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Risk Factors Analysis in Halal Supply Chain Management System

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ABSTRACT

Implementing a Halal supply chain (HSC) management system has been dynamically deployed along the supply chain process in line with the growth of the Muslim community. As the market has become more competitive, businesses have realised the need to obtain Halal certification and incorporate it into their operations as the demand for Halal compliance has increased. Fraud during the implementation and execution process in the HSC management system also increases. This research aimed to prioritise the six risk factors with 24 risk types in the HSC management system for the HSC industry to comprehend, observe, and prepare for risk mitigation. The research methodology applied in this study is qualitative research. It consists of a literature review followed by interviews using qualitative risk analysis with experts to determine the HSC risk factors rating exposure using closed-ended interviews and then securing the experts' opinions on the risk factors. The risk factors analysis in the HSC management system results significantly assist the HSC industry in implementing risk mitigation for their business operations to ensure HSC compliance and business sustainability. The findings are significant for study purposes and for enterprises for references or basic guidelines in identifying the HSC risk and preparing for the risk mitigation action.

1. Introduction

A supply chain is an activity engagement between three or more parties in the movement of trade, services, funds, or data from an origin to several places as a supply chain [1]. The competitiveness of many companies depends on their increasingly complex and vital supply chains. However, their interconnected, global nature also poses a significant risk to a wide range of hazards, with more potential points of failure and less room for error to offset delays and disruptions. When disruptions occur, digital supply networks are set up and organised to adapt and minimise the effects of these disruptions [2]. The vast and complex global supply chain complicates the issue of guaranteeing integrity. As it cuts across many tiers, the circumstance doubles the integrity hazards in maintaining product integrity. Supply chain management focuses on six primary areas: production,

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suppliers, placement, warehousing inventories, delivery, and data, as essential factors to consider [3].

The goal of the Halal Supply Chain (HSC) management system is to retain the Halal integrity of the entire process. The risk may be worsened by such a trade-off between product price and quality [4]. Hence, conducting the risk factors analysis identification in the HSC management system could help the HSC industry conveniently identify the risk and prepare for risk mitigation to minimise the risk exposures. The entire notion of global fraud is difficult to grasp due in part to the deceptive nature of the activity and inadequacies in tracking, monitoring, and reporting systems [5]. According to the Food Safety Agency's Incidents and Resilience Annual Report 2020/21, the largest incident involving meat and animal products was close to 300 cases, and Malaysia was ranked as the 17th country with approximately 25 incidents in the 2019/20 report [6,7]. Due to the integrity problem, risk management with HSCs is more critical. Hence, addressing the risks linked with HSC [8]. Identifying and prioritising risk variables in the analysis is vital, with the results serving as a guide for early risk detection and mitigation strategy. Therefore, this research aim is to identify the risk factors in HSC management system to accommodate the necessity in prioritising the risk for the enterprise's mitigation readiness.

2. Literature Review

2.1 Context of Halal

The context of "Halal" refers to a product obtained, produced/processed, shipped, managed, and distributed following Shariah regulations. The ultimate buyer receives Halal items from HSC, and to ensure the HSC management system is effective, it must guarantee Halal competence at every stage of production. Material, production techniques, and information related to goods are called Halal integrity [8]. To guarantee that final goods are Halal, natural resources or components should be Halal and may not comprise any non-Halal substances, insignificant or negligible amounts. Products should be produced, packaged, and managed using Halal-compliant infrastructure and instruments [9]. Halal also refers to the process of ritual cleansing, slaughtering live animals, premises, which refers to any building or infrastructure used for food preparation, slaughterhouse, and logistics, which relates to services such as transportation of goods and cargo chain services, warehousing, and related activities, pharmaceutical, which refers to pharmaceutical products, and cosmetic and personal care, which refers to materials and preparations used to come into contact with the body's various outer layers [10].

