Exploring factors of choosing halal cosmetics among cosmetics entrepreneurs in Malaysia

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Abstract
Halal cosmetics is expanding well in the manufacturing sector. It has gained the government’s attention to support its development. Generally, the halal industry has been divided into seven sectors which are food services, consumer goods, financial, pharmaceutical, cosmetics, halal logistics, and tourism. This study attempts to address the influencing factors for choosing halal cosmetics among cosmetics entrepreneurs. The researcher adopts the quantitative method to gather data from the respondents. A random sampling technique was used. The findings indicate that the awareness among young halal cosmetics entrepreneurs is very high and there are high consumptions of halal cosmetics among consumers that have become the push factor of young cosmetic entrepreneurs to choose halal cosmetics as their products.

Keywords: Halal cosmetics, cosmetics entrepreneurs, halal industry, manufacturing sector.

Introduction
According to Global Islamic Economy 2017/2018, halal market demand is increasing day by day in the Islamic economy and is targeted to reach about RM12.3 trillion by 2021. According to the report, the most leading is the food industry. The halal certificates have been given to many food industries in Malaysia-by-Malaysia Islamic Development Department (JAKIM). However, their next concern is maintaining halal, quality, and safety of the food during handling, processing, transporting, and storing. Consequently, Halalan Toyyiban Risk Management Plan (HTRMP) has been introduced by Badruldin et al. to help in managing the halal and toyyiban supply chain, start from the procurement until it reaches the consumers [1].
According to Badruldin et al., it is compulsory to have the halal authority to manage and control the halal supply chain in the right way [1]. There are many influencing factors for halal practices, which include the technological, organizational, and environmental (TOE) factors. Moreover, it is found that customer pressure, organizational readiness, and perceived benefits influenced the intention to adopt halal services [2]. From the perspective of a business, halal becomes a new market force and brand identifier which is now moving into the mainstream market, affecting and changing perception on how business should be conducted, including from a marketing point of view [3]. Baharuddin et al. asserted that small entrepreneurs take advantage of business opportunities in the Halal industry [2]. As a result, the halal industry has a great potential to increase profit. Industries must understand the requirements for Muslim markets in producing products purposes.

**Literature Review**

Ngah et al. showed that customers pressure, organizational readiness, and perceived benefits were influence by intention to adopt halal warehousing services [4]. Those factors were recognized as the drivers of adoption. The main barrier, which is cost, has been identified. Besides that, Azmie et al. identified that halal standards influence the adoption in a perspective of Malaysia’s practices whereby technological context, which refer to compatibility and perceived benefits, organizational context contained supporting management, halal integrity, organizational readiness, halal awareness, understanding practices, and expected business benefits [5]. Furthermore, for the context of environmental, government support, competitors support, consumer’s pressure and halal market demand have been identified as the market orientation.

The Halal Industry Development Corporation (HDC) website listed seven key sectors that form the halal industry, which are food services, consumer goods, financial, pharmaceutical, cosmetics, halal logistics, and tourism. Technology, organization, and environment (TOE) is a combination of three structure groups to identify the adoption of innovations which include technology context, organizational context, and environmental context for the organization [6]. As for the organizational context, it describes the characteristics of the organization and the environmental context refers to the organization’s industry and its competitors, customers, and governmental structures. The key driver for the halal industry is the increased demand for services with the ability to supply the demand. It is shown that the current supply is not enough to meet the demand for 1.8 billion people globally.

Based on Allied Market Research (AMR), the halal cosmetics market has expanded its product base to prominently tap into the cosmetics market owing to an increase in demand for halal cosmetic products worldwide, particularly regions dominated by Muslim population such as Malaysia, Indonesia, Saudi Arabia, and UAE. These factors are rising demand for halal cosmetics, which resulted in an increasing halal cosmetics market size by 2022. The global halal cosmetics market is segmented based on product type, application, distribution channel, and geography. For the product type, it is segmented of personal care products, color cosmetics, and fragrances, while the application includes hair care, skincare, face care, and beauty care. Next, halal cosmetics market distribute the products by offline and online channel and geographically in North America, Europe, Asia-Pacific, and LAMEA.
Sugibayashi stated computed that halal cosmetic products must not contain ingredients derived from pig, carrion, blood, human body parts, predatory animals, reptiles, and insects, among others [7]. In the preparation, processing, manufacture, storage, and transport of halal cosmetic products, maintenance of hygiene and pure conditions must be always ensured. There is an emphasis on the absence of filth. Hence, halal cosmetic products bearing the halal logo must be recognized as an indicator of cleanliness, safety, purity, and quality.

