

Halal logistics as the basis of halal and healthy food and its potential contribution to the economy

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ABSTRACT

Enhancing logistics activities to achieve profitability while simultaneously maintaining high levels of customer satisfaction is a widely adopted approach by businesses. Within this context, the halal logistics industry has witnessed significant growth. Halal logistics services guarantee the *halalness* of food products throughout the supply chain, from raw material procurement to final delivery to customers, thereby mitigating any associated risks. The primary objective of this study is to highlight the economic benefits of halal logistics activities in the halal food supply chain. The study aims to contribute to the expansion of the industry and the provision of these services in multiple countries. The research examines the global halal food industry, emphasizing the strategic importance of halal logistics activities and distinguishing between traditional logistics activities and halal logistics activities. The study provides examples of halal logistics practices from around the world and recommends steps for other countries to enter the industry. Muslim countries transitioning from being served to serving in the halal logistics industry may increase their commercial value. Government sanctions may further encourage businesses to take halal food transportation seriously. The study presents numerous examples of halal logistics services from various countries.

1. Introduction

The term "halal" refers to that which is lawful, permissible, and pure, and is central to Islamic beliefs. In the context of Islamic dietary laws, halal products are those that are considered safe and healthy for human consumption while adhering to Islamic regulations (Doğaner, 2021). According to Islamic doctrine, only halal food should be consumed, as stated in the Qur'an: "*O mankind, eat from whatever is on earth that is lawful and good*" (Quran, 2:168). As such, believers are expected to abide by halal rules in all aspects of their lives and to avoid anything that is not halal (Yetim, 2019). The global demand for halal products is continuously increasing due to the sizable Muslim population worldwide. With the increasing demand for

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halal products, businesses have started to pay more attention to halal processes in order to benefit from the growing halal industry.

The process of procuring halal products has become a more meticulous affair with the inclusion of halal products in international trade. Consumers demand that businesses offering halal products follow halal procedures throughout the supply chain, leading to the rise of the concept of halal logistics. A shift in consumer behavior is seen as the primary factor driving the expansion of logistics and the development of halal logistics concepts (Haleem & Khan, 2017). Halal logistics encompasses the transportation of halal products from raw materials to the end consumer without any potential compromises to its halal status. It covers all aspects of the product's transportation, storage, and support activities. It is important to note that the mere fact that products are transported with care does not guarantee compliance with halal logistics rules. The key determinant is compliance with the legal (*fiqh*) rules of Islam regarding situations that may render the logistics of products haram.

In the context of halal logistics, any products that are prohibited from being eaten or drunk in Islam are also considered prohibited. This includes pigs and any substances derived from pigs. If a pig-based content is included in the packaging material used for transporting a halal product, it will be considered haram (Quran, n.d.). The presence of pig products on transported surfaces, even if they are not included in the product or packaging, or exposure to the same air, may also compromise the *halalness* of the product. For edible fish, meat, and dairy products, unsanitary conditions during transportation, storage, and delivery, which are part of the logistics process following meticulous production, can also cause halal products to become haram by altering their chemistry. Halal and haram products cannot be transported in the same vehicle or container in a way that may cause air and physical contact with one another. Moreover, halal products cannot be transported with vehicles and containers that have previously been used to transport non-halal products without proper disinfection. Thus, not only the production phase but also the logistics processes, which are as crucial as the production phase, must be maintained as a halal chain link.

It should be noted that a product's hygienic production process does not necessarily make it halal. To be considered halal, all processes involved in its production and logistics must comply with the rules of Islam. Halal logistics is the delivery of halal products to customers in accordance with the "halal chain link" criteria to ensure that their halal quality is not compromised during logistics processes. Businesses may resort to unhealthy and non-halal methods in production and logistics processes to meet the demands of Muslims, who make up almost a quarter of the world's population, and to make a profit. While a product may be halal in nature, it can become haram due to changes that may occur during its production and logistics processes. The Muslim population is an important market potential for businesses, and entrepreneurs pay attention to it because of its strategic economic value.

