

Online Traceability of Halal Food Information to Protect Muslim Consumers in the Cyber Era

by Siti Nur Azizah

Submission date: 16-Jan-2023 01:54PM (UTC+0700)

Submission ID: 1993457455

File name: IJCC-1-15-2-2021_1-17.pdf (503.57K)

Word count: 8251

Character count: 47481



Copyright © 2020 International Journal of Cyber Criminology – ISSN: 0974–2891
December 2021. Vol. 15(2): 1–17. DOI: 10.5281/zenodo.4766544
Publisher & Editor-in-Chief – K. Jaishankar / Open Access (Authors / Readers No Pay Journal).

This is a Diamond Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International (CC-BY-NC-SA 4.0) License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.



Online Traceability of Halal Food Information to Protect Muslim Consumers in the Cyber Era

Siti Nur Azizah¹

Universitas Negeri Surabaya, Indonesia

Abstract

This study aimed to determine the effect of halal awareness and traceability on consumer purchase decisions. The study focuses on the customer perspective on halal food product buying intentions in the internet era. The consumer perspective emphasizes the factors contributing to halal knowledge and the purchasing decisions associated with halal products. The study examined the effect of halal traceability on the relationship between halal awareness and consumer purchasing intentions. The quantitative research methodology was used, and questionnaires were delivered in person and online to collect data from 350 consumers. The results were analyzed using the SEM method. The study's findings indicate that halal awareness affects customers' purchase intentions. Additionally, religiosity, blockchain as a metric of traceability, and knowledge all influenced consumers' purchase decisions. Halal traceability mediated the association between halal awareness and customer purchasing intentions positively. The study has policy ramifications and implications for academics and marketers.

Keywords: halal traceability, blockchain, halal awareness, consumer intention.

1. Introduction

Prior documentation is abundant in halal food and traceability contexts, with much aspects researched, including halal food awareness, consumer viewpoints, economic referendum, business and branding strategies, and the worldwide market for halal food. Some light has been shed on the context of traceability information during the pandemic, particularly on online traceability and the development of halal food awareness in the cyber era. The current study considers the perspective of online traceability and halal food awareness and their influence on consumers (Muslim consumers). It is because the millennial world is in the emergence of development, the most imperative requisite required to considering the global epidemic of covid-19, the economic world has been increasingly influenced by digital marketing and online services, which have made lifestyles more reachable and available to individuals. Similar to how traceability has transferred to smartphones (Shahzad,

¹ Study Program of Law, Universitas Negeri Surabaya, Jl. Lidah Wetan, Surabaya 60213, Indonesia. Email: sitinurazizah@unesa.ac.id

2020), including this characteristic of online traceability is critical for enriching the research subject with diverse and detailed perspectives. Current research illuminates the halal food and traceability perspectives while also considering the pandemic and cyber period contexts. While enlightening the consumer's purchase intentions in terms of their decision-making regarding halal food is a primary objective, increasing food awareness through online traceability is also a primary objective. Additionally, another perspective on the factors influencing the consumer's intentions across contexts is also a primary objective.

Considering the study's definition of halal food as "Islamic permissible food and ingredients following sharia," elaborating on the concept as "ingredients or material used in the preparation of food" and excluding any non-halal food or products that are najas, incapable of slaughter, harmful, or contain human parts, etc., which are all strongly prohibited under Islamic shariah (N. I. A. Aziz & Ahmad, 2018; Mohamed, 2011). Food traceability is defined as the ability to trace an entity's origin, production, processing, application, or location to verify the food's safety, quality, and risk prevention. Thus, the context of online traceability of halal food awareness refers to the assurance of halal food manufacture, uniqueness, and product location to make it suitable for consumption by Muslims (Ab Rashid & Bojei, 2019; Rahim & Junos, 2012). With the cyber era in mind (Shahzad, 2020), it is necessary to shed some light on the online traceability factor. Online, social media and digital technological availability of halal food traceability all fall under the category of online traceability, which is accessible to the average person and Muslim. It has a role in consumer intention and decision-making for purchases and other activities. The other variable, purchase intention, refers to an individual's intent to purchase something (Muhammad & Saad, 2016). It is influenced by various factors that contribute to an individual's motivation to purchase, invest, or engage in something. The factor influencing the intention to buy something is dominated by the traceability factor of halal food, which is the subject of the current study.

As the research delves into the importance of digital media (Rejeb et al., 2021), the rationale articulates how its occupation of the market industry has been primarily taken and how it has made a steric appearance in every field. It includes the traceability of halal food information, such as social media access providing knowledge to individuals on their feasibility in a single click. It is expanding the scope of the cyber platform for halal food information to improve traceability, as this online access influences purchasing behaviour. It directs the consuming and business framework through connected factors such as knowledge, certification, religiosity, and blockchain-based traceability.

Previously, halal traceability was explored as a moderator between halal food awareness and purchase intention; however, the current research expands on this approach by examining the effect of blockchain technology on halal food information. Similarly, the study's objectives are as follows: (1) To ascertain the extent to which halal food information affects the online traceability factor among Muslims during the pandemic period, elaborating the research purpose; (2) to ascertain the extent to which online traceability influences purchase intentions; and (3) to ascertain the perception of block chain-based traceability over consumer purchase intent. The current research begins with an overview of the topic in the first section, followed by



brief descriptions of variables and other factors; additionally, it includes a rationale, significance, and objective explanation in the second section, followed by a literature review of existing data in the third section, followed by method, analysis, and discussion of the results in the fourth section.

2. Literature review

2.1. Halal Food Information

Establishing a solid framework for Halal food in the report regarding a worldwide market is critical, given its enormous and widespread consumption across countries. Demonstrating that, Halal food is a primary concern of religion because it influences lifestyle, standards, and business. Similarly, halal is controlling the parameter of food quality by encompassing several entities such as material, hygiene, safety, quality, and other determinants to make it served to others. Halal food is not just a need but also a distinguishing feature of the market that must be addressed in conjunction with its associated components and considerations.

