ACCEPTANCE AND PREFERENCE OF CONSUMER'S ON HALAL FOOD SUSTAINABLE TRACEABILITY

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ABSTRACT

Purpose: *Food safety traceability issues have developed to become important due to present consumers being more concerned about the quality of edible material. This is because these consumers are more knowledgeable in regularly selecting and buying food for consumption, leading to the concerns of the ingredients and curiosity on all the activities involved within the supply chain (primary production, processing, distribution, retail to the consumer). To have the ability in tracking products and retrieving product-related information, food manufacturers should continuously obtain data and trace movements throughout all stages of the supply chain. This indicates that the methodology for analyzing foodstuffs with information technology systems is fundamental in producing an effective tracking and tracing structure. Therefore, this study aims to evaluate the perception of consumers, including the supply chain actors, on the importance of a traceability system.*

Design/Methodology/Approach: *Data were obtained from 262 Halal food consumers in Indonesia and analyzed using the PLS-SEM method. Also, some analytical techniques data were obtained using exploratory information. The novelty in this study was to determine the acceptance and preference of sustainable traceability of halal food consumers in Indonesia. This precisely determined the essential sustainability and traceability factors for these consumers.*

Findings: *The results showed a mediating role within the halal supply chain and traceability system variables, while preference was not observed with such responsibility. Besides the evaluation of direct and indirect relationships, comparisons were also conducted on the differences in gender and age groups, which were subsequently divided into several main categories.*

Practical implications: ***T****his study showed that traceability system and halal supply chain implementations were significant predictors for the Indonesian Muslim communities. However, non-Muslim countries did not concentrate much to these aspects due to different levels of understanding.*

Originality/value: *The results indicated that the halal supply chain and traceability system were significant predictors for the Indonesian people, which were primarily Islamic. This was based on the integration of these aspects at a relatively low cost, compared to other countries requiring high expenses due to the production of non-halal products. The application of the MGA-Analysis technique was further conducted in this study, indicating an interesting finding that the acceptance of male respondents was based on preference. Also, respondents aged 41-50 agreed that traceability implementation was essential for acceptance within their category. This study is expected to make a practical and academic contribution to business actors in the Halal Industry and further future reports.*

Keywords: Acceptance, Food Sustainability, Halal Supply Chain, Preference, Traceability System, Type of Consumers.

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INTRODUCTION

The Islamic people presently constitute approximately 25% of the world's population and are still expected to subsequently increase, leading to the size of the global ḥalāl market to reach $2.6 trillion (Martuscelli et al., 2020). Halal food and beverage are the edible materials permitted under Islamic law, which focuses on the following issues, ban on toxic substances and blood, slaughter methods, and animal trillion prohibitions (Mansur et al., 2022). Besides raising the awareness of halal food producers, consumers also select foods that do not conflict with religious values, beliefs, and culture (Zailani et al., 2015). Furthermore, people that prefer a healthy lifestyle are starting to switch to halal food products, which are known for clean and safe ingredients outside the Muslim community. To prevent any policy inconsistencies and unnecessary barriers to the global market, the Joint FAO/WHO Codex Alimentarius Commission has reportedly been adopting general guidelines since 1997 (scope, definition, criteria, and labeling requirements), for the use of the term *"halal"* (Abdallah et al., 2021). Therefore, halal food has the potential for a broader global market, not only for Muslim consumers (Soesilowati & Yuliana, 2013).

Indonesia is the largest Muslim country in the world, where halal food is mostly utilized for consumption. Although the need to obtain these edible materials is mandatory for most Indonesians, there is still an increasing concern regarding the integrity and safety of halal products. This growing concern towards the legitimacy of food products subsequently questions the certification conducted by local authorities, for Halal companies. However, the achievements of supply chain-level transparency are impossible without the participation of all the concerned stakeholders. Based on the food industry's origin and production process, a lack of product information is also being observed (Tan et al., 2020). Halal food production and traceability requirements are essential for raw material providers, manufacturers, and distributors, to provide Shariah-compliant products manufactured by health and safety criteria. This indicates the necessity to have a flow or framework that should be followed, to ensure that all products comply with the required standard. In halal food production, certification is widely explained and regulated, although other elements are practiced to a minimum. The implementation of a complete traceability system makes it easier for companies to apply for halal certification. This is because the food production and processing methods that follow the principles of halal principles are expected to acquire sustainability and environmental issues, such as ensuring the safety and cleanliness of a product for consumption. The three main dimensions for the improvement of traceability implementation are food security assurance, safety, and quality, as well as risk prevention. In addition, traceability provides further information on the application of halal standards, verification of consumers' claims, and delivery of tayyib products to customers (healthiness, healthy, safe, nutritious, and good quality).

According to Dali et al. (2007), the consumer perceptions of halal logos and materials were examined, compared to the demographic profile of respondents. The influence of culture on the perceived value consumers want to feel from buying and using the product. The results showed that the consumers' perceptions of halal logos and ingredients on product labels were positive. Despite Indonesia being the largest Muslim country where halal food is highly consumed, the implementation of a traceability system is still not mandatory. However, the Halal industrial revolution demands that companies should not only focus on the content of their products, as consumers also want all the activities contained in the entire supply chain, to meet the required standards (Omar & Jaafar, 2011). Although a traceability system is not a top priority for consumers in Muslim countries, producers are still required to carry out the implementation, considering the existence of the several risks involved. This indicates the need for halal risk management, which is subsequently in line with industry 4.0,

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where the increase in the digital revolution leads to the faster distribution of news. Assuming an error occurs in the production process due to the absence of a sound traceability system, producers are expected to experience a decrease in consumer confidence, which leads to product boycott activities that are presently rife.

Several countries are found to be studying alternative methods to improve their food traceability systems, using a common data platform for their Halal food supply chain. Therefore, this study aims to evaluate consumer understanding and acceptance of halal food sustainability and traceability. Also, it aims to determine essential sustainability and traceability factors for halal food consumers in Indonesia. This study is being conducted to answer several existing shortcomings, to determine consumer understanding and acceptance of halal food sustainability and traceability in Indonesia.

LITERATURE REVIEW

The consistency with safety legislation and market requirements are critical to the food products industry. This is because the supply chain assurance is well-developed in the high-input food chains delivered to consumers. However, the systems with low inputs such as organic production or conventional sources are not often guaranteed (Manning & Soon, 2013). This is because a food safety management system is essential to ensure that products are safe and healthy. Meanwhile, the concept of halal is limited to food safety and quality, as well as process control, packaging, storage, and delivery (Manning & Soon, 2013). Since the authenticity of halal food causes concern among consumers, especially Muslims, the integrity of these products should be monitored for the assurance of consumers' confidence. This indicates the improvement of food safety with a traceability system, especially a blockchain solution. According to George et al. (2019) and Liu & Li (2020), a blockchain traceability framework was created, where the applications were found to be a perfect solution to achieve quality food security. However, realistic case studies still indicated very few studies and validation applications. Based on a multidisciplinary and integrated view, a conceptual framework for food supply chain assessment and product logistics was also introduced by Manzini & Accorsi (2013). This effectively controlled food products' safety, quality, sustainability, and efficiency. In addition, a case study was subsequently conducted to apply this framework to food supply chain assessment, through an integrated approach. Furthermore, the study of Tieman et al. (2012) stated that product and market characteristics were essential halal supply-chain management variables. This indicated that a sustainable supply chain should ensure whether the product was genuinely halal or not, reducing the risk of non-halal substances contamination. These results were due to halal integrity being the foundation of the food industry. Protective and preventive measures should also be considered to ensure that halal food products remained guaranteed, although they underwent movement in the supply chain, traveled long distances, and experienced various handling activities. This showed that all parties involved in the supply chain (upstream to downstream) should bear an individual and collective responsibility, to intentionally and unintentionally protect halal food products from being cross-contaminated. Therefore, food companies should implement a traceability system, to ensure the authenticity of the halal product and understand the importance of the industrial environmental factors, towards enhancing the integrity of the supply chain.