The global demand for halal food continues to grow rapidly, with Muslims spending \$1.13 trillion in 2018 and \$1.17 trillion in 2019, representing a 3.1% increase. This trend is expected to continue, with spending projected to reach \$1.38 trillion by 2024. In 2019, halal food imports by Organisation of Islamic Cooperation (OIC) countries amounted to \$200 billion. Figure 1 illustrates the major countries from which the OIC imports the most halal food, with no country having a majority Muslim population. Realizing the market potential, these countries are focusing on halal food development to secure their position in the market. Brazil is a key player in the meat industry and is currently the largest exporter of halal food to OIC countries. India, with its strategic location bordering countries with a majority Muslim population, such as Bangladesh and Pakistan, has also taken advantage of this opportunity by producing and exporting halal-certified products to its neighboring countries, thus establishing its presence in the halal food market.

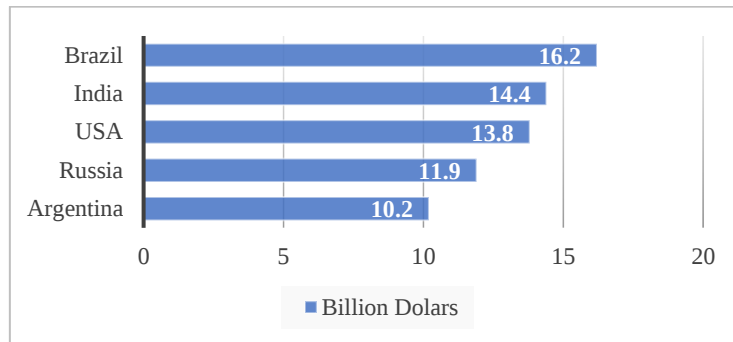


Figure 1. Top five exporters of halal food to the OIC countries (2019)

Source: DinarStandard, State of the Global Islamic Economy Report 2020/21, Dubai

The demand for halal meat in Muslim countries is met by non-Muslim countries as well. Figure 2 shows that Brazil is the largest exporter of meat to OIC countries, followed by Australia and the USA, neither of which has a large Muslim population. Australia, in particular, supports halal meat production and certification to increase both meat trade and demand in Muslim countries. In February 2022, the Australian Trade and Investment Commission (Austrade) signed an agreement with the Malaysian Halal Development Corporation (HDC) to facilitate and increase the export of halal food by Australian traders to ASEAN countries (Australian Trade and Investment Commission, 2022).

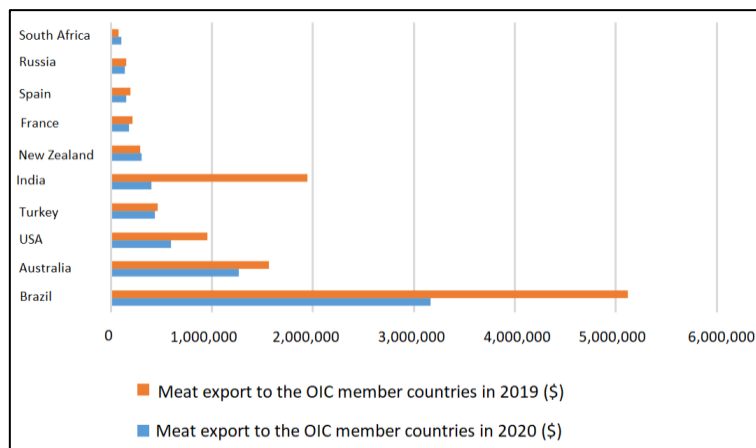


Figure 2. Top ten countries the OIC countries import meat from (2019-2020)

Source: Trade Map, 2019-2020 data

The chart above also illustrates the impact of the Covid-19 outbreak in 2020 on the meat exports of countries such as India and Russia, which implemented trade restrictions. India experienced a significant decrease in the amount of meat exports in 2020. However, Turkey rose to be among the top countries on the list due to the policies implemented in 2020. Although Brazil was the largest exporter of meat in 2019, it experienced a significant decline in 2020 due to Covid-19 measures. Despite the industry's negative effects, its potential size remains undeniable.