In prior studies, information about this context was characterised as awareness and thus defined as the information about things necessary to comprehend, experience, and feel events and objects (Amarul et al., 2019). While reflecting on the notion of halal awareness or halal information, the primary consideration should be the entity of halal and its meaning and description concerning the consumer as well as the market actors. Halal information affects consumers' consumption and investment in halal products, whilst business sectors associate it with the manufacture of halal products through the use of halal procedures throughout the manufacturing process of a halal food product or otherwise (Amarul et al., 2019; Yunus et al., 2014). Numerous determinants, such as knowledge, religiosity, and halal certification, have been illuminated to provide a holistic explanation of halal information. These aspects are associated with halal information and affect consumers' attitudes and production.

To put it simply, facts, figures, sentiments, and experiences all fall under the category of halal information, and this is referred to as the learning process, hence expressing awareness or knowledge (Briliana & Mursito, 2017). Consumer awareness affects the consumers' intentions and decisions by adding value to their purchase intentions. To incorporate the component of halal food information, Muslims' knowledge of food consumption is more significant and reflects their concerns about halal food (Said et al., 2014; Shaari & Mohd Arifin, 2009). Consider another facet of halal food information: religiosity. This can be defined as a practical dedication to religious values, for example, the degree to which someone is devoted to or practices spiritual principles or religion. That specific commitments are always evident in a consumer's or entrepreneur's attitude (by attributing such religious-related values in life). These characteristics all play a role in influencing purchasing and production behaviours, whether in the realm of food consumption, insurance, or cosmetics marketing (Amin et al., 2014; Majid et al., 2015). Religiously motivated actions are constantly studied in consumer forums, and as a result, items are updated within the domains of religious values and norms, considering what is permissible under shariah, what violates the rule, and what is irrelevant. In the past, such studies have been conducted to determine the influence of religion on consumers and

marketing techniques connected to decision-making and purchasing intentions. The halal certification of information encompasses all aspects of halal and shariah-compliant products, food, and other services consumed by Muslims. A firm attitude on this would be viewed as a reflection of product quality according to Islamic sharia standards, and so it would be a proper guideline to follow the shariah regulations following Islamic ideals (Muhamad et al., 2017). Additionally, these certifications are the critical concerns of Muslim customers who are overburdened with halal food information and give them a voice in food investment and purchase. Halal certification is the most vital and visible aspect of halal food information.

2.2. Halal Traceability

Halal traceability refers to tracing the origin, history, manufacturing, and location of a product to ensure its halal status. In contrast, online traceability ensures haleness via online platforms such as social media, YouTube, Facebook, Instagram, and other apps that provide tracing information via available online sources (Verbeke et al., 2013). Indeed, halalness is ensured through adherence to Shariah rules, whether or not they are followed in manufacturing the items, and is traceable through traceability sources (Sayogo, 2017). The capacity to conduct research and browse through online sources equates to the online traceability of halal food information. Expanding the concept, it is the capability of locating a product's manufacturing process and determining its halal processing methods; as a result, the primary suppliers, producers, logistics, and all other users ensure that all halal procedures are followed throughout the product's manufacturing process (Ab Rashid & Bojei, 2019). Halal traceability is vital because it contributes to the product's safety, quality, and hygiene and benefits both suppliers and customers. Additionally, it ensures the product's halal status and increases its adaptability (Abd Rahman et al., 2017; Aung & Chang, 2014).

It has been noted that Muslim consumers rely considerably on internet resources to obtain information about their decision-making capacity and that disclosure of decisions and purchasing intentions is significantly closer to the online aid provided by browsing and other online activities. This intimidates the concept of trust development and drives the individual's purchase and consumption habits; in other words, it directs and orients the purchasing behaviour by developing the trust entity in the individual (Razzaque & Chaudhry, 2013). The argument has been exacerbated that the trace's capacity to obtain compliance with the product and information about the halal principles utilised in the products via the web and mobile apps referring to online tracing contributes to the product's confidence and dependency. To what extent does this available traceability of internet sources aids in purchasing decisions and the factors that influence them determined through well-constructed hypotheses and empirical examinations (Zhang et al., 2016). This study discovers that trust has a variety of effects on purchase decisions, and as a result, consumers gravitate toward items that already have an association with their mindsets.

Similarly, some people are more reliant on their trust instincts than others; thus, the trust instinct does not always play a role in individuals' decision-making. According to Grabner-Kräuter and Kaluscha (2003), if individuals are concerned about their potential to become disposed of their views and objectives, they are more



likely to direct their conduct toward those beliefs and intentions. Previously, data has been collected regarding the trustworthiness of purchasing decisions made in the domains of a vendor's online environment. For example, it has been reported that while trust in the Halal logo undoubtedly affects the disposition that is inherently influenced by the circumstantial life and stages daily of consumers, Muslims place a higher premium on Halal principles and other halal procedures in non-Muslim countries or areas where Muslims are not the majority. It is considered that customers in dominant Muslim nations have a firm conviction in halal certification and hence place a lower premium on halal information about food, regardless of whether traceability is available online or in other ways. As a result, customers' conviction in the halal certification of products has a detrimental effect on the usefulness of traceability compliance and verification of halal standards.

The traceability of halal processing, based on available data, indicates that the halal logo and certification of the product conveys legislative compliance with country requirements, such as dietary laws and religious values. While the food safety regulation is not yet precise, the arguments clarified that halal principles or procedures and valuing religious values also add to the safety and healthy elements of food for consumers, making it more reliable and valid worldwide. It is reasonable to think that adhering to halal rules demonstrates respect for religious values and establishes a distinct identity within the references. According to research, halal processing of meat benefits healthier food processing by increasing the healthy components and decreasing the unhealthy components, so halal procedures are unquestionably necessary for producers to adapt to maintain the quality of their business and brand. According to a Malaysian study on the traceability of halal food information, customers' preference for halal products is motivated by their desire to live a healthier and more fulfilling lifestyle, as stated in its more beneficial benefits (Bonne & Verbeke, 2006; Mohamed, 2011). As a result, such research on halal food information will always help most Muslims who consume halal cuisine. The larger the reputation of the halal certification, the greater the influence on customer views of the utility of traceability, and so the extent of usefulness increases with the importance of the halal certification or processing (Albersmeier et al., 2009; Sayogo et al., 2014). Along with these elements, the capacity to trace halal food information also plays a role in influencing consumer opinions.