A traceability system helps to minimize the production and distribution of unsafe/low-quality products prone to contaminants, leading to the reduction of potential recalls for harmful products (Aung & Chang, 2014). An essential aspect of building a traceability system is the realization of the capabilities across multiple synergistic structures, which are within the entire supply chain. According to Aung & Chang (2014), traceability systems were

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used as a tool to comply with laws and policies, as well as meet food safety and quality requirements. Therefore, traceability was considered an adequate safety and quality monitoring system, which had the potential to increase food chain security and consumer confidence. In this study, only one-third of the respondents had heard of a food traceability system, indicating the low level of consumers' knowledge. Although preferences for fruit and vegetable traceability systems were low, the interest of consumers in its information was still being observed. Also, it raised the need to effectively communicate with consumers on the explored requirements to be strengthened. For example, the information regarding food assurance quality was safer, healthier, or better. Besides the high social and environmental sustainability risks (and opportunities), traceability is still essential due to the fragmented production and widespread involvement of various parties in the supply chain. This study presented an integrative and systematic literature review of 89 peer-reviewed journal articles related to traceability and sustainability in garment products' global supply chain. Also, it focused on the industry-enhanced potential of the global supply chain, to explain how leverage-enabling technologies improved the Triple-Bottom-Line (TBL) performance of actors across the broad ecosystem. This study conceptually framed sustainable supply chain management, which referred to traceability as a meta-capability. In addition, it subsequently contributed to the unexplained question of achieving sustainability in the global supply chain. Based on Manzini & Accorsi (2013), a new conceptual framework for food supply chain assessment was introduced. This focused on distribution issues and was supported by developing a new integrated approach control system in the food supply chain, as outlined in the framework. However, the concepts provided by Aung & Chang (2014) and Manzini & Accorsi (2013) did not involve halal and sustainability variables. Moreover, a blockchain-based framework for supply chain cross-border e-commerce was proposed by Liu & Li (2020), which supported peer-to-peer transactions between several participants. This provided trustworthy products and transactions, as well as tweak information. Within this framework, a multi-supply chain structure was also proposed to store products, transactions, and logistics information. The study of Mohammed et al. (2017), subsequently provided a definition and framework of the halal supply chain, which originated from raw materials, logistics movement activities, warehousing, production, storage, delivery, marketing and sales, as well as Sharia customer service, where Islamic law provided guidelines for proper processes.

Food safety is a condition and effort to prevent edible materials from being contaminated by biological, chemical, and other interferences, which are harmful and lethal to human health. This indicates that safe, quality and highly nutritious food have a vital role in growth, maintenance and improvement, as well as health status and increased intelligence. Based on these conditions, halal food is then defined as all edible materials that are permitted for consumption under Islamic law. In 2007, the global consumption of halal food was responsible for 18-20% of food value in more than 148 countries. This indicated that the logic of the halal system was beyond the binding laws being observed by Muslims, which reflected the act of worshiping the Creator (Allah). Also, halal food is more than a product attribute for Muslims due to being compulsory for consumption. However, non-Muslims have the option to buy these edible materials to address their concerns about food quality (Poniman et al., 2015). Food traceability is defined as the part of logistic management, which captures, stores, and transmits sufficient information on food, feed, and productive animals/substances at all stages in the supply chain. This is mostly based on the security awareness of the products. Furthermore, a food traceability system is a record-keeping structure that obtains product attributes, such as quality and safety parameters, which are required for commercial purposes. When companies incorporate new technologies, these systems often become a source of sustainable competitive advantage, which are most difficult for competitors to imitate

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(Epelbaum & Martinez, 2014). In the Halal Assurance System (HAS), traceability is often found as an essential practice, where the production systems reduce contaminations and industrial vulnerabilities, especially in the food industry. Additionally, a transparent and credible halal supply chain depends on a tracking system and cooperation from all partners. This is because the need for certified producers with HAS is no longer an option, to ensure market competitiveness and significance (Abd Rahman et al., 2017). Halal Supply Chain Management (HSCM) is subsequently defined as the maintenance of a network, to extend integrity from the source to the consumers' purchase point. This indicates that the halal supply chain model should be adapted from the existing supply chain facilitating Islamic values (Tieman et al., 2012). Food production and consumption sustainability are found to be multidimensional, and realized by providing essential goods for overall sustenance. This shows that the supply chain is associated with environmental and socioeconomic impacts, which originates from increased consumer demand and consumption model changed, as well as the idea that cleaner modes of food production involve sustainable intake. However, no previous study had specifically explained the ideal traceability system, as well as the pattern of consumer preferences and acceptance of halal food in Indonesia. Therefore, a study needs to determine the consumer perceptions and acceptance of halal food sustainability and traceability in Indonesia. This is because most previous studies focused on the acceptance of halal products by testing the Theory of Planned Behaviour (TPB), with only a few reports being observed on food supply chain and integrity.

There are two stages in developing a model for halal food consumers, based on the identification of relationships and patterns of influential factors. The first activity aimed to determine the factors significantly influencing the perception and acceptance of traceability, using exploratory techniques and Partial Least Squares SEM. In the SEM-PLS, several theories were developed for the prediction of hypotheses. This was to ascertain whether these theories were acceptable for application. In the selection of food products, lifestyle was found to influence consumers' actions, which were different depending on their backgrounds, principles, and purchasing powers. These aspects promoted consumers to make purchasing decisions based on product halalness, food safety, quality assurance, price, and other attributes. The use of questionnaires also showed the influence of age, educational background, occupation, and income levels on the different perceptions of a product. Also, consumers with a healthy lifestyle and high purchasing power prioritized quality and value over price. In another perspective, consumers have the potential to be price-sensitive than other attributes, due to having lower purchasing power. Furthermore, the attitude was an overall evaluation of an individual concept.

Several investigations related to the relationship between consumer perceptions and purchase intentions were also carried out, based on a case study in a fast-food restaurant. The result showed that only one-third of the respondents had the awareness of food traceability systems. Also, it indicated that the consumers' understanding of this system's importance was still low. This study was subsequently reinforced, which included preferences besides fruit and vegetable traceability systems, due to the frequent changes in consumer perceptions with time and prevailing trends. Furthermore, these perceptions are found to have changed with the development of agro-industrial technology. The implementation of a traceability system along the supply chain reduced the risk of non-halal contamination, ultimately leading to a sustainable assurance structure that decreased long-term total costs. Two types of suppliers were identified, namely traceable (expensive) and untraceable (cheap) suppliers, which incurred appropriate recalls and higher costs during food safety incidents, respectively. This indicated that various consumers with traceability awareness were willing to spend more money on traceable food products. The study also attempted to increase consumer-focused traceability by increasing the willingness to pay, leading to unintended consequences, such as

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a decrease in the supply of traceable edible materials. Thus, the hypotheses for the perception and acceptance model are as follows:

H_1: *The type of consumers, trackability system, as well as halal supply chain and food sustainability are partially related to the acceptance of Sustainable Traceability*

H_{1a}: *Type of consumers is positively related to the acceptance of Halal Food Sustainable Traceability*

H_{1b}: *The implementation of a trackability system is positively related to the acceptance of Halal Food Sustainable Traceability*

H_{1c}: *The implementation of a halal supply chain is positively related to the acceptance of Food Sustainable Traceability*

H_{1d}: *Food product sustainability is positively related to the acceptance of Halal Sustainable Traceability*

H_2: *The type of consumers, trackability system, halal supply chain, and food sustainability are partially related to the preference of Sustainable Traceability*

H_{2a}: *Type of consumers is positively related to the preference of Halal Food Sustainable Traceability*

H_{2b}: *The implementation of trackability system is positively related to the preference of Halal Food Sustainable Traceability*

H_{2c}: *The implementation of the halal supply chain is positively related to the preference of Food Sustainable Traceability*

H_{2d}: *Food product sustainability is positively related to the preference of Halal Sustainable Traceability*

H_3: *Preference is positively related to the suitability of Halal Food Sustainable Traceability*