1.1 Halal logistics

The classical supply chain aims to maximize profits by meeting customer demands. In contrast, the halal supply chain aims to maintain halal integrity from the first source to the end user, ensuring a continuous "halal supply chain" process. The classical supply chain prioritizes cost-oriented planning, while the halal supply chain focuses on maintaining halal quality at every stage and not breaking the halal quality chain. This enables the implementation of a "total halal quality process." In the halal supply chain, it is crucial to ensure the flow of halal values and quality, along with products, money, and information. Table 1 compares traditional logistics processes with halal logistics processes in a supply chain.

Table 1. Differences between traditional logistics and halal logistics

Work process	Classical Logistics	Halal Logistics
Raw material supply	In classical logistics processes, criteria such as cost and proximity to the production facility are taken into account in raw material supply. The purpose is to keep the profitability as high as possible during the supply of raw materials.	Raw materials to be used for halal food production must also be halal and clean. Non-halal and unclean raw materials must not be included in the production processes.
Production	In the production phase, it is aimed to produce the most suitable product for the needs and wishes of the customer by using the resources in the most efficient way for the needs of the business.	In the halal production process, the aim is to offer the customer products whose halalness is maintained in every aspect. It is aimed to produce in accordance with Islamic law and away from waste. The production stages of the products must be inspected by experts through the control points created.
Storage	Products are stored in warehouses prepared in accordance with the conditions of the product, and support activities are carried out in the warehouse.	The most suitable storage facilities for the physical, biological, and chemical properties of the products must be established. In the warehouses, special sections for spoilable halal products must be created to prevent their interaction with non-halal products. Businesses must obtain a halal certificate covering their warehouses, thus having their halal storage service approved.
Handling	Handling is carried out in all supply chain processes, especially in the warehouse, if needed. Handling includes activities such as grouping and positioning products in the warehouse or properly arranging the products in the vehicle.	In the logistics processes of halal products, the halalness of the product must be taken into account during handling activities. The equipment used during handling must not be dirty or in contact with dirt. If they are dirty, the products must be used after cleaning according to Islamic rules. Halal logistics standards also involve clauses concerning handling processes.
Packaging	The products must be packaged in accordance with internationally valid food standards. There must be a description of the product and its content on the package. The packaging products used for packaging must be favorable to human health.	In addition to the standards published by internationally recognized food standards institutions, halal standards must also be taken into account in the packaging of halal products. There must be a description of the product and all its content, including the additives, on the package. Details regarding the packaging of halal products are specified in the prepared standards.

Cross-docking (distribution, transit)	It is the process of grouping and forwarding the products requested by the customers without taking them into stock. Cross-docking is frequently employed by businesses that want to reduce inventory costs.	Cross-docking is risky in halal logistics processes. During forwarding, there may be contact between halal products and non-halal products. For this reason, cross-docking should not be employed. Businesses that employ cross-docking must control the forwarding process through the control points they have created.
Transportation	The movement of raw materials, semi-finished products, and finished products is provided by transportation. Care must be taken to ensure that the vehicle used in transportation is suitable for the product being transported.	In addition to halal product transportation, the transportation carrier (containers in possible cases) must be suitable for halal product transportation. The transportation carrier must not be used to transport a non-halal or dirty product before it is used to transport a halal product. If it has been used for it or if one is not sure about it, the transportation carrier must be cleaned in accordance with the standards. The products must be carefully placed in the transportation carrier against possible problems such as shaking and overturning.
Retail	Finished products with the completed process are delivered to customers through retailers.	Special sections must be prepared for the presentation of halal products, and they must be kept separate from non-halal products. There are halal standards published for the retail transactions of halal products.
Product Information	Customers buy the product that suits their needs. Factors such as the price, content, and visuality of the product are taken into account when purchasing. Customers may purchase products produced in accordance with certain standards by choosing products with food standards logos.	Customers who buy halal products should shop at stores where they can obtain halal products. In addition to the price, content, and availability of the food standard logo, the most important factor to consider is the halal logo on the product. The halal logo represents the institution the producer has taken its certificate from. Customers can get detailed information about the producer and the halal certificate of the producer through the websites of the certification institutions.