2.3. Block chain-based technology

23

Block chain technology is a term that refers to a shared, distributed, and tamper-resistant digital ledger that is based on digital record data in the package and contains blocks that are linked in series for transaction purposes and are shared among a large group of networks. A peer to peer network is always a part of blockchain technology (Galvez et al., 2018). It enables the use of traceability through technologies such as IoT, RFID, and NFC, as it is capable of storing and sharing massive amounts of data (Zhao et al., 2019). This is a data storage source employed in the traceability system to increase its efficiency in information technology (Khan & Salah, 2018). Other fields are heavily invested in research and development of blockchain technology, but consumer and business actor fields receive less attention. In this research, blockchain technology is used to moderate the traceability of halal food information and

determine the extent to which it affects it.

The cryptographic hash secures and transparently improves the halal traceability information and automatically acts as a protective factor in consumption by influencing purchase intentions and directing behaviour through the provision of a large amount of data (Ølnes et al., 2017). Previous research has discovered that it is beneficial in tracing agricultural products and information and that it is also helpful in the business and consumer sectors. However, in the consumption of the entire supply chain, digital transformation of the system, IoT traceability systems aid in the quality of food information, and block chain layer enables the improvement of agri-food traceability (Bechini et al., 2008). Similarly, the application layer exists in blockchain³⁶ technology. A blockchain-based solution enhances traceability and ensures food safety and quality (Feng et al., 2020). Agriculture traceability system based on IoT has been extensively investigated, proving its increased influence over customers and entrepreneurs' actors. Incorporating blockchain technology into the research is significant in developing a meaningful and practical solution that ensures traceability and increases trust authority. Due to the transparency of blockchain technology has taken the lead in supply chains and transactions. Chain technology's functionality is similarly extensive and sophisticated, despite generating essential data about its origin, history, manufacturing, and other processes (Khan & Salah, 2018). Thus, integrating this variable in the research aims to provide a new viewpoint on online traceability systems while also maintaining the quality of halal food and elaborating on the technology's use and efficiency to establish system influence over the use of halal food information.

2.4. Purchase intention ³⁴

The intention is a term that refers to the prediction of behaviour that has been studied extensively⁴⁰ a variety of domains, including economic, political, and social spheres. Generally, it is viewed as a motivating factor that influences an individual's behaviour and strengthens its influence over the emergence of any behaviour through engagement in specific or² desired activities. In the context of halal information traceability, particularly online traceability of halal food information to protect Muslim consumers, data indicates that an individual's attitude toward the concept of halal influences their purchasing and consumption behaviour of halal products. As a result, attitude is considered the impera¹⁰ve element associated with the intentional conduct of purchase and consumption. According to past research, a good attitude toward halal products will organise the purpose to purchase more halal items, but a deliberate negative attitude will cause individuals to become reserved toward halal products. This is especially true if we consider that non-Muslims often have a negative attitude toward Islamic religious objects, which results in their guarded behaviour toward halal products or the avoidance of such information in their purchasing intents. It is thought that providing knowledge on halal food goods results in positive behaviour, resulting in the purchased products, ³³ previously stated. Although it is advised that traceability has a significant impact on halal food consumption, online traceability of halal food information is contained in a small domain where gaps exist from the perspectives of consumers and business players. The current research aims to shed light on this perspective by determining the extent

to which these influences buying intentions and contributes to the protection of Muslims in this cyber era, or as some refer to it, the millennial world.

3. Methods

3.1. Research method

The researcher based the study on the tenets of quantitative research. This study aims to determine the antecedents of Muslim customers' purchasing intentions and determine whether halal traceability affects consumer purchase intentions. The current study established halal awareness as a mediator between purchase intention and behavioural antecedents, while online halal traceability modifies halal understanding and buy purpose among Muslim consumers throughout the pandemic period. Numerous research examining similar variables have used a quantitative approach (Asfarian et al., 2020; Jannah & Al-Banna, 2021; Sayogo, 2017).

3.2. Sampling and population

The demographic studied in this study is Muslim customers who made online purchases of food products throughout the pandemic. Halal certification of the manufacturing process and ingredients is a need for Muslims as it is a tenet of their faith; hence, the researcher concentrates on this group when studying the research framework. Participants from Indonesia are included in the target sample. Purposive and chain referral sampling approaches were utilised to recruit study participants. The researcher employs the purposive sampling strategy because it enables the researcher to retain highly relevant individuals to their judgment and the study questions and objectives (Quah, 1992; Rutberg & Bouikidis, 2018).

Additionally, the referral strategy was employed to augment the sample size. Participants were asked to distribute the questionnaire to their family members and associates. The questionnaire was distributed both online and at grocery stores. The researcher generated 370 questionnaires; twenty were eliminated due to missing values during screening. According to the study's objectives and methodology, the most appropriate time horizon is the cross-sectional time horizon, which the researcher employs (Östlund et al., 2011; Park & Park, 2016).

3.3. Data collection and procedures

The research instrument was a structured questionnaire. The researcher increased the sample size by personal and online administration. The mixed technique expanded the sample frame while minimising the constraints. Muslim consumers' viewpoints were critical in mapping the relationships between the variables, so data collection from a single outlet or store may have limited the generalizability of the findings. As a result, the researcher also made the questionnaire available online and urged persons of Muslim ancestry to participate. Additionally, because the study focuses on the online halal traceability of the products, conducting it online enabled the researcher to contact consumers who may have utilised the internet to conduct research or analyse the halal status of the products. Following data collection, the researcher collected just 350 valid responses, then organised in the Microsoft Excel software for coding.

3.4. Measures

The study examines the relationships between purchase intention and behavioural antecedents such as religion, product knowledge, perceptions of a traceability system based on blockchain technology, and halal certification. The variables' scales were chosen from the literature because they were validated in past studies. Each construct is quantified using a five-point Likert scale that ranges from "strongly disagree" to "strongly agree." Knowledge was assessed using four items adapted from the Briliana and Mursito (2017)'s study. Additionally, four measures were used to determine religiosity. The scale was adapted from Basri and Kurniawati (2019)'s work. Halal certification was examined using five criteria adopted from Y. A. Aziz and Chok (2013)'s and Basri and Kurniawati (2019)'s investigations. Halal awareness and buying intention were assessed using four items adapted from Basri and Kurniawati (2019)'s study. Halal traceability was determined using three criteria adapted from the Sayogo (2017) study. Consumer perceptions of a traceability system utilising blockchain technology were also assessed using three items modified from Hansstein (2014)'s study.