H_4: *Type of consumers is positively related to food product sustainability*

H_5: *Type of consumers is positively related to halal supply chain*

H_6: *The implementation of a traceability system is positively related to food product sustainability*

H_7: *Type of consumers is positively related to traceability system implementation*

H_8: *The implementation of traceability system is positively related to halal supply chain*

H_9: *The implementation of the halal supply chain is positively related to food product sustainability*

H_{10}: *Preference mediates the relationships between the type of consumers, trackability system, halal supply chain, food sustainability, and acceptance of Sustainable Traceability*

H_{10a}: *Preference mediates the relationships between the type of consumers and acceptance of Halal Food Sustainable Traceability*

H_{10b}: *Preference mediates the relationships between the trackability system implementation and acceptance of Halal Food Sustainable Traceability*

H_{10c}: *Preference mediates the relationships between the halal supply chain implementation and acceptance of Food Sustainable Traceability*

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H_{10d}: *Preference mediates the relationships between the food product sustainability and acceptance of Halal Sustainable Traceability*

H_{11}: *The halal supply chain mediates the relationships between the trackability system implementation and preference of Food Sustainable Traceability*

H_{12}: *The halal supply chain mediates the relationships between the trackability system implementation and acceptance of Food Sustainable Traceability*

H_{13}: *The halal supply chain mediates the relationships between the traceability system implementation and food product sustainability*

H_{14}: *The traceability system implementation mediates the relationships between the type of consumers and the halal supply chain*

H_{15}: *The trackability system implementation mediates the relationships between the type of consumers and acceptance of Halal Food Sustainable Traceability*

H_{16}: *There are significant differences between male and female customers in the relationships of Sustainable Traceability Framework*

H_{16a}: *There are significant differences between male and female customers in the relationship of consumer types on acceptance of Halal Food Sustainable Traceability*

H_{16b}: *There are significant differences between male and female customers in the relationship of preference on acceptance of Halal Food Sustainable Traceability*

H_{17}: *There are significant differences between the ages in the relationships of Sustainable Traceability Framework*

H_{17a}: *There are significant differences between the ages in the relationship of trackability system implementation on the acceptance of Halal Food Sustainable Traceability*

H_{17b}: *There are significant differences between the ages in the relationship of traceability system implementation on food product sustainability*

H_{17c}: *There are significant differences between the ages in the relationship of traceability system implementation on halal supply chain*

H_{17d}: *There are significant differences between the ages in the relationship of the halal supply chain on food product sustainability*

METHODS

Data collection was carried out on the consumers of halal food products. To identify and understand consumer perception and acceptance of Halal Food Sustainable Traceability, the following parameters were needed, (1) the type and lifestyle of the food consumers, (2) the applications of the traceability system and Supply Chain Perception, (3) the sustainability of food products (sustainability), and (4) the demographics of the respondents. Meanwhile, in developing the model of traceability for halal food consumers (Figure 1), the relationships and patterns of the influential factors were identified, using experimental techniques and Partial Least Squares SEM.

Unit Analysis

Based on this study, the unit of analysis was the consumer of Halal food in Indonesia, which had a total sample of 262 respondents. According to Hair et al. (2012), the

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determination of the sample focused on the number of paths contained in the framework. There were 15 paths in this present study, leading to the minimum sample collection of 150 respondents. Moreover, a purposive sampling technique was used in this study, where the entire population did not have a similar opportunity and ability to answer study questions. Therefore, several categories were needed in validating respondents towards becoming study samples (halal food consumers).

Item Scales

To measure the existing variables, several measuring tools were adopted from various previous studies, where the type of consumer and traceability systems were divided into 8 categories each (Soba & Aydin, 2013; Workman et al., 2019; Sresnewsky et al., 2020; Lin & Lin, 2007; Mazzoni et al., 2007; McDonald & Wilson et al., 2016; Sayogo, 2018). Also, the supply chain, food sustainability, as well as preference and acceptance of Halal edible materials were measured by 15, 8, and 8 items, respectively (Magnier et al., 2016; Ueasangkomsate & Santiteerakul, 2016; Mohayidin & Kamarulzaman, 2014; Alqudsi, 2014).

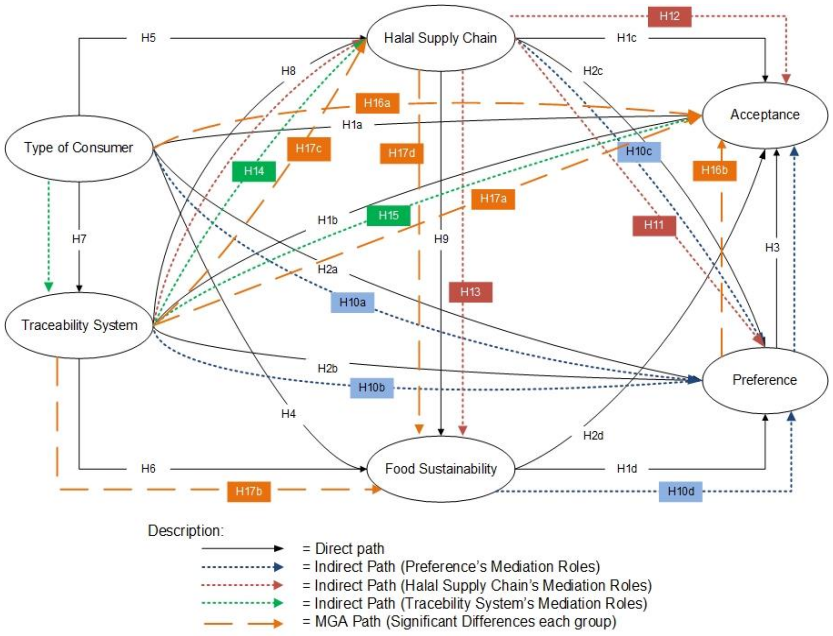

FIGURE 1
HALAL SUSTAINABLE TRACEABILITY FRAMEWORK

RESULTS

Descriptive Analysis

Figure 2 showed that the consumer characteristics of 262 respondents were 48.1%, 22.1%, 19.1%, 3.8%, 3.1%, and 1.1% (each) for Value-driven (CC5), Need-based (CC8), Quality-driven (CC6), Price-driven (CC1), Habitual (CC7), as well as Trendsetter (CC2) and Follower (CC3) customers, respectively. Based on the descriptive analysis (Table 1), the characteristics of respondents to each indicator of the traceability system implementation had mean values of 4.519 (TS1), 4.347 (TS2), 4.427 (TS3), 4.576 (TS4), 4.664 (TS5), 4.615 (TS6), 4.504 (TS7), and 4.542 (TS8). This showed that the average respondent in this study answered *"Agree"*, indicating that the implementation of a traceability system (TS) was important.

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Table 1
CHARACTERISTICS OF QUESTIONNAIRE BASED ON VARIABLE HALAL FOOD PRODUCT IMPLEMENT A TRACEABILITY SYSTEM (TS)

The Measurement Items	Mean	Standard Deviation
Additional information on the halal production process (TS 1)	4.519	0.74
Ensuring halal products and processes through the website are useful (TS 2)	4.347	0.855
Link to a company website, describing that the company's halal practice and process is very important (TS 3)	4.427	0.815
Link to a government website, verifying that a product truly complies to halal principle is very important (TS 4)	4.576	0.726
Traceable food provide rich and detailed information (TS 5)	4.664	0.594
Traceable food provide true and accurate information (TS 6)	4.615	0.599
Traceable food provide balanced information (TS 7)	4.504	0.664
The traceability system help me carefully evaluate the products (TS 8)	4.542	0.651