Source: Doğaner and Fidan, (2021a)

The development of a total halal quality process involves several stages that result in a halal value chain, where halal values are maintained throughout the entire supply chain, leaving no room for doubt about halal criteria. Although logistics for halal products are operationally managed like traditional logistics processes, certain additional issues need to be considered. Businesses that receive halal logistics certificates must consider their processes as a whole, and not just production processes. The process from producer to customer must comply with halal criteria, and not experience any situation that impairs halalness.

According to Gültekin et al. (2019), halal certification institutions emphasize some common issues about halal logistics processes that businesses must pay attention to, regardless of which certificate they obtain. Firstly, facilities, warehouses, and transportation vehicles must be cleaned in accordance with Islamic rules, and designed specifically for halal foods in a way that avoids contamination. Packaging used for food products must comply with legislation and not contain additives that are harmful to human health. The cleanliness of the equipment, machinery, and spaces used in production and logistics processes is crucial for product cleanliness.

Transparency is essential to ensure that products subject to logistics processes are safe and healthy, and must first be provided within the business. In halal logistics processes, transparency and control are essential for maintaining the integrity of the halal supply chain. Businesses use various systems to control products and services, and there are methods to control and monitor halal logistics processes. The most common method is the Hazard Analysis and Critical Control Points (HACCP) system, which is used to control food products and can be applied to halal food control and monitoring. Halal foods are controlled by applying the control points specified in international halal standards to the HACCP system. The Radio

Frequency Identification (RFID) system is also used to monitor products and correctly enter information about them.

Halal food monitoring systems have been specifically developed to ensure the integrity of halal products in the supply chain. For instance, the eHalal project (The eHalal Token Coin), developed by the OIC, aims to establish an internet-based halal information system using blockchain technology. The system is intended to provide low-cost solutions to halal certification institutions and small and medium-sized businesses while facilitating global communication and interconnection among these institutions (Yetim & Türker, 2020). These systems should be integrated into logistics processes and continually improved to maintain halal integrity in complex supply chains and meet the transparency needs of customers.

Foods that fail to comply with the halal rules, suffer from storage problems, have damaged packaging, and do not adhere to hygiene practices may contain harmful substances alongside beneficial ones. Insufficient food safety protocols from the first stage of production to the consumer's table can pose health risks to consumers. In light of the COVID-19 pandemic, food safety has become even more critical to individuals, prompting consumers to question the quality and hygiene of products. Nakat and Bou-Mitri (2021) identified several measures that factories and production facilities should take during the supply chain process to counter COVID-19. These measures include training, personal protective equipment usage, physical distancing, hygiene and sanitation practices, and isolating infected personnel[†].

The Standards and Metrology Institute for Islamic Countries (SMIIC), established under the Organization of Islamic Cooperation (OIC), has developed the OIC/SMIIC 1:2019, OIC/SMIIC 17-1:2020, OIC/SMIIC 17-2:2020, and OIC/SMIIC 17-3:2020 halal standards to ensure the halalness of food products from raw materials to the consumer, without causing harm to human health. These standards provide clear guidelines for halal food processing. Consequently, halal certified products can be said to be better protected against infectious diseases than non-halal products (SMIIC, 2019-2020).