3.5. Data analysis

The relationships between variables were investigated using a variety of tests required for the use of CFA and SEM. The confirmatory analysis was used to determine the model's fitness, and the SEM was used to investigate the relationship between the variables and to check the proposed hypothesis's status.

4. Results

Table 1 descriptively summarises the variables. The table illustrates the total number of valid responses, the range of values, the averages, and the constructs' normalcy (Diawara et al., 2018). According to the table below, there are 350 valid responses for each factor, showing that responses were equal for each construct, and there were no missing values in the final sample. The range of values for each construct was between 1 and 5, which corresponds to the endpoints of the scale used to record responses. Thus, demonstrating that there were no outliers in the data. The mean scores for all components indicate that respondents agreed with the questionnaire's statements. Finally, the standard deviation and skewness values are negligible. Additionally, skewness scores are inside the -1+1 criterion, indicating that the data were regularly distributed.

Table 1: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Std. Error
KNW	350	1.00	5.00	3.1444	1.08250	-.116	.117
REL	350	1.00	5.00	3.3377	1.05029	-.301	.117
HC	350	1.00	5.00	3.4401	1.21646	-.437	.117
HA	350	1.00	5.28	3.3863	1.19260	-.462	.117



HT	350	1.00	5.00	3.5204	1.20389	-.506	.117
PI	350	1.00	5.00	3.5108	1.18172	-.351	.117
PBT	350	1.00	5.00	3.5271	1.228510	-.417	.117
Valid N (listwise)	434						

The values of the adequacy test are listed in Table 2. The KMO and Bartlett tests were performed to determine the sample's suitability. According to the guidelines, the KMO value should be closer to one and Bartlett's sphericity should be significant at the 5% level (Fang et al., 2018). The test findings reveal that the sample's KMO level of adequateness was 0.961. The score is closer to 1, indicating that the requirement was met and that the model and data were significant. Additionally, Bartlett's Test of Sphericity value is 0.000, which is less than 0.05, indicating that the results and the model are substantial, and that the data can be projected for further testing.

Table 2: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.961
	Approx. Chi-Square	13271.821
Bartlett's Test of Sphericity	df	278
	Sig.	.000

The next phase is factor analysis, and EFA was performed using the rotational component matrix technique. The exam identifies and demonstrates the relationship between the items in this study associated with the constructs (Fang et al., 2018). According to prior research, a loading of 0.7 or above is considered acceptable for the items. According to Table 3, all constructions' elements have values larger than 0.7. As a result, there is a substantial correlation between the individual items and the constructs. Additionally, the objects do not interact, indicating a significant relationship between the items and the components. The results demonstrate that both the model and the sample data are substantial, and the data is projected for additional investigation.

Table 3: Rotated Component Matrix

	Component						
	1	2	3	4	5	6	7
KNW1	.827						
KNW2	.883						
KNW3	.836						
KNW4	.788						
REL1		.813					
REL2		.788					
REL3		.767					
REL4		.841					

HC1	.877			
HC2	.844			
HC3	.887			
HC4	.843			
HA1		.867		
HA2		.887		
HA3		.900		
HA4		.896		
HT1			.866	
HT2			.870	
HT3			.895	
PBT1				.890
PBT2				.879
PBT3				.814
PI1				.860
PI2				.876
PI3				.867
PI4				.852

The construct validity analysis determines if the study instrument or individual constructs can measure the phenomenon for which they were designed. Convergent and discriminant validity are used to establish the construct validity. These findings are summarised in Table 4 below. Prior research based on model validity and standard mean error shows that the composite reliability and average variance extracted values should be greater than 0.7 and 0.5, respectively. At the same time, the MSV value is expected to be less than the AVE value (Zhu & Lu, 2017). The results indicate that the CR values for all constructions exceed 0.7, and similarly, the AVE values for each variable exceed 0.5.

Additionally, the MSV values are less than the AVE values, indicating that the data has convergent validity. The researcher examined the intra- and inter-correlations between the constructs to determine the presence of discriminant validity. The results in Table 4 suggest that the most significant intra-construct correlations exist, indicating the presence of discriminant validity. Construct validity is established because both convergent and discriminant validity conditions are met.

Table 4: Construct validity

	CR	AVE	MSV	KNW	REL	HC	HA	HT	PBT	PI
KN	0.71	0.50	0.25	0.63						
W	7	8	9	9						
REL	0.95	0.76	0.28	0.45	0.87					
	1	4	2	2	4					
HC	0.94	0.75	0.28	0.50	0.53	0.87				
	0	9	2	9	1	1				



HA	0.96	0.86	0.23	0.42	0.42	0.48	0.93			
	2	5	8	4	1	8	0			
HT	0.92	0.83	0.21	0.45	0.46	0.41	0.43	0.91		
	2	5	9	7	8	2	9	4		
PBT	0.95	0.79	0.33	0.45	0.42	0.47	0.52	0.72	0.915	
	2	5	8	1	1	8	1	1		
PI	0.94	0.73	0.41	0.45	0.47	0.45	0.68	0.65	0.620	0.95
	1	5	9	6	2	2	7	1	2	5

The numbers in Table 5 represent the model fitness findings. The table contains the observed data, while the threshold values determine the model's validity. The results indicate that CMIN is less than three, within the threshold level. The GFI is 0.907, the IFI is 0.979, and the CFI is 0.979, which are more than 0.90 and 0.8. Additionally, the RMSEA is less than 0.08, with a value of 0.056. The model's fitness is established because all values fall inside the threshold ranges.

Table 5: Model fitness

Indicators	Threshold range	Current values
CMIN/DF	Less or equal 3	2.189
GFI	Equal or greater .80	.907
CFI	Equal or greater .90	.979
IFI	Equal or greater .90	.979
RMSEA	Less or equal .08	.056

The findings of the structural equation modelling performed on the data to evaluate the variable associations provided in Chapter 2 are summarized in Table 6. The findings demonstrate that knowledge directly and significantly affects the intention to acquire food products. A unit increase in product knowledge results in a 21.6 unit increase in purchase intention. The hypothesis is accepted since the association is significant and positive. The second direct association between religion and choice to purchase is examined. The findings indicate that religiosity has a beneficial effect on buy intention. A unit increase in Muslim customers' religiosity results a 0.3 unit rise in their buying intention for halal food products. The hypothesis is accepted since the association is significant and positive. Halal certification has a direct, positive, and considerable effect on purchase intent, as does customer perception of blockchain-based traceability. A unit increase in halal certification results a 0.34 unit rise in purchase intention, whereas an increase in traceability via blockchain results in a 0.31-unit increase. As a result, hypotheses 3 and 4 are also accepted.