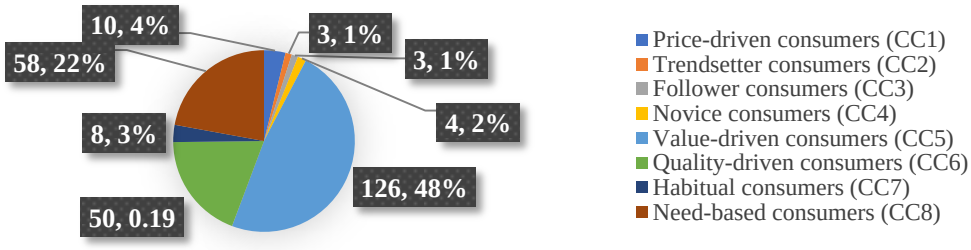

FIGURE 2
CHARACTERISTICS OF CONSUMERS

Table 2
CHARACTERISTICS OF QUESTIONNAIRE BASED ON VARIABLE IMPLEMENT A HALAL SUPPLY CHAIN PERCEPTION (HC)

The Measurement Items	Mean	Standard Deviation
I only buy product that is certified halal (H_{C1})	4.405	0.931
I select halal even at a high price (H_{C2})	4.412	0.903
Halal is more important than price and brand (H_{C3})	4.469	0.881
I am very confident with halal certification from LPPOM MUI (H_{C4})	4.492	0.74
Popular brand describes the quality of products (H_{C5})	3.641	1.004
Brand name using the Arabic letter describes product halalness (H_{C6})	2.74	1.153
All halal logos are trustworthy (H_{C7})	3.573	1.081
I do not really care about product halalness (H_{C8})	1.756	1.173
The production, processing, and distribution of Halal meat products involve different companies at various stages, with service companies providing transport and packaging (H_{C9})	4.485	0.818
Food should not contain anything in its preparation, processing, transportation, or storage, using means or facilities that is unlawful according to Islamic law (H_{C10})	4.58	0.761
Halal food rules should apply to the food production, storage, transportation, distribution, preparation, and final consumption (H_{C11})	4.622	0.698
Halal and non-Halal meat products should be separately stored throughout the Supply chain, to avoid the risk of Halal product contaminations (H_{C12})	4.756	0.666
Hygiene and sanitation standards should be adhered to during the processing of Halal food (H_{C13})	4.859	0.409
Halal meat products sold at the supermarket and butcher have undergone the true food requirement of production, handling, and distribution (H_{C14})	4.302	0.885
Halal meat products are separately transported from the other non-halal goods throughout the Supply chains and logistics (H_{C15})	4.645	0.752

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Meanwhile, the responses in each indicator of the Halal Supply Chain Perception Implementation (Table 2) had mean values of 4.405(H_{C1}), 4.412 (H_{C2}), 4.469 (H_{C3}), 4.492 (H_{C4}), 3.641(H_{C5}), 2.74 (H_{C6}), 3,573 (H_{C7}), 4,485 (H_{C9}), 4.58 (H_{C10}), 4,622 (H_{C11}), 4,756 (HC_{12}), 4,859 (H_{C13}), 4,302 (H_{C14}), 4,645 (H_{C15}) and 1.75 (inverse question; H_{C8}). This showed that the average respondent in this study answered "Agree", indicating that the implementation of a Halal Supply Chain Perception (HC) was important. The results showed that consumers did not previously consider the importance of halal labels, which later became a concern and an essential factor in purchasing decisions. This required competition among companies, to provide halal labels to their products and increase the higher-stretching business. Furthermore, this condition was experienced by the middle-class Muslim market in Indonesia, which underwent a revolution due to a fundamental shift in the behavior of halal products. To ensure halal integrity, the implementation of the traceability system was needed, for consumers to guarantee confidence in the authenticity of the product.

Profile of Respondents

Table 3 shows the frequency of the sample, based on the demographic characteristics of the respondents, which mostly contained women (58.8%) than men (41.2%). Also, 85.5% of the respondents were married, while those that were single and divorced were 10.3 and 4.2%, respectively. Based on age, most respondents were between 31-40 years old (51.9%), with an educational background of 51.9%, 42.4%, and 5.7% for Bachelor's, Master's, and Under-Bachelor's degrees, respectively. The results also showed that almost 56% of respondents had a relatively high educational background, which were Bachelors and Masters.

Table 3
SAMPLE DISTRIBUTIONS (n=262)

Variable	Category	Frequency	Percentage
Gender	Male	108	41.2%
	Female	154	58.8%
Ages	<20	1	0.3%
	21-30	37	14.1%
	31-40	119	45.4%
	41-50	46	17.5%
	51-60	57	21.7%
	>60	2	0.7%
Marital Status	Single	27	10.3%
	Married	224	85.5%
	Divorced/Widowed	11	4.2%
Monthly Income (IDR)	< Rp1,500,000	10	3.8%
	Rp1,500,001–Rp3,000,000	42	16.0%
	Rp3,000,001–Rp7,000,000	111	42.4%
	Rp7,000,001–Rp10,000,000	37	14.1%
	Rp10,000,001–Rp20,000,000	38	14.5%
	>Rp20,000,000	24	9.2%
Education Degree	Master’s degree	111	42.4%
	Bachelor’s degree	136	51.9%
	Under Bachelor’s degree	15	5.7%

In identifying the types of consumers in Indonesia, this study adopted several categories from previous reports, where they were divided into eight categories, namely: price-driven, trendsetter, follower, novice, value-driven, quality-driven, habitual, and need-based customers (Soba & Aydin, 2013; Workman et al., 2019; Sresnewsky et al., 2020; Lin &

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Lin, 2007; Mazzoni et al., 2007; Law, 2016; McDonald & Wilson et al., 2016). According to the number of family members, 60.68% have more than four households. This was supported by the employment data, with most of the respondents being civil servants and private-sector workers (86.4% entrepreneurs and 11.1% homemakers), indicating that the purchase of halal food was for household consumption. Furthermore, most shopping habits were carried out in traditional markets (55.3%) and modern retail (42.4%). This was based on their respective locations, which were mostly in residential (54.2%) and suburban (25.2%) areas, where access to traditional and modern retail markets was highly distributed. Among the eight types of consumers identified in this study, the majority (48.1% and 19.1%) considered the benefits and costs incurred, as well as the quality of the halal food products. Meanwhile, others were concerned with low prices and selected moderate products as a trend. This indicated that the quality of the product and the benefits obtained by consumers were important in purchasing halal edible materials in Indonesia. Although a fairly open market with the highest population of Muslims had 87.2% of 229.6 million people (Global Religious Futures, 2020), the global halal retail location continued to grow where Indonesia has a great opportunity to participate in the competition regarding halal food business.

Measurement Model Assessment

The evaluation of the measurement model was carried out to assess the validity and reliability of the design. In the PLS-SEM method, this model was an outer design containing a set of relationships between indicators and latent variables (Hair et al., 2014). According to Hair et al. (2014), the value of the loading factor should be more than 0.70 to assess the validity of the convergent. Based on the analysis, 17 indicators from a total of 47 measuring items were below 0.70. However, the remaining 30 items were maintained to measure each of the intended variables. This was because this study used a reflective measurement model, where the indicators were a set of representative items reflecting the tested latent variables. In addition, the elimination of indicators was not much of a problem, due to other factors being subsequently represented. Therefore, latent variables still had similar interpretations after the elimination of indicators (Garson, 2016). Furthermore, the analysis continued by observing the average variance extracted (AVE) value, to test convergent validity with a cut-off above 0.50. This analysis produced several values above 0.05, with 0.640, 0.642, 0.633, 0.838, 0.631, and 1.000 observed for acceptance, food sustainability, halal supply chain, preference, traceability system, and type of consumers, respectively. Therefore, all variables were valid, with the ratio implying that the latent factors were responsible for more than 50% of the reflective indicator variance. However, the AVE was only relevant for reflective measurement models. When examining the reflective indicators, higher loadings at a narrow range was very desirable, indicating that all items explained the underlying latent construct (Chin, 2010). Since there was no problem with convergent validity, the analysis of discriminant validity was subsequently conducted for each construct.