Despite the high demand for halal products, the halal industry has not grown as fast as expected. Torlak (2012) identified the lack of trust, certification problems, and lack of promotion as some of the issues hindering the marketing of halal products. Lestari and Saidah (2020) employed the SWOT analysis method to investigate the halal logistics services in Indonesia. Their study revealed that the halal logistics industry in 2020 faced obstacles such as lack of trust, certification problems, and lack of promotion. Countries like Malaysia have recognized these problems and taken steps to address them, allowing them to become pioneers in the market (Torlak, 2012; Lestari & Saidah, 2020).

1.2 Halal standards

Halal certification is a crucial aspect that instills confidence in halal products and services. A halal certificate is issued by authorized institutions confirming that a product adheres to Islamic regulations. The scope of these certificates varies depending on the authorized institution's rules, and they update businesses' certificates regularly through inspections (Yener, 2011). In response to customers' requests for information

[†] In this sense, the hadith, “If you hear of an outbreak of plague in a land, do not enter it; but if the plague breaks out in a place while you are in it, do not leave that place.” (Bukhari, Tıb, 30; Muslim, Selam, 92) is of great importance. The quarantine measure implemented in epidemics applies not only to humans but also to animals. Prophet Muhammad (SAW) also stated that diseased animals must be kept separate from healthy animals (Müslim, Selâm, 104-105; Ebû Dâvûd, Tıb, 24). As can be seen, it is emphasized that both humans and animals must be subjected to quarantine rules if they are sick. These situations, of course, are closely related to logistics activities.

on product content, halal compliance, and manufacturing processes, businesses display logos on their packages after obtaining certificates from authorized institutions. If customers know the institutions that issue halal certificates and their certification conditions, and prioritize halal-certified products in their preferences, it could raise awareness and promote the halal industry's growth.

As per Çeker (2021), more than 500 institutions worldwide provide halal certification and standards services, with most of these institutions serving local markets. Based on a 1% certification expense to total halal food turnover, the annual budget approximates \$12 billion. It is estimated that 80% of this budget goes to established institutions in developed countries. To meet businesses' halal-certified product demands, institutions have emerged, which primarily offer certification and support services. However, some institutions operate with profit as their primary objective, rather than service provision (Çeker, 2021). Some of these institutions issue halal certificates without proper inspection and control, which requires auditing to ensure that the certification process is properly managed and eliminate doubts.

The lack of standardized practices among certifying institutions and the absence of accreditation pose significant challenges. As a result, certificates issued by these organizations are deemed invalid in certain countries, presenting a major obstacle to establishing a global halal supply chain and value chain. While the presence of numerous institutions creating halal standards and issuing corresponding certificates fosters greater interest in the subject and its wider adoption, the lack of centralized regulation leads to confusion among consumers and businesses. Supporting these institutions and regularly monitoring them through a union and supreme board would enhance the halal industry by expanding their operations and bolstering trust in certification institutions.

In a study by Azam and Abdullah (2021), four prominent halal certificates were compared based on their content: those developed by JAKIM in Malaysia, the Islamic Religious Council of Singapore (MUIS), the Indonesian Ulema Council (MUI), and the SMIIC halal standard developed by the OIC. The researchers emphasized both the similarities and differences observed in the comparison, with discrepancies arising from cultural distinctions, varying halal policies, and differing regional practices. Given that Islam is intended for all people, not just Muslims, the halal standard should be easily adopted and embraced globally. To this end, developing halal food and logistics standards accepted by every Muslim worldwide is crucial, and can be achieved through research coordinated by the OIC.

2. Halal logistics and its economic contribution potential

In recent years, the halal industry has experienced growth both in OIC countries and worldwide, driven by the increasing global awareness of sustainability, ethical consumption, green growth, and digitalization. The halal industry encompasses various sectors, including food, finance, tourism, media and entertainment, cosmetics and pharmaceuticals, and fashion. The OIC countries have a significant presence in the halal industry, accounting for a large proportion of its total value (SGIE, 2022).