The bottom section of Table 6 contains the results for the indirect relationships formed by the factors' mediation and moderation. Halal awareness is a mediator between all four independent variables and purchase intention, resulting in significant and positive outcomes. This demonstrates that the mediation was adequate, and that halal awareness effectively mediates the interactions. As a result, each of the four mediation hypotheses is accepted. The last relationship postulated in the study is a moderating effect of halal traceability on halal awareness and product

purchasing intention. The presence of halal traceability modifies the association between halal awareness and buy purpose favorably, i.e., the presence of halal traceability strengthens the relationship between awareness and purchase intention.

Table 6: Regression results

Regression		Estimate	S.E.	C.R.	P	Decision
KNW	→ PI	.216	.055	5.557	.000	Accepted
REL	→ PI	.301	.046	5.132	.000	Accepted
HC	→ PI	.348	.029	11.157	.000	Accepted
PBT	→ PI	.318	.039	10.157	.000	Accepted
Mediation		Estimate	S.E.	C.R.	P	Decision
KNW*HA	→ PI	.268	.041	5.440	.000	Accepted
REL*HA	→ PI	.155	.043	4.189	.000	Accepted
HC*HA	→ PI	.174	.044	4.120	.000	Accepted
PBT*HA	→ PI	.195	.054	5.120	.000	Accepted
Moderation						
HT*HA	→ PI	.265	.045	4.440	.000	Accepted

5. Discussion and Conclusion

The study's objective was to determine the relationship between customer knowledge, religion, halal certification, and traceability using blockchain technology. Due to the pandemic, people turned their focus to online purchasing, and most listings omit information on the products' ingredients and certifications. As a result, Muslim consumers face difficulties while shopping for household and food items, as they must verify their halal status before purchasing. As a result, the study developed a model to assess the association between these parameters during the epidemic. The study's findings reveal that customers' halal awareness positively moderated their behavioural intention. These findings corroborate those of Basri and Priawati (2019), Bashir (2019), and Putri (2018). However, a study conducted by Jaiyeoba et al. (2019) demonstrated that halal awareness has a detrimental effect on customers' purchase decisions in Nigeria. This indicates that their level of halal awareness influences consumers' purchase intentions. The more informed people are, the more inclined to consider purchasing halal food. This demonstrates a dearth of halal consciousness among Muslims and allows marketers and policymakers to establish campaigns promoting halal orientation and awareness among target consumers. Additionally, the study discovers a favorable and significant relationship between blockchain technology, religion, knowledge, and halal certification in affecting consumers' halal awareness and purchase decisions. The study demonstrated that customers' halal awareness is determined by their level of expertise and the presence of halal certification, which also influences their purchase decisions. These findings are corroborated by Putri (2018), who discovered that religiosity and knowledge significantly affect customers' halal awareness. Knowledge and religiosity have a significant impact on how humans behave in decision-making and purchasing areas. Thus, religiosity, knowledge, and understanding compel religious believers to adhere to their religious beliefs and utilize them to guide other aspects such as purchasing decisions.



6. Conclusions, Recommendations, and Implications

While research on halal traceability and other aspects of halal purchase intention has increased in recent years, additional study is required to validate all antecedents and determinants affecting consumer behavior. The study's findings indicated that halal traceability of food goods is crucial for influencing consumers' purchasing decisions. The study, however, focuses exclusively on the consumer perspective and ignores the role of business actors in this process. Additionally, the study examines the element of perceived traceability via blockchain and puts it as a positive influencer of buying decisions, but additional research is necessary to understand the indicator's characteristics fully. There is an unquestionable market opportunity and potential for applying cutting-edge technologies such as blockchain to process information about products and consumers, so this area warrants additional study. Additionally, future research should focus on the business actors engaged in the manufacturing process and their associations with halal traceability and halal awareness, as Jannah and Al-Banna (2021) attempted. Considering the elements that influence consumer purchasing intentions, researchers can examine the actions taken by producers to increase customers' halal awareness and knowledge.

Additionally, the current study has several limitations. The study used a limited sample size, and future researchers are encouraged to enlarge it to improve the robustness and generalizability of the findings. Second, as previously stated, while this study concentrated on the customer perspective, future researchers can examine the production side. Additionally, while the study's findings confirmed consumers' halal traceability, additional research is necessary to elucidate the findings. The study aimed to include respondents from diverse geographical places by publishing the questionnaire online; nevertheless, the results do not reflect the respondents' geographic locations. Because producers' and policy actors' practices and procedures vary, future researchers should either focus on a single place or include location as a control variable in their study. However, cross-sectional data should be collected for future research projects, and a mixed-methods approach might be employed to evaluate consumer and producer viewpoints.

The study has ramifications for marketers, policymakers, and theoretical frameworks. The study demonstrates the significance of halal stipulations knowledge, religion, halal awareness, and certification on customer intention and contributes to the consumer intention literature. The study's findings and model can be used by future academics to enhance the components further and explore the domain of halal purchase intention. Additionally, the study emphasizes the significance of halal certification. Developers and policymakers should consider including halal certification on the packaging of their products. Marketers and executives of companies specializing in halal product development might use the study's findings to design campaigns to increase public understanding of the halal process. Additionally, policymakers should emphasize the importance of halal supply chain management since the results reveal that customers are interested in the components and manufacture of products. Blockchain technology, for example, can be utilized to advance halal supply chain management.

