logistics environment, i.e., standard IR4.0 for Malaysia. Bear in mind that companies and their people need to be equipped with knowledge and resources, as these are the common drivers for a positive change in technology adoption.

**Empower Logistics SMEs with Appropriate Technology for Halal Compliance**

The change will take some time, from ensuring all companies are digitally transformed and traceability-ready to being open to the idea of halal logistics that would lead to a commitment to change. On a case-by-case basis, companies could be empowered with the technology for halal traceability through funding, matching companies to IT vendors, and technical training. For example, suppose blockchain is the technology decided for the halal logistics environment in Malaysia. In that case, all companies need to accept the concept of blockchain technology before they can allow themselves to commit to the change. Blockchain is known to be a system that allows data transparency, which makes SMEs fear them. They fear all their company data will be exposed to others when blockchain is implemented. Hence, we should find ways to educate them that blockchain does not necessarily have to be total transparency; instead, the data could be selectively used for halal compliance tracing, which the governing bodies have developed the coding system for (refer to the first item proposed above).

Implementing technology for halal traceability in logistics is by answering the 5WH questions: what to trace, where to trace, how to trace, when to trace, and why the trace. These are the simple context that could be educated down to the logistics SMEs. Figure 2 illustrates the overall proposition of enabling, equipping and empowering tasks for the governance of halal logistics compliance based on the above discussions.
CONCLUSION

This research has taken the bottom-up approach in tackling the issues for further proposals on governance for halal logistics compliance. The intention was to leverage appropriate technology for halal logistics, but it had to go through a process of understanding the real situation faced by the logistics SMEs. Our approach has brought insight to support the logistics SMEs in technology intervention for halal traceability. The proposed framework, in the end, is the 3Es for the governance of halal logistics compliance, which emphasises the need to enable halal traceability capacity, equip the SMEs with knowledge, and empower them with appropriate technology. This framework is based on the concept of Process-People-Technology, which is the fundamental knowledge in the information systems domain. Based on this concept, traceability is the process, the people need the knowledge, and the technology is based on the appropriateness of the halal logistics compliance governance.

It has been mentioned since the beginning of this paper that blockchain technology is perceived as the right solution for the fourth
industrial revolution (4IR) (Ismail et al., 2021). However, we must reiterate that this technology may not be the only technology deemed appropriate for halal compliance governance. New technology is introduced rapidly, as frequent as daily, and it is a must to investigate and fully understand the companies' capacity and technology's capability in enabling halal traceability across the supply chain. This leaves room for improvement in future work on adopting technology for the governance of halal logistics compliance.

ACKNOWLEDGMENTS

The Malaysian Technology Development Corporation supports this work (MTDC) Mini Social Research Grant to Universiti Kuala Lumpur in 2020.

CONFLICT OF INTERESTS

The authors declare no competing interests, such as financial or personal relationships, regarding the writing of this article.

AUTHORS’ CONTRIBUTIONS

SI and NN designed the study and gathered the literature. SI and MZM analysed the results. SI wrote the article. NN and MZM reviewed and edited the article.

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