Wong & Wong (2019) stated that two testing steps were used to measure discriminant validity, namely the Fornell Larcker criterion and the heterotrait-monotrait ratio of correlations (HTMT). However, Henseler et al. (2015) suggested that prioritizing the HMTInference test was better than the Fornell Lacker criterion. This was because of the criterion failure to identify discriminant validity, especially for significant cases. For this reason, the HMTinference was often adopted as the test to identify discriminant validity. Based on this analysis, a bootstrapping procedure with a re-sample of 5000 was initially executed to obtain the confidence interval (CI) value, which was found to be less than 1.00 (Table 4). This indicated that there was no problem with the discriminant validity (Henseler et al., 2015). Another analytical method was the cross-loading value, where each correlation

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should be >0.70. This showed that an indicator was declared valid when having the highest loading factor for the intended construct than others (Table 5). Therefore, the latent construct predicted better indicators in their block than other categories. Meanwhile, the reliability analysis was carried out using a CR (composite reliability) test, rho_a, and Cronbach's alpha. This was conducted by observing all latent variable values with a CR value of 0.7, as well as Cronbach's alpha and rho_a of 0.6. In this study, the results met the test requirements, which stated that the construct had good reliability or the questionnaire was reliably consistent. In addition, Cronbach's alpha and the CR were the lower and upper limits of internal consistency reliability, respectively (Hair et al., 2019) (Table 6).

Table 4
CONFIDENCE INTERVAL ($HTMT_{Inference}$)

	Original Sample (O)	Sample Mean (M)	2.5%	97.5%
Food Sustainability -> Acceptance	0.039	0.038	-0.075	0.155
Food Sustainability -> Preference	-0.088	-0.089	-0.209	0.038
Halal Supply Chain -> Acceptance	0.591	0.593	0.405	0.772
Halal Supply Chain -> Food Sustainability	0.416	0.414	0.241	0.564
Halal Supply Chain -> Preference	0.831	0.822	0.650	0.959
Preference -> Acceptance	-0.044	-0.045	-0.175	0.098
Traceability System -> Acceptance	0.178	0.178	0.051	0.305
Traceability System -> Food Sustainability	0.344	0.351	0.203	0.512
Traceability System -> Halal Supply Chain	0.668	0.671	0.571	0.763
Traceability System -> Preference	0.058	0.060	-0.126	0.263
Type of Consumer -> Acceptance	-0.002	-0.004	-0.107	0.096
Type of Consumer -> Food Sustainability	-0.091	-0.090	-0.190	0.007
Type of Consumer -> Halal Supply Chain	0.056	0.056	-0.037	0.149
Type of Consumer -> Preference	-0.016	-0.014	-0.099	0.076
Type of Consumer -> Traceability System	0.164	0.165	0.052	0.276
Traceability System -> Food Sustainability -> Preference -> Acceptance	0.001	0.001	-0.004	0.008
Type of Consumer -> Traceability System -> Food Sustainability -> Preference -> Acceptance	0.000	0.000	-0.001	0.001
Type of Consumer -> Halal Supply Chain -> Food Sustainability	0.023	0.023	-0.016	0.066
Traceability System -> Halal Supply Chain -> Acceptance	0.395	0.398	0.268	0.538
Type of Consumer -> Traceability System -> Halal Supply Chain -> Preference -> Acceptance	-0.004	-0.004	-0.017	0.011
Traceability System -> Food Sustainability -> Preference	-0.030	-0.032	-0.087	0.014
Type of Consumer -> Food Sustainability -> Preference	0.008	0.008	-0.003	0.028
Type of Consumer -> Traceability System -> Food Sustainability -> Acceptance	0.002	0.002	-0.005	0.010
Halal Supply Chain -> Preference -> Acceptance	-0.036	-0.036	-0.146	0.084
Type of Consumer -> Halal Supply Chain -> Food Sustainability -> Preference	-0.002	-0.002	-0.008	0.002
Type of Consumer -> Traceability System -> Halal Supply Chain -> Preference	0.091	0.091	0.028	0.158
Type of Consumer -> Halal Supply Chain -> Preference -> Acceptance	-0.002	-0.002	-0.013	0.005
Traceability System -> Halal Supply Chain -> Food Sustainability -> Preference -> Acceptance	0.001	0.001	-0.003	0.006
Traceability System -> Food Sustainability -> Acceptance	0.014	0.013	-0.027	0.059
Type of Consumer -> Traceability System -> Halal Supply Chain -> Acceptance	0.065	0.065	0.021	0.118
Traceability System -> Halal Supply Chain -> Preference -> Acceptance	-0.024	-0.024	-0.100	0.057
Type of Consumer -> Halal Supply Chain -> Preference	0.046	0.045	-0.032	0.119

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Table 4
CONFIDENCE INTERVAL ($HTMT_{Inference}$)

	Original Sample (O)	Sample Mean (M)	2.5%	97.5%
Food Sustainability -> Preference -> Acceptance	0.004	0.004	-0.011	0.021
Traceability System -> Halal Supply Chain -> Food Sustainability -> Acceptance	0.011	0.011	-0.021	0.045
Halal Supply Chain -> Food Sustainability -> Preference	-0.036	-0.036	-0.089	0.016
Type of Consumer -> Traceability System -> Halal Supply Chain -> Food Sustainability -> Preference -> Acceptance	0.000	0.000	-0.001	0.001
Type of Consumer -> Traceability System -> Halal Supply Chain -> Food Sustainability -> Acceptance	0.002	0.002	-0.004	0.008
Type of Consumer -> Traceability System -> Preference	0.010	0.010	-0.022	0.049
Type of Consumer -> Traceability System -> Preference -> Acceptance	0.000	0.000	-0.004	0.002
Type of Consumer -> Traceability System -> Food Sustainability	0.057	0.057	0.017	0.109
Halal Supply Chain -> Food Sustainability -> Preference -> Acceptance	0.002	0.001	-0.005	0.009
Traceability System -> Halal Supply Chain -> Preference	0.555	0.552	0.410	0.693
Type of Consumer -> Preference -> Acceptance	0.001	0.001	-0.005	0.012
Traceability System -> Preference -> Acceptance	-0.003	-0.003	-0.025	0.013
Type of Consumer -> Halal Supply Chain -> Food Sustainability -> Acceptance	0.001	0.001	-0.003	0.005
Type of Consumer -> Traceability System -> Food Sustainability -> Preference	-0.005	-0.005	-0.017	0.002
Type of Consumer -> Food Sustainability -> Acceptance	-0.004	-0.003	-0.015	0.009
Type of Consumer -> Traceability System -> Halal Supply Chain	0.110	0.110	0.036	0.187
Type of Consumer -> Halal Supply Chain -> Food Sustainability -> Preference -> Acceptance	0.000	0.000	0.000	0.001
Type of Consumer -> Food Sustainability -> Preference -> Acceptance	0.000	0.000	-0.003	0.001
Type of Consumer -> Halal Supply Chain -> Acceptance	0.033	0.034	-0.020	0.099
Halal Supply Chain -> Food Sustainability -> Acceptance	0.016	0.016	-0.032	0.068
Type of Consumer -> Traceability System -> Acceptance	0.029	0.029	0.005	0.062
Type of Consumer -> Traceability System -> Halal Supply Chain -> Food Sustainability	0.046	0.046	0.012	0.088
Traceability System -> Halal Supply Chain -> Food Sustainability	0.278	0.277	0.167	0.386
Traceability System -> Halal Supply Chain -> Food Sustainability -> Preference	-0.024	-0.025	-0.062	0.011
Type of Consumer -> Traceability System -> Halal Supply Chain -> Food Sustainability -> Preference	-0.004	-0.004	-0.013	0.001

Structural Model Assessment

After meeting the outer model criteria, the structural design (inner model) analysis was subsequently carried out. According to Hair et al. (2021), the evaluation of the structural model (inner model) predicted the relationship between the latent variables. In Hair et al. (2012) also suggested that the value of inner VIF, predictive relevance (Q2), and model fit should be adopted, to assess the structural model (inner model). Also, the assumption of multicollinearity was used to observe no perfect or significant correlation between the independent variables. This was because the correlation value between the observed variables

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(VIF) did not exceed 5.00 (Hair et al., 2014). Moreover, the method used to test multicollinearity was observed from the correlation matrix of the variables generated by the VIF value. The results showed that the value of the inner VIF for all variable constructs was below 5.00, indicating that all the independent factors had a VIF value<5.00. Therefore, no multicollinearity was observed between the independent variables.