7. References

- Ab Rashid, N., & Bojei, J. (2019). The relationship between halal traceability system adoption and environmental factors on halal food supply chain integrity in Malaysia. *Journal of Islamic Marketing*, 11(1), 117-142. <https://doi.org/10.1108/JIMA-01-2018-0016>
- Abd Rahman, A., Singhry, H. B., Hanafiah, M. H., & Abdul, M. (2017). Influence of perceived benefits and traceability system on the readiness for Halal Assurance System implementation among food manufacturers. *Food Control*, 73, 1318-1326. <https://doi.org/10.1016/j.foodcont.2016.10.058>
- Albersmeier, F., Schulze, H., Jahn, G., & Spiller, A. (2009). The reliability of third-party certification in the food chain: From checklists to risk-oriented auditing. *Food Control*, 20(10), 927-935. <https://doi.org/10.1016/j.foodcont.2009.01.010>
- Amarul, A., Sukirno, S., & Kurnia, D. (2019). Understanding the awareness of the importance of halal labels to business actors based on range of long business variations. *Business and Management Research*, 8(1), 17-21. <https://ideas.repec.org/a/jfr/bmr111/v8y2019i1p17-21.html>
- Amin, H., Abdul-Rahman, A.-R., & Razak, D. A. (2014). Theory of Islamic consumer behaviour: An empirical study of consumer behaviour of Islamic mortgage in Malaysia. *Journal of Islamic Marketing*, 5(2), 273-301. <https://doi.org/10.1108/JIMA-06-2013-0042>
- Asfarian, A., Hilmi, K. I., & Hermadi, I. (2020). Preliminary User Studies on Consumer Perception Towards Blockchain-Based Livestock Traceability Platform in Indonesia: An Implication to Design. *2020 International Conference on Computer Science and Its Application in Agriculture (ICOSICA)* (pp. 1-6). IEEE. <https://doi.org/10.1109/ICOSICA49951.2020.9243217>
- Aung, M. M., & Chang, Y. S. (2014). Traceability in a food supply chain: Safety and quality perspectives. *Food control*, 39, 172-184. <https://doi.org/10.1016/j.foodcont.2013.11.007>
- Aziz, N. I. A., & Ahmad, F. A. (2018). The Halal Lifestyle of Muslim Working Women. *International Journal of Academic Research in Business and Social Sciences*, 8(5), 1138-1147. <http://dx.doi.org/10.6007/IJARBS/v8-i5/4489>
- Aziz, Y. A., & Chok, N. V. (2013). The role of Halal awareness, Halal certification, and marketing components in determining Halal purchase intention among non-Muslims in Malaysia: A structural equation modeling approach. *Journal of International Food & Agribusiness Marketing*, 25(1), 1-23. <https://doi.org/10.1080/08974438.2013.723997>
- Bashir, A. M. (2019). Effect of halal awareness, halal logo and attitude on foreign consumers' purchase intention. *British Food Journal*, 121(9), 1998-2015. <https://doi.org/10.1108/BFJ-01-2019-0011>
- Basri, Y. Z., & Kurniawati, F. (2019). Effect of Religiosity and Halal Awareness on Purchase Intention Moderated by Halal Certification. *KnE Social Sciences*, 592-607. <https://doi.org/10.18502/kss.v3i26.5403>
- Bechini, A., Cimino, M. G., Marcelloni, F., & Tomasi, A. (2008). Patterns and technologies for enabling supply chain traceability through collaborative e-business. *Information and software technology*, 50(4), 342-359. <https://doi.org/10.1016/j.infsof.2007.02.017>
- Bonne, K., & Verbeke, W. (2006). Muslim consumer's motivations towards meat



- consumption in Belgium: qualitative exploratory insights from means-end chain analysis. *Anthropology of food*(5). <https://doi.org/10.4000/aof.90>
- Briliana, V., & Mursito, N. (2017). Exploring antecedents and consequences of Indonesian Muslim youths' attitude towards halal cosmetic products: A case study in Jakarta. *Asia Pacific Management Review*, 22(4), 176-184. <https://doi.org/10.1016/j.apmr.2017.07.012>
- Diawara, B., Dicko, M., Coulibaly, Y., N'diaye, M. K., Jamin, J.-Y., & Poussin, J.-C. (2018). Perception by farmers of the determinants of irrigated rice yield in Mali. *Agronomy for Sustainable Development*, 38(6), 1-11. <https://doi.org/10.1007/s13593-018-0542-2>
- Fang, W.-T., Ng, E., & Zhan, Y.-S. (2018). Determinants of pro-environmental behavior among young and older farmers in Taiwan. *Sustainability*, 10(7), 2186. <https://doi.org/10.3390/su10072186>
- Feng, H., Wang, X., Duan, Y., Zhang, J., & Zhang, X. (2020). Applying blockchain technology to improve agri-food traceability: A review of development methods, benefits and challenges. *Journal of cleaner production*, 260, 121031. <https://doi.org/10.1016/j.jclepro.2020.121031>
- Galvez, J. F., Mejuto, J. C., & Simal-Gandara, J. (2018). Future challenges on the use of blockchain for food traceability analysis. *TrAC Trends in Analytical Chemistry*, 107, 222-232. <https://doi.org/10.1016/j.trac.2018.08.011>
- Grabner-Kräuter, S., & Kaluscha, E. A. (2003). Empirical research in on-line trust: a review and critical assessment. *International journal of human-computer studies*, 58(6), 783-812. [https://doi.org/10.1016/S1071-5819\(03\)00043-0](https://doi.org/10.1016/S1071-5819(03)00043-0)
- Hansstein, F. V. (2014). Consumer knowledge and attitudes towards food traceability: A comparison between the European Union, China and North America. *2014 International Conference on Food Security and Nutrition IPCBEE* (pp. 114-118). IACSIT Press. <http://dx.doi.org/10.22004/ag.econ.165744>
- Jaiyeoba, H. B., Abdullah, M. A., & Dzuljastri, A. R. (2019). Halal certification mark, brand quality, and awareness: Do they influence buying decisions of Nigerian consumers? *Journal of Islamic Marketing*, 11(6), 1657-1670. <https://doi.org/10.1108/JIMA-07-2019-0155>
- Jannah, S. M., & Al-Banna, H. (2021). HALAL AWARENESS AND HALAL TRACEABILITY: MUSLIM CONSUMERS' AND ENTREPRENEURS' PERSPECTIVES. *Journal of Islamic Monetary Economics and Finance*, 7(2), 285-316. <https://doi.org/10.21098/jimf.v7i2.1328>
- Khan, M. A., & Salah, K. (2018). IoT security: Review, blockchain solutions, and open challenges. *Future generation computer systems*, 82, 395-411. <https://doi.org/10.1016/j.future.2017.11.022>
- Majid, M. B., Sabir, I., & Ashraf, T. (2015). Consumer purchase intention towards Halal cosmetics & personal care products in Pakistan. *Global Journal of Research in Business & Management*, 1(1), 47-55. <https://www.researchgate.net/profile/Muhammad-Majid-10/publication/338801113>
- Mohamed, A. (2011). Food traceability and halal traceability tracing system. *AR Nazahah, & J. Sutina (2012). The halal product acceptance model for the religious society. Business & Management Quarterly Review*, 3, 17-25.
- Muhamad, N., Leong, V. S., & Isa, N. M. (2017). Does the country of origin of a halal