2.2 Supply Chain Management

Supply chain management aims to increase collaboration between supply chain participants, enhancing stock control and efficiency [1]. In general, a Supply Chain Management System (SCMS) refers to the process along the supply chain that includes procurement activity through manufacturing and supply in line with the marketplace demand [11]. The adoption of information technology (IT) is an innovation that has received much attention [12]. Technology in the supply chain enabling data standardisation and exchange of information facilitation exchange has convinced the supply chain industry to adopt technology to standardise the flow of information and stakeholders' interaction [13]. The context of a system in SCMS is a collection of rules or processes by which something is carried out in a structured approach, and IT is a tool to connect all those processes. The use of technology to facilitate a seamless supply chain change has been widely adopted. Over the last decade, several studies have enabled blockchain to work with other technologies to provide

highly technical services to patients [14]. RFID is tagged in every process of tea packaging and recorded on the blockchain network to accommodate the consumer on the traceability of the products [15]. The Internet of Things (IoT), RFID, and quick response (QR) code applications combined with blockchain applications give traceability solutions to track a product's path till it reaches the consumer [16].

2.3 HSC Management System

The key HSC management includes a process-oriented method to managing the movement of material, capital, and knowledge via strategic collaboration and coordination of stakeholders to produce value for the supply chain so that Halal and Toyyib are expanded from farm to fork [17]. Blockchain allows easy access to multilayer supply chain participants to interact efficiently and safely for better and exceptional judgment. It is regarded as a beneficial business tool in improving HSC management performance and increasing the credibility of halal products [18]. Blockchain and smart contracts ensure total visibility and transparency since each QR code is validated by smart contracts that require all activities to adhere to Halal standards. Halal certificate legitimacy also could be validated and archived on the blockchain [19].

2.4 Risk

Risk appetite is the degree to which a company is ready to embrace risk, and businesses should have a general understanding of the level of risk it is prepared to assume when pursuing their different value-adding initiatives [20]. Risk identification is the basis for risk evaluation as it provides a methodology for identifying risks and their likelihood opportunities. Companies need to continuously challenge themselves and expand the risk factors data that was previously gathered and examined [21]. The risk factors domain associated with SCM includes IT, strategy and market exposure, regulatory, sourcing, logistics, and operations, as depicted in Table 1**.**

Table 1
Risk Factors in HSC

Risk Factors	Risk Types
Information Technology	• Data collection & storage
	• Lack of investment in IT infrastructure
	• Data Accuracy
	• Privacy
	• Scalability
	• Real-time data
	• End-to-end visibility
	• Vulnerability of an asset that is exposed to cyber threats
Strategy & Market Exposure	• Management cooperation in compliance with Halal practices
	• Bullwhip effect
Regulatory	• Documents & regulatory compliance
	• Implementation challenges of internal & external Halal governance
	• Halal logo authenticity & credibility
	• Lack of support from the Government
Sourcing	• Lack of transparency on the source of product origin
	• Product traceability
	• Lack of trust in supply chain partners on Halal practices compliance
	• Risk of Halal product origin/material

Logistics	•	Delivery lead time
	•	Delivery traceability
	•	Risk of contamination
Operations	•	Lack of infrastructure & facilities following Halal compliance
	•	Unknown 3rd party warehousing conditions
	•	Human resource training

2.4.1 Risk assessment

Risks are examined based on their possibility and consequence, as depicted in Table 2, and the resulting risk analysis results serve as the foundation for establishing how risks should be handled [22]. The risk parameter projected the potential consequence and likelihood that are matched by multiplying the likelihood and potential consequences that could result from a different risk attribute [23]. It indicates that the same risk is assigned to various outcomes and probability combinations [24].

Table 2
Risk Parameters – Risk Matrix

Likelihood (Rating)	Consequences/ Impact (Rating)				
	1 Very Low	2 Low	3 Medium	4 High	5 Very High
5 Frequent	Low 5	Medium 10	High 15	High 20	High 25
4 Likely	Low 4	Medium 8	Medium 12	High 16	High 20
3 Possible	Low 3	Low 6	Medium 9	Medium 12	High 15
2 Unlikely	Low 2	Low 4	Medium 6	Medium 8	Medium 10
1 Rare	Low 1	Low 2	Low 3	Medium 4	Medium 5

** Source: (Sobel et al., 2020)*

The likelihood scale of an event is the probability that it will occur. It is possible to represent likelihood using qualitative words (frequent, likely, possible, unlikely, and rare), as a percentage probability, or as a frequency, as well as using numerical, such as a percentage or frequency, as depicted in Table 3.