Table 5
CROSS LOADINGS

	Acceptance	Food Sustainability	Halal Supply Chain	Preference	Traceability System	Type of Consumer
AC4	0.848	0.484	0.732	0.591	0.515	0.143
AC5	0.784	0.547	0.526	0.343	0.487	0.121
AC6	0.711	0.488	0.383	0.176	0.415	0.105
AC7	0.813	0.310	0.515	0.471	0.478	0.046
AC8	0.811	0.303	0.513	0.448	0.434	0.039
AC9	0.825	0.283	0.615	0.545	0.433	0.111
CC	0.121	0.034	0.166	0.128	0.164	1.000
FS1	0.351	0.764	0.484	0.360	0.460	0.003
FS3	0.352	0.823	0.441	0.363	0.442	0.050
FS4	0.478	0.854	0.566	0.429	0.564	0.054
FS6	0.411	0.760	0.526	0.361	0.478	-0.001
HC1	0.551	0.468	0.816	0.713	0.544	0.218
HC10	0.547	0.559	0.820	0.587	0.552	0.143
HC11	0.532	0.583	0.805	0.589	0.541	0.032
HC12	0.538	0.502	0.798	0.644	0.492	0.008
HC15	0.437	0.440	0.705	0.588	0.373	0.105
HC2	0.653	0.468	0.822	0.732	0.604	0.179
HC3	0.646	0.501	0.851	0.764	0.589	0.183
HC9	0.527	0.525	0.739	0.528	0.588	0.168
PC1	0.488	0.399	0.721	0.924	0.503	0.119
PC2	0.464	0.414	0.709	0.919	0.482	0.051
PC6	0.565	0.483	0.793	0.903	0.560	0.174
TS1	0.495	0.482	0.603	0.561	0.772	0.141
TS2	0.479	0.472	0.593	0.527	0.813	0.180
TS3	0.520	0.506	0.617	0.544	0.869	0.217
TS4	0.477	0.534	0.663	0.558	0.836	0.090
TS5	0.442	0.516	0.468	0.364	0.812	0.123
TS6	0.384	0.452	0.452	0.335	0.730	0.062
TS7	0.369	0.444	0.358	0.249	0.719	0.046
TS8	0.470	0.475	0.456	0.333	0.791	0.145

Table 6
COLLINIERITY

	Acceptance	Food Sustainability	Halal Supply Chain	Preference	Traceability System	Type of Consumer
Acceptance						
Food Sustainability	1.914			1.891		
Halal Supply Chain	4.241	1.858		2.185		
Preference	2.978					
Traceability System	2.092	1.857	1.028	2.082		
Type of Consumer	1.05	1.033	1.028	1.049	1	

The next test was carried out by running a blindfolding procedure, to determine the

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value of Q-Squared. This statistic was obtained through the reuse sample technique known as *"Blindfolding"*, where the distance of removal was set between 5 and 10. The number of observations subsequently divided by the distance of removal was found not to be an integer (Hair et al., 2012). For example, when an omission distance of 7 was selected, every seventh data point was omitted, indicating that the parameter was estimated with the remaining values. According to Hair et al. (2014), the omitted data points were replaced with average values. This was because the estimated parameters predicted the omitted data points, as the difference between the actual and expected values became the input for the Q^2 calculation. The blindfolding technique was only applied to endogenous constructions with reflective indicators, indicating the predictive relevance of the pathway model when Q^2 became more significant than zero. Based on the calculation of predictive relevance (Q^2), which showed a value greater than zero (Table 7), the model was observed to have a relevant value. According to Avkiran & Ringle (2018), the development of a goodness-of-fit index for PLS-SEM was not entirely successful. Moreover, Henseler & Sarstedt (2013) showed that the goodness-of-fit (Tenenhaus et al., 2004; Esposito Vinzi et al., 2008) indices were not suitable for model validation. The PLSc (consistent PLS) ensured the possibility to correct the PLS bias and subsequently mimic the results, based on the CB-SEM factor model (Bentler & Huang, 2014; Dijkstra & Schermelleh-Engel, 2014; Dijkstra & Henseler, 2015). In this case, the fit measures should be adopted, such as standard root mean square residual (SRMR) and normed fit index (NFI) (Henseler et al., 2014; Andriani & Putra, 2019). This was because the evaluation of the model fitting in this study was carried out using two test designs, i.e., the standardized root mean square residual (SRMR) of 0.082 and the normed-fit index (NFI) of 0.706 (70%). The model was considered to have a good fit when the SRMR was below 0.10 (Hair et al., 2014).

Table 7
PREDICTIVE RELEVANCE

	SSO	SSE	Q^2 (=1-SSE/SSO)
Acceptance	1572.000	1086.954	0.309
Food Sustainability	1048.000	743.787	0.290
Halal Supply Chain	2096.000	1514.631	0.277
Preference	786.000	369.436	0.530
Traceability System	2096.000	2065.113	0.015
Type of Consumer	262.000	262.000	

Hypothesis Testing

Data analysis was carried out from the stage of conceptualization to testing the study hypothesis, which was used to develop answers to the problem formulation. Based on Table 8, consumer types, food sustainability, and preference were found to have no effect, due to the *p-value* being above the 0.05 threshold. However, the traceability system and halal supply chain were influential with *p-values* of 0.006 and 0.000 (<0.05), as well as path coefficient values of 0.178 and 0.591, respectively. This indicated that they had a positive relationship direction. Therefore, the acceptance of Indonesian consumers increased when they know that the production process has an excellent traceability system and a strict halal supply chain. Meanwhile, these acceptances were not based on the type of consumer, food sustainability, and preference. These were in line with Omar & Jaafar (2011), which found that consumers' methods of selecting halal products were based on the food ingredients and the halalness of all activities along the supply chain. The results also showed that the halal supply chain was the only predictor capable of influencing preference, at a *p-value* and path coefficient of 0.000 (<0.05) and 0.831, respectively, indicating a positive relationship direction. This indicated that consumer preferences for halal food sustainable traceability only increased

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when they know that the production process has an excellent supply chain. Also, the implementation of the supply chain was found to affect the preferences for receiving halal products. This indicated that the supply chain model should be adapted from the existing design, which closely facilitated Islamic values and ensured halal integrity between concerned stakeholders. Several essential factors supporting the halal performance, such as traceability, specificity, quality assurance system, as well as trust and commitment, enhanced the halal integrity of the food supply chain (H_{1a}; H_{1d}; H_{2a}; H_{2b}; H_{2d}; H_3; H_{1b}; H_{1c}; H_{2c}) (Figure 3).