Methods
The researchers adopted a quantitative method. A random sampling method was selected. A questionnaire was used as the data collection instrument. There were two sections which include section A, the respondents’ profile and section B, the influencing factors of choosing halal cosmetics among cosmetics entrepreneurs. Section A has 7 items which were gender, age, race, status, and involvement in the cosmetic industry and income per month, while section B consisted of questions related to the influencing factors in choosing halal cosmetics among the cosmetics entrepreneurs. Respondents were asked to indicate their perceptions and agreement towards the statements in the questionnaires by using five-point Likert Scale answers. The sample was 250 respondents around Selangor who were the entrepreneurs of halal cosmetics who used social media as the medium of promotion.

Results and Discussion
The total number of respondents was 250. It is found that 26.8% of them are male while the remaining 73.2% are female. Most of 53.2% of the respondents which was in the range of 18-25 years old and above, followed by 26-33 years old with a percentage of 28.4%, 34-40 years old with a percentage of 14.8%, while the remaining of 3.6% was above 40 years old. The respondents were 86.4% of Malay, 3.2% from Indian, 4.0% Chinese, and the remaining is 6.4% from international respondents. 47.6% of respondents have been operated their business for less than one year, 46.8% is between one to five years, 2.8% is between five to ten years, and the remaining 2.8% is more than 10 years of operation. % Of respondents have heard about Halal cosmetics before. 24.4% of them have had the information through newspapers or magazines, 27.2% was on television or radio, 4.8% was through government publications, and 43.6% are from others. The summary of the respondents’ background is in Table 1. Based on the findings, it is apparent that halal cosmetic awareness is very high. However, there is more to do by the government to promote halal cosmetics among consumers.

Based on Table 2, the mean for compatibility was 3.98 ± 0.768, perceived benefits was 3.952 ± 0.779, management support was 4.004 ± 0.763, organizational readiness was 4.048 ± 0.742, understanding practices was 4.116 ± 0.810, expected business benefits was 4.048 ± 0.867, awareness was 3.940 ± 0.836, halal integrity was 4.000 ± 0.801, government support was 4.024 ± 0.801, competitors pressure was 3.952 ± 0.790, consumers pressure was 4.044 ± 0.729 and halal market demand was 4.104 ± 0.774.

Understanding practices was the main factor that influences choosing halal cosmetics among cosmetics entrepreneurs. The finding is consistent with what has been found by Ruževičius [8]. He indicates that consumers of the non-Muslim country consider halal products as healthy and safe to be consumed however the majority acquires more information on the quality of the Halal products. Consequently, an understanding of the enablers and the barriers is essential to
understand the actual situation which occurs in the halal industry and ultimately provide information about the industry to the government [4].

**Table 1. Respondents’ Background**

| Item                  | Percentage | Item                  | Percentage |
|-----------------------|------------|-----------------------|------------|
| Gender:               |            | Year of operation:    |            |
| Male                  | 26.8%      | <1                    | 47.6%      |
| Female                | 73.2%      | 1-5                   | 46.8%      |
|                       |            | 5-10                  | 2.8%       |
|                       |            | >10                   | 2.8%       |
| Age Group:            |            | Heard of halal:       |            |
| 18-25                 | 53.2%      | Yes                   | 90%        |
| 26-33                 | 28.4%      | No                    | 10%        |
| >40                   | 3.6%       | Channel heard of halal: |          |
| Race:                 |            | Newspaper/            | 24.4%      |
| Malay                 | 86.4%      | Magazines             |            |
| Indian                | 3.2%       | Television/radio      | 27.2%      |
| Chinese               | 4.0%       | Government publications | 4.8%      |
| International         | 6.4%       | Others                | 43.6%      |

**Table 2. Descriptive statistics on influencing factors in choosing halal cosmetics among cosmetics entrepreneurs.**

| Factors                  | Mean         |
|--------------------------|--------------|
| Compatibility            | 3.980 ± 0.768|
| Perceive benefits        | 3.952 ± 0.779|
| Management support       | 4.004 ± 0.763|
| Organizational readiness | 4.048 ± 0.768|
| Understanding practices  | 4.116 ± 0.774|
| Expected business benefits | 4.048 ± 0.868|
| Awareness                | 3.940 ± 0.836|
| Halal integrity          | 4.000 ± 0.801|
| Government support       | 4.024 ± 0.801|
| Competitor’s pressure    | 3.952 ± 0.797|
| Consumer’s pressure      | 4.044 ± 0.729|
| Halal market demand      | 4.104 ± 0.774|

**Conclusions**

This initial study has indicated two essential findings related to halal cosmetics: 1) The awareness among young halal cosmetics entrepreneurs is very high, 2) There is also high consumptions of halal cosmetics among consumers that become the push factor of young cosmetic entrepreneurs to choose halal cosmetics as their products.