Table 3
Likelihood Scale

Rating	Annual Frequency		Probability	
	Descriptor	Definition	Descriptor	Definition
5	Frequent	Up to once in 2 years or more	Almost certain	90% or greater chance of occurrence over life of the asset or project
4	Likely	Once in 2 years up to once in 25 years	Likely	65% up to 90% chance of occurrence over the life of the asset or project
3	Possible	Once in 25 years up to once in 50 years	Possible	35% up to 65% chance of occurrence over the life of the asset or project
2	Unlikely	Once in 50 years up to once in 100 years	Unlikely	10% up to 35% chance of occurrence over the life of the asset or project
1	Rare	Once in 100 years or less	Rare	<10% chance of occurrence over the life of the asset or project

The impact of an event will be greater if the entity is more susceptible, and if there is no risk mitigation in place, the possibility of an incident happening increases. Vulnerability evaluation methods could include the capacity to forecast occurrences and prevent occurrences, like having risk responses in place, and the capacity to endure the incident, like having sufficient capital and strong finances [25].

3. Methodology

This research focuses on the risk factors analysis in the HSC management system by identifying the risk factors prioritisation from a systematic literature review. Qualitative research will be conducted by interviewing at least 5 HSC industry professionals with more than 10 years of experience. The purpose is to obtain their perspective on the HSC risk factors prioritisation, where the results will be measured based on the risk parameter exposure. It consists of a Literature Review (LR) followed by interviews using qualitative risk analysis with experts to determine the HSC risk rating exposure using closed-ended and opinion-using open-ended interviews. In the interview conducted to collect the data, a closed-ended response is complemented by an open-ended question, and it is helpful to discuss the data acquired [26].

The qualitative method of an LR is used in conducting the studies, followed by interviews of which the participants were chosen based on their knowledge and experience, with not less than ten years of experience and exposure in the HSC sectors, with the selected organisations involved with Halal compliance. The participants are from five HSC organisations with industry specialisations in regulatory, consultant for a multi-national corporation (MNC), consultant for a local small medium enterprise (SME), an MNC company, and logistics expert. The qualitative risk analysis method is then applied to identify the risk rating exposure by documenting the severity evaluation to generate a risk matrix exposure through a close-ended interview and obtain the expert opinion on the risk factors analysis.

4. Results

4.1 Participant's Profile

The participants are invited to provide the risk rating exposures from their expertise specialisation in the industry they are servicing. The interview was successfully secured with the senior management from the HSC industry where the first participant, P1, a representative from a regulatory body who has a vast background in Halal governance for over twenty years, the second participant, P2, a consultant from the government agency that provides consultation for Halal certification to MNC globally who has over twenty years' experience, the third participant P3, a consultant from the private sector who provides consultancy for Halal certification mainly for local SME companies specialised in pharmaceuticals, food, and cosmetics with ten years' experience, the fourth participant P4, a representative from an MNC company in compliance with Halal with over fifteen years experience and the fifth participant P5, is specialised in HSC logistics compliance with over ten years' experience.

4.2 Risk Factors in Halal Supply Chain

The risk factors analysis consists of six domain risk factors with twenty-four risk types derived from the SLR and is outlined in Table 5 below.

Table 5
Risk Factors Analysis

Risk Factor	Risk Types
1) Information Technology	1) Data collection & storage 2) Lack of investment in IT infrastructure 3) Data accuracy 4) Privacy 5) Scalability 6) Real-time data 7) End-to-end visibility 8) Vulnerability of an asset that is exposed to cyber threats
2) Strategy & Market Exposure	1) Management cooperation in compliance with Halal practices 2) Bullwhip effect
3) Regulatory	1) Documents & regulatory compliance 2) Implementation challenges of internal & external Halal governance 3) Halal logo authenticity & credibility 4) Lack of support from the Government
4) Sourcing	1) Lack of transparency on the source of product origin 2) Product traceability 3) Lack of trust in supply chain partners on Halal practices compliance 4) Risk of Halal product origin/material
5) Logistics	1) Delivery lead time 2) Delivery traceability 3) Risk of contamination
6) Operations	1) Lack of infrastructure & facilities in accordance with Halal compliance 2) Unknown 3rd party warehousing conditions 3) Human resource training

4.3 Qualitative Risk Analysis

The risk prioritisation was discussed with the industry professionals, and their opinions were solicited based on the details of the risk factors and risk types. The weights for each risk aspect are derived by multiplying the impact with the likelihood of a given risk element. The average of the risk types was calculated based on the final weight of each risk factor category.