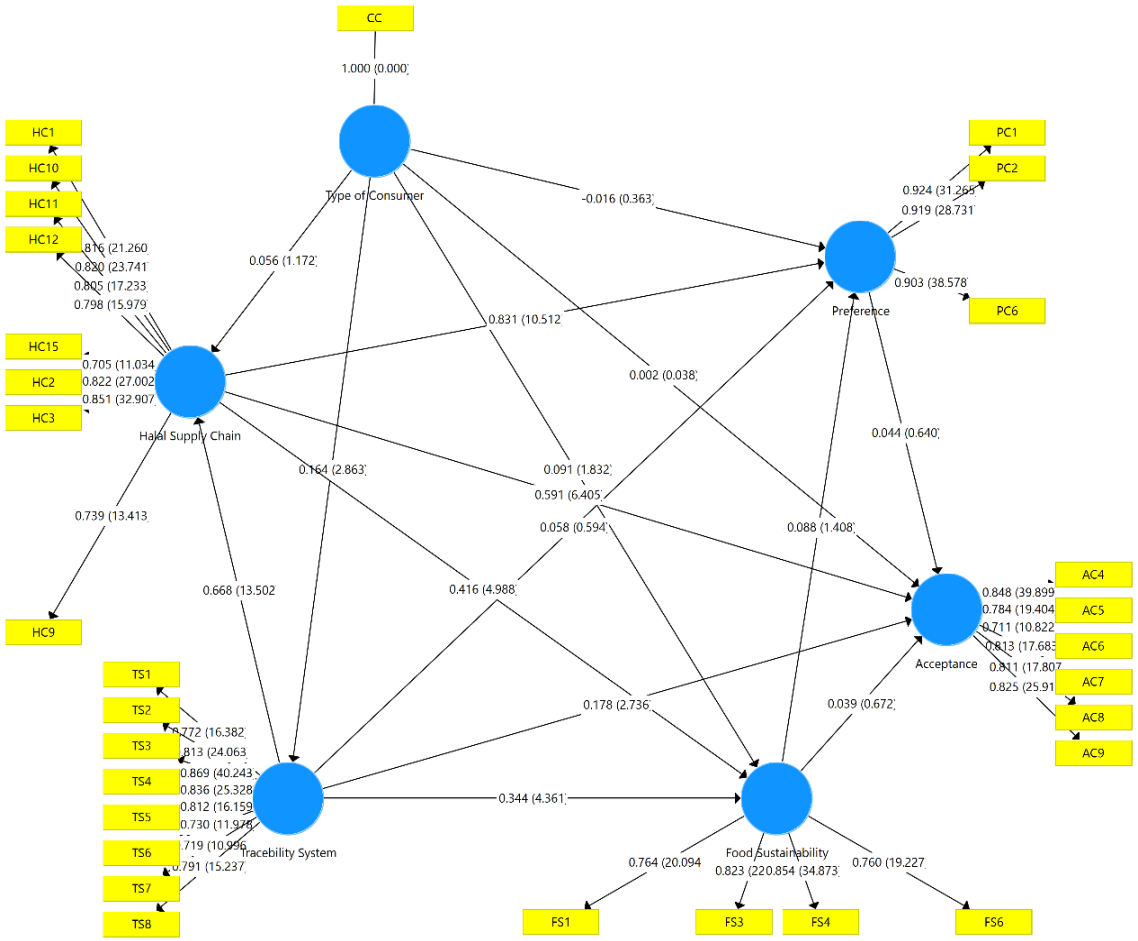

FIGURE 3
HYPOTHESIS TESTING

This study also confirmed the hypotheses of H_6, H_7, H_8, and H_9, due to the *p-values* and path coefficients being 0.000, 0.004, 0.000, and 0.000 (<0.05), as well as 0.344, 0.164, 0.668, and 0.416, which indicated a positive direction of the relationship. Therefore, the traceability system had a positive effect on food product sustainability, where the better systematic implementation stimulated the sustenance of improved and long-lasting edible materials. Furthermore, an effective traceability system of industry required a developed halal supply chain as an essential aspect, to survive and thrive in the global food market. This was because global businesses and markets often changed to become highly efficient, as competition frequently shifts from trading to value chains. From a marketing perspective, traceability indicates the assurance of consistent delivery of products to customers with guaranteed security. In the next relationship, the type of consumers had a positive effect on the traceability system implementation, which improved when adjusted to the existing

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conditions. This indicated that the type of consumer with the knowledge of buying quality products often demanded an increase in the guarantee of the purchased goods. Also, the behaviour of the middle-class Indonesian Muslim community was increasingly changing, based on becoming more religious as their welfare increased. The middle-class Muslim consumers in Indonesia were divided into four groups due to their emotional and spiritual values, namely apathetic, rationalist, conformist, and universalist. This was a factor being considered by the halal industry players, as the understanding of Indonesian Muslim consumers was significant to building a marketing strategy.

Table 8
HYPOTHESIS TESTING

Hypothesis		Original Sample (O)	T Statistics (|O/STDEV|)	*P Values*	f Square	R Square
H_{1a}	Type of Consumer -> Acceptance	-0.002	0.038	0.970	0.000	0.503
H_{1b}	Traceability System -> Acceptance	0.178	2.736	0.006	0.031	
H_{1c}	Halal Supply Chain -> Acceptance	0.591	6.405	0.000	0.169	
H_{1d}	Food Sustainability -> Acceptance	0.039	0.672	0.501	0.002	
H_{2a}	Type of Consumer -> Preference	-0.016	0.363	0.716	0.001	0.659
H_{2b}	Traceability System -> Preference	0.058	0.594	0.552	0.005	
H_{2c}	Halal Supply Chain -> Preference	0.831	10.512	0.000	0.941	
H_{2d}	Food Sustainability -> Preference	-0.088	1.408	0.159	0.012	
H_3	Preference -> Acceptance	-0.044	0.640	0.523	0.001	
H_4	Type of Consumer -> Food Sustainability	-0.091	1.832	0.067	0.015	
H_5	Type of Consumer -> Halal Supply Chain	0.056	1.172	0.241	0.006	
H_6	Traceability System -> Food Sustainability	0.344	4.361	0.000	0.121	
H_7	Type of Consumer -> Traceability System	0.164	2.863	0.004	0.028	
H_8	Traceability System -> Halal Supply Chain	0.668	13.502	0.000	0.807	
H_9	Halal Supply Chain -> Food Sustainability	0.416	4.988	0.000	0.176	
H_{10a}	Type of Consumer -> Preference -> Acceptance	0.001	0.175	0.861		
H_{10b}	Traceability System -> Preference -> Acceptance	-0.003	0.283	0.777		
H_{10c}	Halal Supply Chain -> Preference -> Acceptance	-0.036	0.636	0.525		
H_{10d}	Food Sustainability -> Preference -> Acceptance	0.004	0.495	0.621		
H_{11}	Traceability System -> Halal Supply Chain -> Preference	0.555	7.820	0.000		
H_{12}	Traceability System -> Halal Supply Chain -> Acceptance	0.395	5.689	0.000		
H_{13}	Traceability System -> Halal Supply Chain -> Food Sustainability	0.278	4.853	0.000		
H_{14}	Type of Consumer -> Traceability System -> Halal Supply Chain	0.110	2.836	0.005		
H_{15}	Type of Consumer -> Traceability System -> Acceptance	0.029	1.978	0.048		

Understanding food consumption trends were significant for consideration in government policies and strategic industry development. This was because the implementation of the traceability system had a positive effect on the halal supply chain,

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which subsequently had a significant influence on food product sustainability. The better the implementation of the traceability system, the higher the improvement of the halal supply chain, which sustainably maintains the sustainability of food products. In the food trade, the demands of the globalization era promoted the integrity of the product chain, including security issues and information on the origin of raw materials to quality problems. Consumers also demanded verifiable evidence of traceability, as an essential criterion of food safety quality and assurance. To overcome this requirement, there was a need for a traceability system with the ability to provide information on the origin, processing, retail, and final destination of foodstuffs (Aung & Chang, 2014). The results also showed no effect on H_4 and H_5, due to having a *p-value* above 0.05. In the indirect relationship, the preference variable was not able to mediate the association (no mediation effects) between the four predictors (Type of Consumer, Traceability System, Halal Supply Chain, and Food Sustainability) and the acceptance of Halal Food Sustainable Traceability. This indicated that preference did not act as a mediating variable between the existing relationships (H_{10a}, H_{10b}, H_{10c}, & H_{10d}). The existence of a preference did not also boost the existing predictors to affect the acceptance of Halal Food Sustainable Traceability, as it only worsened the existing conditions due to everyone having their own bias. Preferences from close people also often provided consumers with a sense of security, when carrying out purchasing decisions, especially the selection of food products. Besides that, information and communication technology played an essential role in facilitating food safety policies, by encouraging positive changes in consumers' behaviors.