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Technology Facilitation Assessment for Malaysia Halal Quality Assurance for Food and Beverages, Consumer Goods, Logistics, and Cosmetics Industry

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Abstract

This study aimed to identify the appropriate characteristics of assistive technology to facilitate the quality control process in halal industry segments, namely, food and beverages, consumer goods, logistics, and cosmetics. For this purpose, four separate research projects were conducted to cover these four different industry segments. This paper combined the findings and provided a compilation of all the results. Questionnaire surveys were distributed during the 13th Malaysian International Halal Showcase (MIHAS 2016) as the pilot study. Main data collection was done on the industry in Johor in the southern part of Malaysia. The seven elements of technology characteristics selected for this study are speed, convenience, integration, auto-report, customizable, cost, and data accessibility. Findings of this study show that each industry segments have different technology characteristics preference. Nevertheless, the majority of respondents agreed that technological assistance in halal quality control is vital in helping companies to ensure the halal integrity of their products and services.

Keywords: Facilitation assessment, assistive technology, facilitate quality, halal industry.

Introduction

Halal certification by the Department of Islamic Development Malaysian (JAKIM) is the highest Halal logo recognized worldwide. Malaysia is the only country that has its halal authority under the government department. Malaysia has the most comprehensive halal standards, guidelines, and manuals to date compare to other nations in the world. Malaysia is the first country in the
world to introduce Halal status and Halal logo in 1971 and the first halal standard (MS1500) in 2004 [1]. This portrays the commitment of Malaysia in gearing to be the world leader in the halal industry.

Currently, Malaysia has gazette 13 Halal standards addressing seven industry categories. On top of that, there are other related documents such as halal manuals, guidelines, and procedures. A halal product or service should portray the highest quality of product and services. Sungkar et Al. stated that halal integrity means that the halal product is being sourced, produced, stored, and distributed in the manner coherent with the Islamic values, where these are in line with the modern and universal values such as high quality and safety, hygienically produced with respect for animal welfare and traded [2]. This also means to achieve the halal status; a product and service not only need to comply with shariah law but also pass the other quality accreditations such as MESTI, GMP, HACCP, ISO, and other related quality assurance accreditations. Although all these quality documents are very important in helping to uphold the integrity and quality of halal products and services, to read thru, understand, identify, and compile the related clause and develop the appropriate checklist are very tedious and exhaustive. A finding from a preliminary study shows that complying with JAKIM halal certification is perceived as costly, tedious, and time-consuming.

This study focused on technology as part of the solution in overcoming the problems mentioned. The importance of information technology (IT) has increase and rapidly becoming the most important factor in productivity and cost reduction [3–6]. Weston claimed that IT could act as a feedback mechanism to users who are keen on measuring productivity. This may refer to acquire rapid and accurate information and improve communication links. Technology should also be friendly enough for users to feel at ease in performing their tasks. This posits that to change the industry’s unhealthy perception of the process of acquiring halal certification, and at the same time promote the industry to adopt halal, and information technology can be proposed as the possible solution to the current problems. This study was intended to achieve two objectives; 1) to identify the technology requirements that the industry needs in helping them to pursue or carry the tasks in managing halal quality control, 2) to evaluate the perceived significant technology requirements for industry to conform the halal quality standard.

**Literature Review**

An extensive literature review has been done to really understand the current situation of halal implementation in Malaysia. Numerous areas of subjects in regards to halal control and certification have been reviewed, and among them are the concept of halalan toyibban, haram critical control point, halal application process, current halal certification technology and technological characteristics of what is perceived as useful and ease by technology user.