Table 6 is the risk factors indicator that consists of Information Technology (IT), Strategy and Market Exposure (SM), Regulatory (RL), Sourcing (SC), Logistics (LG), and Operations (OP).

Table 6
Risk Factors Indicator

Risk Factors	Indicator
Information Technology	IT
Strategy & Market Exposure	SM
Regulatory	RL
Sourcing	SC
Logistics	LG
Operations	OP

The analysis of the weightage of each risk factor derived from the interview with the participants of P1, P2, P3, P4, and P5 is tabulated in Table 7.

Table 7
Risk Factors Details by Participants

Indicator	P1			P2			P3			P4			P5		
	Impact	Likelihood	Matrix	Impact	Likelihood	Matrix	Impact	Likelihood	Matrix	Impact	Likelihood	Matrix	Impact	Likelihood	Matrix
IT	3	1	3	3	3	9	3	3	9	5	1	5	4	3	12
SM	3	3	9	4	4	16	4	4	16	3	1	3	4	2	8
RL	4	2	8	4	2	8	4	3	12	3	1	3	3	2	6
SC	4	2	8	4	4	16	4	4	16	3	1	3	4	1	4
LG	1	1	1	5	3	15	3	3	9	2	1	2	4	2	8
OP	3	2	6	4	3	12	4	3	12	1	1	1	4	1	4

As per Table 8, the risk prioritisation matrix illustrates a clear mapping of the risk exposure of the identified risk factors analysis where green indicates a low risk, yellow with medium risk, and red indicates a high-risk exposure. The results project risk rating prioritisation in the HSC management system.

Table 8
Risk Prioritisation Matrix

Likelihood	Impact 1	Impact 2	Impact 3	Impact 4	Impact 5
5					
4				▪P2_SM ▪P2_SC ▪P3_SM ▪P3_SC	
3			▪P1_SM ▪P2_IT ▪P3_IT ▪P3_LG	▪P2_OP ▪P3_RL ▪P3_OP ▪P5_IT	▪P2_LG
2			▪P1_OP ▪P5_RL	▪P1_RL ▪P1_SC ▪P2_RL ▪P5_SM ▪P5_LG	
1	▪P1_LG ▪P4_OP	▪P4_LG	▪P1_IT ▪P4_SM ▪P4_RL ▪P4_SC	▪P5_SC ▪P5_OP	▪P4_IT

4.3.1 High-risk exposure

The high-risk exposure occurred when participants were concerned about the high potential of occurrence with significant impact, resulting in disastrous consequences for the company.

4.3.1.1 Strategy and market exposure

P2 and P3 are consultants where P2 specialised in attending MNCs locally and internationally, and P3 attended local SMEs. Both have vast experience in providing Halal certification and HSC compliance services for various reputable companies, and they have the same concern that strategy and market exposure falls under high-risk exposure. Concerning strategy and market exposure, P2 believes that halal certification is a value-added proposition for the company, and management cooperation is a critical success factor in complying with HSC's best practices. Hence management

commitment toward complying with HSC requirements is highly important. P2 also highlighted that with Halal certification, there is a potential market demand for the products with a possibility of a market bubble effect. P3 also mentioned that most of the management of large companies with Halal certification offers full support as they understand the criticality of ensuring HSC compliance for its operations for business sustainability.

4.3.1.2 Sourcing

As for sourcing, consultants P2 and P3 gave their professional opinions on the severity of high-risk exposure for the said risk factors in the HSC industry. P2 mentioned that product visibility is essential, and with traceability, it will be easier to manage and respond to any damage or incident during the HSC process. P2 further mentioned that companies should consistently perform the assessment and audit of their suppliers and secure information on the provenance of their products. P3 pointed out that different countries have various specifications and prerequisites to meet before accessing their respective local markets and that some countries strongly require the importer to provide product declarations, such as bovine source declarations. P3 also emphasised that to access the Indonesian Halal market, the product should receive Halal certification from the Indonesian Ulama Council to ensure that it originates from Halal sources.

4.3.2.3 Logistic

Logistics accessed by P2 as a high-risk exposure, where P2 clarified that it is crucial to track the logistics carefully from the point of origin to the end of consumption. In some circumstances, the transportation risks contamination because it transports non-Halal goods during backhaul operations. This is because having a full container load is intended to maximise profit and minimise cost. This could have exposed the Halal goods and the shipment to contamination. P2 believes that failing to adhere to the HSC logistic requirement could lead to contamination, potential reputational damage and additional costs in resolving the issue.