Besides preference, two variables also acted as mediators in this study, namely the halal supply chain and the traceability system. The supply chain was found to fully mediate (H_{11}) the relationship between the traceability system and preference. This was in line with the discovery of a direct relationship (H_{2b}) that indicated no effect when not through the halal supply chain. This variable was then found to partially mediate (H_{12}) the relationship between the traceability system and acceptance, indicating the determination of an influential direct association (H_{1b}). Also, the role of the halal supply chain partially mediated (H_{13}) the relationship between the traceability system and food sustainability, through the discovery of an effective direct association (H_6). This indicated that the presence or absence of a halal supply chain influenced the acceptance and the relationship between traceability system and food sustainability. Meanwhile, the role of the traceability system fully mediated (H_{14}; H_{15}) the relationship between the type of consumer to the supply chain and acceptance. This is in line with the discovery of an insignificant direct relationship (H_5; H_{1a}). Therefore, food production and processes supporting halal principles met sustainability and environmental issues, including the assurance of a product's safety and cleanliness for consumption. The three main dimensions for the improvement of traceability implementation were food safety assurance, security and quality, as well as risk prevention. In addition, traceability provided further information on the application of several halal standards have been applied, allowed the verification of consumers' claims, and ensured the delivery of tayyib products to customers (healthy, safe, nutritious, and good quality).

Multi-Group Analysis (MGA) Assessment

Multi-Group Analysis (MGA) was used to test predefined data groups, to determine the existence of significant differences across group-specific parameter estimates, including outer weights and loadings as well as path coefficients (Hair et al., 2021). When the groups are known, MGA also tested for the variations between the different classes in two identical models. The ability to identify the presence/absence of multigroup differences was anchored in the PLSPM technique (Hair et al., 2021).

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Table 9 MGA ANALYSIS GENDER		
Hypothesis		***p-Value*-diff (Male vs Female)**
H_{16a}	Type of Consumer -> Acceptance	0.031
H_{16b}	Preference -> Acceptance	0.032

Based on Table 9, there were differences between the male and female groups, regarding the relationship between the type of consumer and preference for acceptance. This was because the *p-value* difference was 0.031 and 0.032 (<0.05), indicating that H_{16a} and H_{16b} were confirmed. In Table 10, the acceptance of male respondents was not based on the type of consumer. However, this variable was very important for female respondents, to receive halal food sustainable traceability. Another interesting thing found in this study was the acceptance from male respondents, regarding the preference, which was found to be opposite in female participants.

Table 10 BOOTSRAPPING RESULTS OF GENDER		
Path	***p-Value* (Male)**	***p-Value* (Female)**
Type of Consumer -> Acceptance	0.178	0.046
Preference -> Acceptance	0.017	0.555

Based on Table 11, there were differences between the groups of respondents above 50 years and 41-50, regarding the relationship between the traceability system and acceptance. This was because the *p-value* difference was 0.032, indicating that H_{17a} was accepted in the comparison of these groups (>50 and 41-50 years) and rejected in other classes. In addition, the comparisons of age group above 50 and 31-40 years found differences in the relationship between the traceability system and food sustainability. This was because the *p-value* difference was 0.043, indicating that H_{17b} was accepted in the comparison of these groups (>50 and 31-40 years), and rejected in other analysis.

Table 11 MGA ANALYSIS AGES							
Hypothesis		***p-Value* new (Diatas 50 Tahun vs Usia 21 - 30 Tahun)**	***p-Value* new (Diatas 50 Tahun vs Usia 31 - 40Tahun)**	***p-Value* new (Diatas 50 Tahun vs Usia 41 - 50 Tahun)**	***p-Value* new (Dibawah 30 Tahun vs Usia 31 - 40Tahun)**	***p-Value* new (Dibawah 30 Tahun vs Usia 41 - 50 Tahun)**	***p-Value* new (Usia 31 - 40Tahun vs Usia 41 - 50 Tahun)**
H_{17a}	Traceability System -> Acceptance	0.511	0.738	0.032	0.654	0.432	0.074
H_{17b}	Traceability System -> Food Sustainability	0.084	0.043	0.268	0.792	0.340	0.306
H_{17c}	Traceability System -> Halal Supply Chain	0.241	0.194	0.857	0.003	0.422	0.198
H_{17d}	Halal Supply Chain -> Food Sustainability	0.117	0.047	0.551	0.968	0.254	0.148

Based on Table 12, the age groups below 30 and 31-40 years found significant differences in the relationship between traceability system and halal supply chain. This was because the *p-value* difference was 0.003, indicating that hypothesis H_{17c} was confirmed in the comparison of these age groups (<30 and 31-40 years). Furthermore, the age groups

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above 50 and 31-40 years found differences in the relationship between halal supply chain and food sustainability. This was because the *p-value* difference was 0.047, indicating that H_{17d} was confirmed in comparison of these age groups (>50 and 31-40 years).

Table 12
BOOTSRAPPING RESULTS OF AGES

Hubungan	*p-Value* (Diatas 50 Tahun)	*p-Value* (Dibawah 30 Tahun)	*p-Value* (Usia 21 - 30 Tahun)	*p-Value* (Usia 31 - 40Tahun)	*p-Value* (Usia 41 - 50 Tahun)
Traceability System -> Acceptance	0.795	0.434	0.434	0.363	0.003
Traceability System -> Food Sustainability	0.735	0.006	0.006	0	0.047
Traceability System -> Halal Supply Chain	0	0	0	0	0
Halal Supply Chain -> Food Sustainability	0	0.332	0.332	0.084	0.001

In the relationship between traceability system and acceptance, the consumers aged 41-50 years were mostly affected. This indicated that old age concentrated more to the traceability system, compared to young age. Meanwhile, the implementation of this system increased the sustainability of halal food products in consumers under the age of 50 years. Subsequently, the respondents with all age categories agreed that traceability system improved the quality of the existing supply chain. Also, only the respondents over the age of 41 years agreed that the halal supply chain increased the food product sustainability.

DISCUSSION

The results showed that the consumer acceptance of halal food sustainable traceability was only influenced by the implementations of the trackability system and the supply chain. This indicated that the other two predictors (type of consumer and product sustainability) were unable to determine acceptance from the consumer. In addition, preference was one of the capable predictors to determining the acceptance of halal food sustainable traceability. However, this variable did not have a mediating role for the overall predictors. Halal food consumers also agreed that they accepted halal food sustainable traceability when the trackability system and supply chain were effectively implemented, and were not based on internal factors such as consumer characteristic differences. Therefore, implementing the traceability system and the halal supply chain played an essential role in this study. These two predictors had a mediating role in several relationships, and became the main variables for both consumer preference and acceptance of halal food sustainable traceability.

This study subsequently explored several differences in the gender categories, through the Multi-Group Analysis (MGA) procedure. This indicated that the type of consumer variable did not determine the acceptance of male respondents. However, this variable became very important for female participants, to receive halal food sustainable traceability. The acceptance of male respondents was also based on preference, which was found to be the opposite for female participants. In addition, the respondents aged 41-50 years agreed that traceability implementation was essential for their acceptance in their age category. Meanwhile, the implementation of this system increased the sustainability of halal food products in respondents under the age of 50 years. In addition, only the age groups over 41 years agreed that the supply chain increased the sustainability of halal food products.

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CONCLUSION

This study showed that traceability system and halal supply chain implementations were significant predictors for the Indonesian Muslim communities. However, non-Muslim countries did not concentrate much to these aspects due to different levels of understanding. This was because they viewed halal products as clean, healthy, and delicious products, indicating their support for the knowledge of these edible materials. Moreover, these were quality products based on the concept of halalan thoyyiban (halal and healthy), due to integrating Good Manufacturing Practices (GMP) and HACCP. In Indonesia, the production of non-halal food was still highly unproduced, for integration to be conducted at a relatively low cost. Meanwhile, enormous costs were highly incurred in non-Muslim countries still producing much non-halal products. Therefore, the implementations of traceability systems and supply chains required expensive infrastructures, which directly impacted the selling price of halal products. This was because companies need to have a good understanding of when they want to integrate halal supply chains for different markets. Based on this study, the main predictors of preference and acceptance of halal food sustainable traceability were developed and analyzed. Also, each of the existing mediating roles were tested by comparing Multi-Group (MGA) technique with several categories of respondent groups, such as gender and age. However, some limitations still have to be evaluated in this study, where the cost needed in implementing halal food sustainable traceability was not considered. Another limitation was the comparisons of limited respondent groups. For this reason, further studies on the existing shortcomings should be deeply reviewed, to obtain a more comprehensive result.

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