**Halalan Toyibban and Haram Critical Control Point (HrCCP)**

Halal has been widely accepted as one of the quality indicators for high-quality products and services. Currently, products and services that bear the status of halal, especially from halal JAKIM, will gain a higher market value. JAKIM halal logo has been recognized as the most preferred halal brand as it represents the Shariah law as well as other quality standards. Halal should not only be viewed from the perspective of the product is being produced but also on handling of the product throughout all processes of it reaching the consumers. This complete
supply chain cycle is referred to as “from farm to fork.” This concept should ensure that there would not be any cross-contamination between halal product and non-halal substance, which will result in the halal product turn to be non-halal (haram) or subhah. There are seven categories of halal certification schemes in Malaysia: food and beverages, cosmetics, pharmaceuticals, consumer goods, logistics, food premise, and slaughterhouse.

On top of complying with standards based on the seven schemes to acquire halal status, a company must identify Haram Critical Control Point (HrCCP) in their working process. HrCCP is a critical point in the production of goods process that can cause the finished product to be haram or subhah and unsafe to be consumed by humans. HrCCP plays a vital role in the halal assurance management system which, is the main element of enquiring Halal status. HrCCP is closely related to the audit process where the halal checklist is prepared, basically to ensure the HrCCPs are monitor systematically. Moreover, the proper control and monitoring of HrCCPs should be supported with supporting documents and evidence.

**Halal Application Process**

Application of halal certification from JAKIM will involve three main phases, namely application process, audit process, and approval process, as shown in Figure 1. These stages involve both parties, companies as applicants and JAKIM as the certification body [7].

![Figure 1. Process Flow of JAKIM Halal Certification](image-url)
Among these processes, the most critical and complex is the audit process. The audit process is divided into two parts: document audit and site audit. Document audit will be done after the applicant submitted the online application form, followed by submitting all relevant supporting documents within five working days. Failing to do this will cause the application not to be processed and the application will be reset, and a new application form needs to be re-submitted. If all documents are completed, JAKIM auditors will conduct a site audit at the applicant's premises. According to JAKIM auditor, most applications failed due to the unreadiness of the company in terms of providing supporting documents as evidence that they have fulfilled the halal standard requirement.

Furthermore, the company also needs to prove that they have a halal monitoring system incorporated in their business process [8]. Understanding the requirement, standards, and procedures of halal certification is very challenging and overwhelming to some companies, especially first-time applicants. This situation has impeded the motivation of companies to pursue halal certification, particularly by small-medium enterprises.

**Halal Certification Technology**

Technology is an instrument that was created to facilitate processes or daily affairs. The term “technology” is not easy to define due to time and the different levels of understanding among researchers and philosophers. However, Oxford Dictionaries, technology is defined as the application of scientific knowledge for practical purposes, especially in industry. In the perspective of business, BusinessDictionary.com defined technology as the purposeful application of information in the design, production, and utilization of goods and services and in the organization of human activities. Frank et al. stated in their study that information technology has not only to play a great role in total quality management (TQM) but also facilitate the process in the main act as an enabler [9]. The study by Brah et al. has conformed the same for TQM in logistics companies [10]. Therefore, there is no doubt that technology is crucial for a total quality management system to work effectively and efficiently. According to Husny et al., there are eight technologies have been developed specifically to support halal certification activities [11], as shown in Table 1.

**Table 1. Halal Certification Technology**

| No | Type            | Category          | Introducer                                      |
|----|-----------------|-------------------|------------------------------------------------|
| 1  | My e-Halal      | Web-Based Technology | JAKIM                                          |
| 2  | JAKIM My SMS 15888 | Mobile Phone Technology | JAKIM                                          |
| 3  | HaFYS Technology | Machine Technology  | Halalysis Sdn. Bhd.                            |
| 4  | MyMobilHalal 2.0 | Mobile Phone Technology | Syahrul Junanini and Johari Abdullah            |
| 5  | HDC Halal Widget | Web-Based Technology | HDC                                            |
| 6  | HDC i-Kiosk     | Machine Technology  | HDC                                            |
| 7  | HDC Nokia Apps  | Mobile Phone Technology | HDC                                           |
| 8  | HDC iPhone      | Mobile Phone Technology | HDC                                           |

The technology listed was developed to provide information on the halal status, whether it is halal certified or not. To date, there is no research and development focus on assisting the industry to ensure their product and services comply with the halal requirement. Surprisingly, this is the most crucial part of getting to be halal certified that more study to be conducted.
Formation of Research Model

Based on the literature reviews and preliminary study, a conceptual framework has been developed based on seven characteristics of technology assistance needed to facilitate industries in monitoring their halal quality control activities. These characteristics are also looked from the perspective of its perceived usefulness and perceived ease of use of Technology Acceptance Model (TAM) [12–14]. Characteristics identified from literatures were then used in the preliminary study to validate the characteristics, which then form the research constructs. During the preliminary study four experts in halal industry and information technology has been interviewed. The characteristics chosen for this study are: 1) speed, 2) convenient, 3) integrated, 4) auto-report, 5) customizable, 6) cost-effective, and 7) transparency of data. This is important to achieve halal certification from JAKIM. Figure 2 shows the conceptual framework for this research.