4.3.2 Medium risk exposure

The medium risk exposure occurred when participants highlighted the medium probability of occurrence with moderate implications to the company.

4.3.2.1 IT

P2, P3, P4, and P5 are involved directly in the day-to-day commercial, except P1 found that IT has medium risk exposure. P2 briefly explained that most large companies ensure the IT infrastructure maintenance is intact to avoid any potential IT systems breakdowns, which could lead to the severity mode in a crisis as large companies depend on IT. P2 also highlighted that companies adopting digital transactions before the COVID-19 pandemic had doubled their revenue during the pandemic as their readiness for digitalisation conveniently catered to the market's needs. Some companies may invest in IT infrastructure subject to the return on investment and clients' needs. P2 also mentioned that data privacy varies from country to country, as some may not even be able to provide religious data due to racism avoidance. The data storage also depends on retaining financial records for tax purposes for at least seven years. As for Halal, the requirement is for three years, and most large companies keep the data on the cloud to ensure data scalability. Data transparency is also crucial for

managing any potential incident. P2 also mentioned that some products in Japan, such as wagyu beef, provide barcode scanning for its consumers to trace the source and history of the wagyu beef. P3 mentioned that there are instances where the local SME cannot offer the Halal compliance data as it was not appropriately kept. Hence, P3 believes that the data must be kept digitally, and at any point in time, the data could be furnished whenever required. As for P4, it was deliberated that as for MNC in ensuring Halal compliance, the data was safely kept and recorded and could be efficiently used for any possible audit exercise. They were also allocated with IT budget and have a complete IT system to ensure the business process in meeting the HSC compliance is intact. At the same time, awareness and training were given to all staff in managing any possible cyber threats. According to the feedback from P5, the logistics provider is more concerned about the movement of its container, and they are using a container tracking system to record the location, including identifying the Halal critical point.

4.3.2.2 Regulatory

P1, P2, P3, and P5 agreed that regulatory falls under medium risk exposure. According to P1, adopting Halal complements Good Manufacturing Practice (GMP) and Hazard Analysis Critical Control Point (HACCP). Halal certification by the Malaysian Department of Islamic Development (JAKIM) is recognised in forty-six countries worldwide. P1 also added that the Malaysian Government allocated a budget for developing the Halal industry following the Government's direction to establish Malaysia's Halal Ecosystem. P2 emphasised that compliance with regulatory requirements is essential for successful certification.

P2 said that Malaysia and Indonesia are pioneers in Halal and that there are two hundred certification bodies in the world, including forty-six countries with eighty-four certification bodies under JAKIM. P2 further emphasised that the Ministry of Domestic Trade and Consumer Affairs is responsible for regulatory enforcement, while JAKIM is responsible for verification. Some countries do not place the Halal emblem on their domestic products but use it for export purposes. According to P2, only 3 per cent of the local Malaysian industry is certified as Halal and barely 0.5 per cent exports Halal products. The government of Malaysia strongly supports the industry's pursuit of Halal certification. Input obtained from P3 that Halal regulatory rules are thorough but difficult for the industry to comply with, and GMP and HACCP compliance is also required. Before Halal certification, some state regulations imposed additional requirements on local businesses, such as accreditation with Food Safety is Responsibility of the Industry (MESTI) (Malay: Makanan Selamat Tanggungjawab Industri). P3 further stated that the Malaysian government provided substantial support for Halal certification. P5 likewise believes that the HSC industry must comply with the regulatory body's requirements to prevent potential non-conformance reports during Halal auditing.

4.3.2.3 Operations

P1, P2, P3, and P5 concur that business operations come within the category of medium-risk exposure. P1 highlighted that comprehensive Halal certification guidelines are accessible, and it is convenient for the industry to comply with Halal infrastructure and facilities standards requirements. The Halal executive of the industry must also attend a course on Halal best practices and compliance, after which the Halal executive will be able to impart their knowledge to the operations staff. According to P2, the environment may cause contamination, while the operation team may contribute to cross-contamination. Even with comprehensive tertiary packaging protection, rough

handling due to forklift, rough route, driver, and improper handling may expose the product to the risk of contamination.