- logo matter? The case of packaged food purchases. *Review of International Business and Strategy*, 27(4), 484-500. <https://doi.org/10.1108/RIBS-06-2017-0049>
- Muhammad, S. A., & Saad, R. (2016). Impact of attitude toward zakat evasion and moral reasoning on intention to pay zakat: A pilot study. *International Journal of Research in Business Management*, 4(2), 59-64.
- Ølnes, S., Ubacht, J., & Janssen, M. (2017). Blockchain in government: Benefits and implications of distributed ledger technology for information sharing. *Government Information Quarterly*, 34(3), 355-364. <https://doi.org/10.1016/j.giq.2017.09.007>
- Östlund, U., Kidd, L., Wengström, Y., & Rowa-Dewar, N. (2011). Combining qualitative and quantitative research within mixed method research designs: a methodological review. *International journal of nursing studies*, 48(3), 369-383. <https://doi.org/10.1016/j.ijnurstu.2010.10.005>
- Park, J., & Park, M. (2016). Qualitative versus quantitative research methods: Discovery or justification? *Journal of Marketing Thought*, 3(1), 1-8. <http://fmreo.skku.edu/DATA/2016%2018.pdf>
- Putri, E. O. (2018). Intention Toward Halal and Organic Food: Awareness for Natural Content, Religiosity, and Knowledge Context. *KnE Social Sciences*. <https://doi.org/10.18502/kss.v3i10.3425>
- Quah, D. (1992). Empirical cross-section dynamics in economic growth. *European Economic Review*, 37(2-3), 426-434. [https://doi.org/10.1016/0014-2921\(93\)90031-5](https://doi.org/10.1016/0014-2921(93)90031-5)
- Rahim, N. A., & Junos, S. (2012). The halal product acceptance model for the religious society. *Business and Management Quarterly Review*, 3(1), 17-25. <https://www.researchgate.net/profile/Nazahah-Abd-Rahim/publication/321758309>
- Razzaque, M. A., & Chaudhry, S. N. (2013). Religiosity and Muslim consumers' decision-making process in a non-Muslim society. *Journal of Islamic Marketing*, 4(2), 198-217. <https://doi.org/10.1108/17590831311329313>
- Rejeb, A., Rejeb, K., Zailani, S., Treiblmaier, H., & Hand, K. J. (2021). Integrating the Internet of Things in the halal food supply chain: A systematic literature review and research agenda. *Internet of Things*, 13, 100361. <https://doi.org/10.1016/j.iot.2021.100361>
- Rutberg, S., & Bouikidis, C. D. (2018). Focusing on the fundamentals: A simplistic differentiation between qualitative and quantitative research. *Nephrology Nursing Journal*, 45(2), 209-213. <https://europepmc.org/article/med/30303640>
- Said, M., Hassan, F., Musa, R., & Rahman, N. (2014). Assessing consumers' perception, knowledge and religiosity on Malaysia's halal food products. *Procedia-Social and Behavioral Sciences*, 130, 120-128. <https://doi.org/10.1016/j.sbspro.2014.04.015>
- Sayogo, D. S. (2017). Online traceability for halal product information: perceptions of Muslim consumers in Indonesia. *Journal of Islamic Marketing*, 9(1), 99-116. <https://doi.org/10.1108/JIMA-07-2016-0057>
- Sayogo, D. S., Zhang, J., Pardo, T. A., Tayi, G. K., Hrdinova, J., Andersen, D. F., & Luna-Reyes, L. F. (2014). Going beyond open data: Challenges and motivations for smart disclosure in ethical consumption. *Journal of theoretical and applied electronic commerce research*, 9(2), 1-16. <https://doi.org/10.4067/S0718-18762014000200002>
- Shaari, J. A. N., & Mohd Arifin, N. (2009). Dimension of halal purchase intention: A



- preliminary study. *American Business Research Conference*.
<http://eprints.um.edu.my/id/eprint/11147>
- Shahzad, M. A. (2020). TRACEABILITY BY SMART DEVICES, CELLULAR CHANNELS AND SOCIAL NETWORK TOPOGRAPHY MAY HELP TO COUP COVID-19 TRANSMOGRIFY. *Authorea Preprints*.
<https://doi.org/10.22541/au.159285573.30718910/v2>
- Verbeke, W., Rutsaert, P., Bonne, K., & Vermeir, I. (2013). Credence quality coordination and consumers' willingness-to-pay for certified halal labelled meat. *Meat science*, 95(4), 790-797. <https://doi.org/10.1016/j.meatsci.2013.04.042>
- Yunus, N. S. N. M., Rashid, W. E. W., Ariffin, N. M., & Rashid, N. M. (2014). Muslim's purchase intention towards non-Muslim's Halal packaged food manufacturer. *Procedia-Social and Behavioral Sciences*, 130, 145-154.
<https://doi.org/10.1016/j.sbspro.2014.04.018>
- Zhang, J., Liu, H., Sayogo, D. S., Picazo-Vela, S., & Luna-Reyes, L. (2016). Strengthening institutional-based trust for sustainable consumption: Lessons for smart disclosure. *Government Information Quarterly*, 33(3), 552-561.
<https://doi.org/10.1016/j.giq.2016.01.009>
- Zhao, G., Liu, S., Lopez, C., Lu, H., Elgueta, S., Chen, H., & Boshkoska, B. M. (2019). Blockchain technology in agri-food value chain management: A synthesis of applications, challenges and future research directions. *Computers in Industry*, 109, 83-99. <https://doi.org/10.1016/j.compind.2019.04.002>
- Zhu, X., & Lu, C. (2017). Re-evaluation of the New Ecological Paradigm scale using item response theory. *Journal of Environmental Psychology*, 54, 79-90.
<https://doi.org/10.1016/j.jenvp.2017.10.005>

Online Traceability of Halal Food Information to Protect Muslim Consumers in the Cyber Era