**Figure 2.** Research Conceptual Framework

Methods

Survey Distribution and Data Collection

Malaysian International Halal Showcase (MIHAS) 2016 was chosen as the venue for pilot study as local and international Halal companies in various sizes from micro to multinational, are gathered in one place to showcase their products. The result achieved from the reliability test for a pilot study showed that the questions used in the questionnaire survey are reliable with Cronbach alpha, α = 0.643. The questionnaire was improved for the use of main data collection. The respondent distribution of each industry segment is as shown in Table 2.

**Table 2.** Survey Respondent Distribution

| Industry        | Sample size | Total Respond | Valid |
|-----------------|-------------|---------------|-------|
| F&B             | 62          | 63            | 46    |
| Consumer        | 53          | 36            | 36    |
| Good Cosmetics  | 52          | 39            | 39    |
| Logistics       | 50          | 50            | 50    |
| Total Company Participated | 171         |               |       |
The sample size was based on the company's population for each industry segment in Johor Bahru, Malaysia. One hundred seventy-one companies have participated in this survey [15–18]. Four types of halal industry segments: F&B, consumer goods, cosmetics, and logistics were chosen to represent the highest number of company establishments in Johor. A 5-point Likert scale was used to allow the respondent to express how much they agree or disagree to the statements in the questionnaires. Ranging from strongly disagree to strongly agree. The research design is shown in Figure 3.

**Figure 3. Research Design**

The main data collection was done using an online survey. Invitation email to 400 Malaysian Halal certified companies in Johor that consist of 28% of F&B, 24.4% consumer goods, 24% cosmetics, and 23% logistics. 176 (43%) valid responses were received within 30 days. The researcher has performed the reliability test and achieves a better result of $\alpha = 0.843$. According to Tabachnick & Fidell, smaller sample size of 150 - 200 cases should be sufficient to perform analysis if the solution has several loading maker variables above 80 [19].
Results and Discussion

Overall, the findings acquire from data collected show that strongly agree are the highest bar in all charts for all industry segments. This shows that most of the respondents have strong agreement that all characteristics evaluate is important to them in choosing technological solutions. This has clearly shown in Figure 4.

\[ \text{NOTE}: 1 = \text{Speed, 2 = Convenient, 3 = Integrated, 4 = Auto-report, 5 = Customizable, 6 = Cost-effective, 7 = Transparent.} \]

**Figure 4.** Response Chart

To achieve the second objective of this research, mean tests were conducted for each technology characteristic in each industry segment. Analysis from the mean test shown in Table 3 demonstrated that speed (4.1), convenience (4.0), auto-report capability (3.86) are the most preferred characteristics that the industry had selected to be incorporated in their technology solutions [15–18].

| Technology Characteristics | Mean   |
|----------------------------|--------|
| Speed                      | 4.10   |
| Convenient                 | 4.00   |
| Auto-Report                | 3.86   |
| Transparency of data       | 3.76   |
| Cost-Effective             | 3.77   |
| Integrated                 | 3.67   |
| Customizable               | 3.58   |

The highest characteristics demand is at speed at 4.10 followed by convenience at 4.00. These two characteristics played the most important role to the industry when it comes to having technological support in assisting them to meet JAKIM halal requirements. Other characteristics such as integrated, auto-report generated, customizable, cost-effective, and transparency of data are also important where the mean analysis result showed above 3.5 for all constructs, which these range between unsure (3) to agree (4).
This research provides a foundation for future empirical studies on technology requirements for halal quality management. This study has delivered major evidence for the contention that all seven characteristics of the study, namely speed, convenience, integrated, auto-report, customizable, cost-effective, and transparency of data, are important and needed by the industry to assist them in applying for halal certification. Gaining halal status for a company is an added value, especially in competing with another halal producer in the global halal market.

The significant contribution of this study is to identify the technology features that industries need to look for in helping them to comply and monitor with Malaysia Halal certification and quality requirements. Technology developers can use these research findings to develop technologies that would really suit the industry's needs. Besides that, another significant contribution of this study is to encourage future research on multifarious dimensions and the contribution of technology design and development specifically for the halal industry, for instance, the application of the 4th Industrial Revolution in halal business operations. Exploratory and explanatory research can be conducted on the application of the internet of things, blockchain, smart logistics, robotics, big data, etc. in halal supply chain processes.