P2 added that engaging a Halal executive applicable to SMEs and above is essential for achieving Halal compliance. Before hiring any third-party warehouse provider, it is recommended to do an internal inspection of the physical conditions of the warehouse. As for P3, they highlighted that the Halal module is primarily theoretical. Hence, practical training may need to be enhanced to ensure Halal compliance understanding. P3 added that the Halal practical training might apply to five-star hotels and large manufacturers as they have a Human Resource Development Fund (HRDF) that could finance continuous Halal-related training. It is essential to cultivate a skilled workforce to manage Halal operations. P3 highlighted further that training personnel on Halal operations-related matters is viewed as a waste of time and resources by certain SMEs. Some organisations prioritise production and, if necessary, only undertake Halal training to utilise the available HRDF without assessing the quality of the trainer. P5 informed that currently, the industry was concerned about getting a certified Halal warehouse. P5 also mentioned that throughout the Halal auditing process, the company was required to produce a list of committees and a list of training attended to ensure the company operations hands-on with the HSC requirement.

4.3.2.4 Strategy and market exposure

P1 and P5 both categorised strategy and market exposure as medium-risk exposure. P1 emphasised that most big businesses offer complete assistance and collaboration in adhering to Halal best practices, which helps the business reach international markets. P1 also said management engagement increased during meetings with the regulators during the COVID-19 pandemic. P1 also emphasised that critical point products, including pharmaceutical and medical equipment devices like bone replacement and tube feeding, now have Halal accreditation. This strategy gives consumers the certainty that the products are Halal-certified. Applying Halal certification to some products with a bullwhip effect might occasionally lead to misleading marketing. P5 emphasised that the regulatory body will regularly monitor and audit the company issued with Halal, and management must provide complete cooperation in Halal compliance. As a result, to maintain certification, operations such as production, maintenance, and safety, among others, must adhere to Halal regulations.

4.3.2.5 Sourcing

P1 and P5 also agreed that sourcing falls under medium-risk exposure. P1 believes that products secured through original equipment manufacturers (OEM) should come with data sourcing transparency to ensure the sustainability of the HSC industry. As for P5, it was highlighted that the businesses should embrace Halal by JAKIM, and there should not be any problems with the transparency of the product's origin. P5 also said that the Malaysian Halal Management System 2020 requirements make it easy for the organisation to understand and follow the Internal Halal Control System for SMEs and the Halal Assurance System for medium and large companies.

4.3.2.6 Logistic

P3 and P5 both have the same opinion that logistics fall under the medium risk category. P3 mentioned that there are instances in which a Halal certificate from overseas is only valid for one year, but the product's arrival is delayed due to some logistics issue. P3 stressed that major hypermarkets have highly stringent policies regarding cross-contamination, which can occur due to

the logistics and distribution processes. P5 informed that most logistic providers deliver on time, and regarding the risk of contamination, it may happen highly in both inbound and outbound containers.

4.3.3 Low-risk exposure

The participants' recognition that the possibility of the event occurring is low and that the impact on the company is relatively small led to identifying the low-risk exposure.

4.3.3.1 Logistic

P1 and P4 relatively agree on the minimal impact of logistic risk exposure. P1 explains that logistics for Halal product imports are under the purview of the Malaysian Quarantine and Inspection Services, and they are working together with the Port Authority to ensure the compliance of Halal. P1 also highlighted that any contamination exposed should be managed and responded to immediately. P4 explained that they had established a process to ensure manageable delivery lead time. The marketing department will provide a marketing plan forecast for the production team to manage production, with the head office being informed three months in advance and the factory level one month earlier for planning in terms of product sourcing and logistical arrangements. All the logistic delivery is traceable through the application of the SAP system. A contract with Halal certification binds the logistics provider, and the company strictly monitors upon and after loading to ensure Halal compliance.

4.3.3.2 IT

The response from PI highlighted that the adoption of IT is very important in line with the current approach to modernising the supply chain industry. P1 also highlights that their IT systems are manageable, and the client's data is safely secured.

4.3.3.3 Strategy and market exposure

As for P4, an MNC that has received Halal certifications emphasised that the management fully complies with Halal best practices and is highly devoted to attending Halal discussions, additionally, they are the Halal Centre of Excellence, and one-hundred-fifty of the four hundred branches worldwide have received Halal certification.