ORIGINALITY REPORT

15%

SIMILARITY INDEX

12%

INTERNET SOURCES

9%

PUBLICATIONS

5%

STUDENT PAPERS

PRIMARY SOURCES

1	Narendranath Epperla, Qihong Zhao, Sayan Mullick Chowdhury, Lauren Shea et al. "Postibrutinib relapse outcomes for patients with marginal zone lymphoma", Blood Advances, 2023 Publication	2%
2	katalog.vse.cz Internet Source	2%
3	mospace.umssystem.edu Internet Source	1%
4	jimf-bi.org Internet Source	1%
5	www.sysrevpharm.org Internet Source	<1%
6	Submitted to Trident University International Student Paper	<1%
7	Submitted to Suan Sunandha Rajabhat University Student Paper	<1%

8	"Financial Technology (FinTech), Entrepreneurship, and Business Development", Springer Science and Business Media LLC, 2022 Publication	<1 %
9	koreascience.kr Internet Source	<1 %
10	gbmrjournal.com Internet Source	<1 %
11	Submitted to Old Dominion University Student Paper	<1 %
12	pbr.iobm.edu.pk Internet Source	<1 %
13	shodhganga.inflibnet.ac.in Internet Source	<1 %
14	www.profinf.net Internet Source	<1 %
15	Banking Academy Publication	<1 %
16	Nida Karimah, Darwanto Darwanto. "Effect of Halal Awareness, Halal Certification, Food Ingredients Composition, Halal Marketing and Religiosity on Purchase Intention of Imported Food Products", Al-Kharaj : Jurnal Ekonomi, Keuangan & Bisnis Syariah, 2021 Publication	<1 %

17	Siti N. Azizah. "The adoption of FinTech and the legal protection of the digital assets in Islamic/Sharia banking linked with economic development: A case of Indonesia", The Journal of World Intellectual Property, 2023 Publication	<1 %
18	core.ac.uk Internet Source	<1 %
19	"Proceedings of the 3rd International Halal Conference (INHAC 2016)", Springer Science and Business Media LLC, 2018 Publication	<1 %
20	José Guadalupe Flores López, Carlos Armando Jacobo Hernández, Beatriz Alicia Leyva Osuna, Luis Alberto Limón Valencia. "The Effect of the Knowledge Management Processes Capability on Innovation Activities in the Mexican Industry", Administrative Sciences, 2023 Publication	<1 %
21	Submitted to University of Nevada Reno Student Paper	<1 %
22	researchonline.nd.edu.au Internet Source	<1 %
23	uobrep.openrepository.com Internet Source	<1 %
24	etd.uum.edu.my Internet Source	<1 %

25	www.deltainst.com Internet Source	<1 %
26	www.myfoodresearch.com Internet Source	<1 %
27	Talita Leoni Rizkitysha, Arga Hananto. ""Do knowledge, perceived usefulness of halal label and religiosity affect attitude and intention to buy halal-labeled detergent?"" , Journal of Islamic Marketing, 2020 Publication	<1 %
28	icbm.sjp.ac.lk Internet Source	<1 %
29	Norasekin Ab Rashid, Jamil Bojei. "The relationship between halal traceability system adoption and environmental factors on halal food supply chain integrity in Malaysia", Journal of Islamic Marketing, 2019 Publication	<1 %
30	religiondocbox.com Internet Source	<1 %
31	"Community Empowerment, Sustainable Cities, and Transformative Economies", Springer Science and Business Media LLC, 2022 Publication	<1 %

32

Dwi Suhartanto, Marwansyah Marwansyah, Muhammad Muflih, Moh Farid Najib, Irgiana Faturrohman. "Loyalty formation toward Halal food", British Food Journal, 2019

Publication

<1 %

33

Iwan Vanany, Jan Mei Soon, Anny Maryani, Berto Mulia Wibawa. "Determinants of halal-food consumption in Indonesia", Journal of Islamic Marketing, 2019

Publication

<1 %

34

Johan, Zaimy Johana, and Lennora Putit. "Conceptualizing the Influences of Knowledge and Religiosity on Islamic Credit Card Compliance", Procedia Economics and Finance, 2016.

Publication

<1 %

35

Mohamed M. Mostafa. "Information Diffusion in Halal Food Social Media: A Social Network Approach", Journal of International Consumer Marketing, 2020

Publication

<1 %

36

Raouf Mehannaoui, Kinza Nadia Mouss, Karima Aksa. "IoT-based food traceability system: Architecture, technologies, applications, and future trends", Food Control, 2023

Publication

<1 %

37 Yuswar Zainul Basri, Fitri Kurniawati. "Effect of Religiosity and Halal Awareness on Purchase Intention Moderated by Halal Certification", KnE Social Sciences, 2019
Publication <1 %

38 archive.aessweb.com
Internet Source <1 %

39 ec.europa.eu
Internet Source <1 %

40 edepot.wur.nl
Internet Source <1 %

41 etd.uwc.ac.za
Internet Source <1 %

42 hrmars.com
Internet Source <1 %

43 myscholar.umk.edu.my
Internet Source <1 %

44 ndltd.ncl.edu.tw
Internet Source <1 %

45 researchbank.rmit.edu.au
Internet Source <1 %

46 www.grafiati.com
Internet Source <1 %

47 www.scitecresearch.com
Internet Source <1 %

48

www.syekhnurjati.ac.id

Internet Source

<1 %

49

Arif Billah, Md Ahbabur Rahman, Md Tareq Bin Hossain. "Factors influencing Muslim and non-Muslim consumers' consumption behavior: A case study on halal food", Journal of Foodservice Business Research, 2020

Publication

<1 %

50

Ratih Hendayani, Yudi Fernando. "chapter 84 Missing Part of Halal Supply Chain Management", IGI Global, 2019

Publication

<1 %

51

Syayyidah M. Jannah, Hasan Al-Banna. "HALAL AWARENESS AND HALAL TRACEABILITY: MUSLIM CONSUMERS' AND ENTREPRENEURS' PERSPECTIVES", Journal of Islamic Monetary Economics and Finance, 2021

Publication

<1 %

52

Mahmut Selami Akin, Abdullah Okumuş. "Shaping the consumers' attitudes towards Halal food products in Turkey [1]", Journal of Islamic Marketing, 2020

Publication

<1 %

Exclude bibliography On