To summarize, this study has succeeded in stipulating evidence to achieve the objectives outlined for this research. Seven important categories of technology characteristics have been identified. All seven of these characteristics are significant where all these categories are needed and perceived as important by all four segments of the industry studied. Speed and convenience are the top two desired characteristics for a technology. This explained that in the current business situation, industries are always looking for the fastest way but convenient to use in doing their work. Cost is not the major issue if they are able to get the job done in the quickest time. This is shown from the finding where cost-effective falls at number five.

This research is limited to only four halal industry segments instead of seven; there were F&B, consumer goods, cosmetics, and logistics. The industry segment that was not included in this study is pharmaceuticals, slaughtering house, and food premises. This research also only concentrated on Johor-based companies and studied the general characteristics of technology solutions. However, from these limitations comes the opportunity for future studies. A study could be carried out on industries beyond the boundary of Johor state. A comparison analysis can be conducted to see the differences and the common preference of technology characteristics between states in Malaysia. This study can also be extended to the other three industry segments that are pharmaceuticals, slaughtering houses, and food premises. Another good study could also be conducted on looking to a specific technology such as mobile technology, cloud services, and data analytical dashboard. These studies will give a much more concise and specific finding that will benefit both users and the system developers.

Conclusions
In conclusion, technology that can increase speed and at the same time be convenient and easy to use may be more desired by the industry regardless of the cost. Besides that, understanding the desired characteristics of technology is the necessary enabler of promoting the development of suitable technology to assist the halal industry. Finally, this study has also made a major contribution to future innovation in technology application in the halal industry by providing the characteristics required by the industry in assisting them to be players in the halal marketplace.
Data Availability

Readers able to access the data underlying the findings of the study by contacting HOLISTICS Lab Sdn. Bhd.: http://holisticslab.my/ or contact the correspondent author.

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Sharia compliance as the potential factor for halal tourism destination development

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Abstract

The substantial potential of Indonesian halal tourism expansion has obtained society's immediate attention. It is reflected in Indonesian Muslim majority society’s religious enthusiasm, potentially appealing halal tourism destination resources, and the economic potential to enhance social welfare. Recently, society has put tourism as one of their needs, not as their leisure activity. Many tourists in Indonesia have been declared as halal tourism sites. However, many people perceive halal tourism as a mere trend and brand adopted due to the halal substantial, like hotels and restaurants. Therefore, a sharia principle is critically required to be the fundamental or guideline for the halal concept implementation. The halal concept can be successfully implemented if sharia compliance has expanded. Besides, the establishment of halal tourism should also follow the sharia principles to ensure the adoption of sharia values due to the considerable number of tourists. Sharia compliance becomes one of the Muslim identities, as shown from the role of the Muslim clerics on the scientific forum and research that articulate halal tourism establishment carries excellent opportunity to improve society's economy and well-being. Therefore, social compliance is the potent factor to be consistently cultivated through Indonesian halal tourism potential.

Keywords: Sharia compliance, halal tourism destination, potential factor, social compliance.

Introduction

Currently, the formal or non-formal halal certification or halal guarantee of a product has been frequently discussed in public. As the Muslim majority country, Indonesia can establish a system of halal products and tourism destinations. The discourse on this topic has also been promoted by various forums and communities that adopt halal terms, including halal tourism. The numerous tourism destinations in Indonesia create the massive potential to be developed into halal tourism. Consequently, society aspires the local and center government to enact a relevant policy that can
be comprehensively implemented. It will bring tremendous effects on the social economy and welfare.

Tourism has been placed as one of the people's purposes and needs. Thus, the enactment of relevant regulation facilitates proper management, primarily on the society's manner on the halal tourism system and administration. Indonesia has an abundance of tourism resources, but with no intensive coaching for the business actors and users in each tourism site, the regulation will not be adequately applied. Many regions and countries have claimed to be the center of halal tourism (with more than one tourism site), but some only place the halal term as a label to attract more local and foreign tourists. Almost none of the local government policies have included training on the importance of sharia compliance for the society that has adopted halal tourism. The examples of sharia compliance implementation on the halal tourism destination are the organization management, supporting facilities and infrastructures, the provided product, the product on sale, and so forth.