4.3.3.4 Regulatory

According to P4's opinion, some companies who have already gained Halal certification in Malaysia must submit a new Halal certification application should their product enter the Indonesian market. P4 stated that compliance and adherence to regulatory body standards are essential.

4.3.3.5 Sourcing

According to the input from P4, as an MNC with Halal certification, their procurement is highly careful in acquiring Halal products. Before granting clearance to any HSC vendor, they will conduct stringent due diligence assessments and ensure that HSC's best practices are followed. In addition, they perform a continuous supplier audit evaluation on the existing vendor. If there is a problem with

the vendors, they will implement their business contingency plan and transition to another vendor as an alternative. In addition, they have an SAP system that can trace the entire sourcing process within two hours.

4.3.3.6 Operations

P4 highlighted that as an MNC, the infrastructure and facilities of the operations are designed dedicatedly in compliance with Halal. They also owned a Halal warehouse, and as for third-party warehouse providers, the warehouse must be certified Halal. P4 also stated that they regularly provide onboarding Halal training and training refreshers to ensure employees understand Halal compliance.

5. Conclusion

Based on the risk rating results, a greater concern about HSC risk exposure consistently was highlighted by P2, a consultant for MNC, and P3, a consultant for local SME, on strategy and market exposure, as well as sourcing with P2, including HSC logistics as a high-risk exposure. The remaining risk exposure was marked as moderate. P2 has broad experience in various industries in managing the HSC requirements and compliance for large corporations locally and globally, which applies to P3, which caters primarily to pharmaceutical, food, and cosmetics for local SMEs. The risk exposure prioritisation was made based on their wide exposure in various HSCs' industries.

As for P4, they are MNC that has been granted Halal certification for one-hundred-fifty out of four-hundreds of its branches worldwide, and the Malaysian branch is the Halal Centre of Excellence. They have implemented the HSC strategy since 1970, before being regularised by the government, considering that all risk exposures are tolerable due to the company's full compliance with HSC, with the greatest focus only on IT risk exposure as they are fully dependent on IT solutions as all data are tracked using the IT systems globally. They conveniently managed the operations and resolved any possible incidents by tracking the incident in the system. The lower risk exposure explains that due to the full compliance complete with risk mitigation planning. P1's regulatory body suggested a medium-risk exposure for strategy and market exposure, regulatory, sourcing, and operations, while the remainder is a low-risk exposure. Meanwhile, P5, the HSC logistic specialist, indicates that all the HSC risks are moderate, with IT as a greater concern.

The IT risk exposure explained that the industry must adopt the application of IT in their HSC day-to-day business processes with the concern on the accuracy of data kept and the enabling the IT solutions that are secured against any potential breach to ensure the data held are safe and protected. The strategy and market exposure is essential through the management's support in maintaining HSC compliance and Halal certification, contributing to the brand's and products' trustworthiness. As for sourcing, it focuses on the origin transparency of the product and trust in the supplier chain's compliance with HSC best practices. Meanwhile, Halal governance is crucial in ensuring the industry acknowledges and complies with Halal standards, failing which Halal accreditation may be revoked. Both logistics and operations are equally important as logistic traceability is crucial in guaranteeing HSC compliance from potential contamination through facilities and infrastructures, and personnel engaged in managing the operations have to be knowledgeable and comply with the conduct of HSC best practices. The high-risk exposure required immediate action and commitment from the senior management as the risk may implicate the company's reputational and financial loss. The medium risk moderately involves the company as responsibility and

accountability are defined. Meanwhile, the low-risk exposure has a minimal impact on the company as the risk mitigation is managed by the existing routine procedures implemented in the organisation.

The interview with the industry experts to acquire their perspectives mostly depended on the experts' respective areas of expertise and the HSC industry to which they had been exposed and experienced. Future research may use multiple participants from each HSC industry in this study and other HSC industries to ascertain the results' consistency. It is also suggested that the additional identified risk factors and types be incorporated into the HSC management system to understand the risk implications in the HSC industry. In addition, the quantitative research methodology might also be applied to a more extensive sampling size to focus on the findings of the illustrative risk mapping. The research is of considerable importance to the organisation as a guideline on the possible risk in the HSC management system, with the benefit acquired potentially providing significant assistance in gaining clarity and anticipating the risks connected with the sector. The research might also serve as a foundation or reference for the organisation to comprehend the importance of risks and mitigate and minimise any possible risks.

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