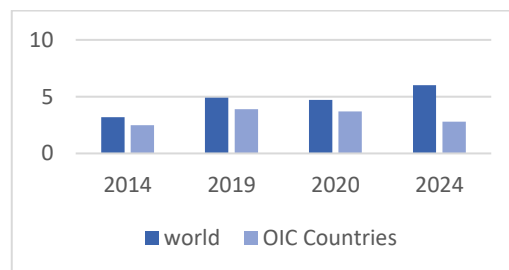


Figure 3: Estimated Market Size of the Halal Industry (trillion US dollars)

Source: (SESRIC, 2021)

The halal industry's global market value increased from \$3.2 trillion in 2014 to \$4.9 trillion in 2019, but it also witnessed a decline in market size due to the COVID-19 pandemic, like many other economic industries. However, the post-pandemic period is expected to bring positive momentum, with the market size estimated to reach \$6.0 trillion in 2024. In 2020, the estimated market size of the halal sector in OIC countries was \$3.7 trillion, projected to grow to \$4.7 trillion in 2024 (SESRIC, 2021). The OIC countries in the Gulf Cooperation Council region and Southeast Asia represent relatively higher shares, given their income levels, strong Halal ecosystem, and high consumer awareness of halal.

Halal park studies have been conducted in many countries, and Malaysia leads in this field. Halal parks operate using the system of logistics villages where all logistics processes related to the halal industry's products and services are carried out. Halal parks aim to provide customers with halal products that are sensitive to environmental conditions and avoid contamination with haram products. Halal parks are designed with sustainability and green logistics in mind, and businesses in the park establish commercial connections with one another and conduct their marketing activities in the park. Malaysia has halal parks in 14 different locations.

The proximity of these parks to transport routes and terminals facilitates halal logistics processes, and there are 40 multinational businesses and 200 local businesses operating within these halal parks. In addition to food and logistics, businesses providing services in sectors such as cosmetics, personal care, and pharmaceuticals are also located in these parks. These investments contribute to the countries' economic growth and enable them to have a permanent place in the halal industry. According to the economic data of Malaysia for 2017, the halal industry contributed to 7.5% of Malaysia's gross domestic product (HDC, 2021; Mujar & Hassan, 2014). Clustering of small businesses in a certain region that serve in the halal industry will strengthen the communication they establish with one another and enable the industry to achieve faster economic growth.

3. Conclusion and recommendations

The halal and healthy life industry is a promising and rapidly growing sector in the global market. The demand for halal products and services continues to rise due to the increasing Muslim population and the health and cleanliness benefits they offer. However, it is important to note that a product's content being halal does not necessarily make the product halal. To be considered halal, the entire halal chain must be maintained throughout the processes that occur until the product is delivered to the customer, and the raw materials used in the product must also be halal. Halal logistics is a crucial aspect of maintaining the halal chain.

Halal logistics encompasses activities such as production, storage, handling, packaging, and transportation of halal products in accordance with Islamic law from raw material supply to delivery to the customer. Halal logistics ensures that the halal quality of the food product is preserved during logistics processes and that it does not undergo any process that violates Islamic rules. Compliance with halal logistics is essential to maintaining the halal quality of the food product during the production process (Doğaner & Fidan, 2021a). Developing a sound halal logistics system will enable the transparent and high-quality movement of halal foods in international trade. Consumers using a product with a halal logistics certificate can be confident that the product has not undergone any process that violates Islamic rules from the seed to the plate.

The Covid-19 pandemic has led to an increase in the use of the concept of food safety. Food businesses have been implementing various measures to ensure the reliability and cleanliness of the products they offer. Many studies have been conducted in the literature to shed light on these improvements, and the scope of related standards has been expanded. Although the concept of halal food mostly refers to food that complies with Islamic rules, examining the concept and halal standards suggests that all food products

offered for human consumption should not harm human health or the environment. Attention should be paid to their cleanliness during the preparation process, and their content should consist of natural, non-genetically modified products.