Recently, the Indonesian government has instituted Law No. 33, the Year 2014, on the halal product guarantee. The law describes the halal product as the product that has been declared halal, following the sharia. It even suggests all products have this halal certification. Some universities are also advised to have the Institution of Halal Certification. This institution is expected to facilitate the audit of a product to attain the halal certification [1]. Indonesia's Muslim majority society has been the benchmark for the formally legitimated halal certification on product and non-product. The enactment of regulation will not produce significant results with no society's compliance and determination to implement the sharia consistently.

Halal certification is not a mere label or symbol that increases sales performance to generate more profit. It instead acts as the halal guarantee (the absence of the elements prohibited by the sharia or religion). As for the Muslims, sharia compliance becomes an obligation. Society demands that the halal label does not only signify the commercialization gain that aims to attain profit, but it should indicate sharia compliance. Thus, the commitment to follow Islamic teaching can be the factor that maintains society's faith toward halal labels and certification. Besides the sharia compliance adoption in the halal guarantee system, the accessible bureaucracy is also required in filing halal certification. This halal certification system should also prepare intensive education and training to maintain the commitment and consistency toward sharia compliance. Intensive training and education should also involve regulation based on Islamic teaching that substantially guides people. It also aids the government in carrying out Law No. 33, the Year 2014 on the halal product guarantee. Society's necessity on the halal guarantee is not only limited to the food and beverage product but also to the services and their management system. As the concept of halal tourism, society demands the proper halal substantial. Therefore, the sharia compliance regulation that obligates people to attend formal or non-formal intensive training and education is needed as an element to develop halal tourism destinations.

**Sharia Compliance**

Etymologically, the word sharia is adopted from the term syara’a (شريعة), which means an object that is widely open. Then, the word sharia, that is meant the source of drinking water formed. The Arabic, later, connotes the term with a straight line to pursue [2]. Terminologically, Muhammad Ali al-Sayis translates sharia as the straight direction. It was then expanded into ‘the law that rules
human behavior from the detailed postulates.' [3]. Syekh Mahmud Syaltut defines sharia as the laws and regulations prescribed by Allah for His devotees. From those definitions, sharia can be defined as the primary and subsidiary laws on human behaviors based on Al-Qur'an and the hadiths of the Prophet [2].

The predominant sources of Islamic teaching are Al-Qur’an and hadiths. With many theorems related to an issue, a scientific methodology on sharia laws has been accurately and adequately summarized and explained. A mastery in sharia education helps people precisely comprehend Al-Qur’an and As-Sunnah, as taught by Muhammad SAW. Conversely, without a proper sharia comprehension, Al-Qur’an and Sunnah can be perverted and utilized in the wrong way. Thus, sharia is the key to understand Al-Qur’an and Sunnah in a proper, scientific, and Saheeh methodology. Every Muslim should better understand sharia, compared to aqeeda, morals, and other fields. Sharia and fiqh are placed in the most robust area in Islamic teaching. Even Islamic clerics are frequently referred to as someone with excellent sharia knowledge, not the other type of knowledge. Thus, sharia intelligence is essential to be comprehended. It is common for a Muslim to have no expertise in Arabic, hadith, interpretation, usul al-fiqh, and so forth. However, Muslims should comprehend sharia knowledge, especially the fiqh, even if only in a limited portion since with no fiqh comprehension, Muslims will not perform proper worship. They are not obligated to understand sharia education perfectly, but they are required to comprehend the primary part, such as the parts related to praying, marriage, taharah, and so forth [4].

In addition, compliance means following a particular standard, specification, or law that has been distinctly regulated by an authorized institution or organization. The scope of regulation can be national or international, such as international standards ruled by ISO or other national laws. Compliance represents social effects from a direct or indirect request from other people. It refers to someone’s willingness level to receive or reject the inquiry from other people. One of the psychological constructs massively studies it in the social psychology field, specifically in prosocial behavior. Robert C. Cialdini is the figure who has completed a series of research through direct observation in this field [5]. In conclusion, sharia compliance can be defined as obedience toward sharia that is explained in Al-Qur’an and hadiths. Muslims are responsible for consistently complying with sharia since it becomes their need to perform worship based on their aqeeda. Sharia compliance symbolizes their submission and resignation to Allah, as their pledge to their faith as the worshiper of Allah.