States and institutions hold significant responsibilities in promoting halal logistics practices worldwide, with legal regulations being the primary measure. Protecting consumer rights can be ensured through legal sanctions that emphasize the sensitivity of the issue (Talib et al., 2015). Moreover, businesses face significant costs during the transition to halal logistics services, which hinder the transition process. Providing financial support and legal regulations can assist such businesses. The Malaysian government's effective efforts to shape the industry with halal logistics standards and practices are noteworthy (Doğaner & Fidan, 2021b). The government provides direct monetary funds, grant allocations, and tax exemptions to promote halal certified businesses in the country, encouraging more halal logistics services and potentially improving logistics performance. Bashir et al.'s study (2019) examining Korean companies' strategies for entering the international market pointed to a great need for financial support related to subsidies and tax reductions.

Considering halal processes as a whole, changes in practices taking place in ports and terminals are crucial. Northport in Malaysia is a halal port with a halal certificate specifically prepared for the storage, transportation, and logistics processes of halal products. The Port of Rotterdam in the Netherlands also has halal certification and provides halal services, and Malaysia aims to become a halal hub through these practices (Talib et al., 2016). For governments to increase halal logistics processes and make them competitive, they should attach importance to employee training and control. Sensitive tasks in the process should be performed by individuals with comprehensive knowledge and experience differentiating between halal and haram. However, there is a shortage of human resources capable of managing halal logistics processes (Pahim et al., 2012). In this sense, collaboration between doctors, chemists, microbiologists, food engineers, and theologians is essential to investigate halal logistics and better understand the harms of non-halal foods to human health. Various studies (Bhakoo & Choi, 2013; Chang & Wu, 2015; Spring et al., 2017; Gligor et al., 2018; Gualandris & Klassen, 2018) suggest that the development of human capital through education, training, and research is fundamental to advance the logistics industry.

To promote the growth of the halal logistics industry, it is crucial to provide special training to those who will work in this field. Well-trained human resources can instill trust and confidence in the industry. Rahman et al. (2018) recommend that the government or its commissioned institutions take an active role in providing halal logistics training, particularly to logistics companies. Gligor et al. (2018) also stress the need for appropriate and rigorous government-funded training to overcome the shortage of trained logistics personnel. In the UK, for example, government-sponsored training is offered in the form of financial support and incentives for supply chain organizations (Spring et al., 2017). To ensure that training reaches more logistics companies and encourages the adoption of more halal logistics services, the government's mission to promote halal logistics training should encompass the entire nation, not just large logistics clusters (Ngah et al., 2015; Talib et al., 2021). Offering more structured and halal-centered training programs through government initiatives could persuade more companies to join and potentially lead to greater adoption of halal services. This could ultimately help raise awareness among customers, increase demand, and remove one of the most significant obstacles to the growth of the halal industry.

The development of common halal standards and logos under the OIC could facilitate halal product trade. Although a standard has been developed by OIC committees, countries such as Malaysia, Indonesia, and Australia –which are actively involved in halal trade, do not accept it, hindering its improvement and access to a wider audience. The absence of a common standard and a wide-ranging accreditation system makes it difficult to audit certifying institutions, leading to concerns over low-quality service providers and tarnishing the industry's reputation.

The halal logistics sector has significant potential as the fastest growing sub-industry of the halal industry. However, apart from a few countries, many fail to take advantage of this potential in the global trade. To draw attention to the issue, various institutions and associations need to conduct more extensive studies so that the problem can be made more transparent. Governments and supreme institutions need to take action to participate in and expand the industry. Increasing awareness among consumers could also increase demand and drive the adoption of halal logistics services, prompting businesses to obtain halal certification and offer halal services in accordance with the best practices described in the Quran and Sunnah.

Conflict of Interest Statement

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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