The compliance toward an institution or system can be measured through legitimacy theory. The theory represents a situation where the institution's strategy is linear with the applied system so that the institution has managed to run its approach following the valid norm and rule. The implemented norm or value in an institution significantly affects the level of its users' compliance to apply that norm or value. An entity’s behavior is always assumed to represent his or her willingness, classified as proper, and follow the implemented standards. Society legitimacy to an institution is an essential strategic factor for the institution’s development in the future. In improving sharia compliance, some efforts are required. First, protective, through ensuring conformity toward regulation, rules, and standards adopted from analysis in the halal certification system and requirements, and during the supervision and inspection. Second, constructive, by maintaining the frugality of sources and maximum results efficiency using objective information and productive suggestion during the review on every management level. Third, consultative, by
providing a useful recommendation for all management staff as the policy perfection to obtain the organization purpose. It is also completed to prevent all possible risks and distortion while also increase the efficacy of resource usage [6].

Tourism in Sharia (Al-Qur’an and Hadiths)

Islam is a religion that comprises all human living aspects, including aqeeda (theology), sharia (law), and morals (ethics). The sharia aspects are divided into worship (ritual) and muamallah (socio-cultural). The muamallah are specified into the factors related to God and the ones related to other human beings. Tourism can be classified into the social community and socio-cultural aspects (muamalah). In Arabic, tourism is associated with the term rihlah that means a journey or safara. The word safara and its derivatives have been mentioned 12 times in al-Qur’an. Meanwhile, the term sara and its derivatives have been discussed 27 times in Al-Qur’an, such as in the surah of al-Qashash: 29; al-Thur: 10 (in the form of f’il mudhari’ and mashdar); Yusuf: 10, 19, and 109; al-Hajj: 46; al-Rum: 9 and 42; Fathir: 44; al-Mukmin: 21 and 82; Muhammad: 10; Ali Imran: 137; al-An'am: 11; al-Nahl: 36, al-Naml: 69; al-Ankabut: 20; Saba’: 18 (mentioned in the form of f’il amr and mashdar); al-Kahfi: 47; Yunus: 22; al-Ra’id: 31; al-Naba’: 20; al-Takwir: 3; Thaha: 21; and al-Maidah: 96 [7].

Islam always instructs its devotees to travel or have a journey and move away while doing kindness for the world and hereafter. It is explained in the Al-Qur’an, in the form of amr (command). Allah also commands humans to have a journey that regards and observes everything they see in detail. It is instructed in some verses below.

Say, O Prophet, "Travel throughout the land and see how He originated the creation, then Allah will bring it into being one more time. Surely Allah is the Most Capable of everything (Surah al-Ankabut: 20). Have they not traveled throughout the land to see what the end of those destroyed was before them? They were far superior in might. But there is nothing that can escape Allah in the heavens or the earth. He is certainly All-Knowing, Most Capable (Surah al-Fatir: 44).

Those two verses indicate that humans will attain additional value on the rihlah, followed by detailed observation (taddabur) since it reminds them of their position as Allah adherents in the earth. Thus, their rihlah carries amusement and reward from Allah. Further, Al-Qur’an also illustrates that if humans are willing to look at their surroundings, they will see the regulation applied for them in the form of the as-Sunnah. Additionally, Al-Qur’an also accentuates that a tourist destination should have security assurance and supporting infrastructures for the tourists, as mentioned by a traveler named al-Qurthubi in comprehending Surah Saba’s: 18 [8].

We had also placed between them and the cities1 We showered with blessings many small towns within sight of one another. And We set moderate travel distances in between, saying, "Travel between them by day and night safely." (Q.S. Saba’: 18). Therefore, supporting facilities should be provided, including security, to assure tourists’ safety and comfortability during their rihlah. In relation to sharia or halal tourism, Hakim, et al. [9] argues eight standard factors of administration and management of sharia tourism, namely:

1. all provided services should pursue Islamic principles,
2. the staffs and guides should adopt discipline and respect toward Islamic principles,
3. ensuring that all activities do not contradict Islamic principles,
4. the buildings should reflect Islamic principles,
5. the restaurants should adhere to the international standard of halal services,
6. the transportation service should be equipped with a proper security system,
7. places that facilitated tourists to worship should be provided,
8. and should not give access to areas that contravene Islamic principles.

Halal or sharia tourism are those that implement sharia in their operational management aspects and destination. In the application of sharia principles, Muslims’ sharia compliance should be ensured, along with good deeds and tolerance for the followers of other religions [10]. The sharia tourism term is also frequently referred to as halal tourism. However, society has declared some opinions on this idea. During the forum group discussion (FGD), the Indonesia council of ulama (MUI) strictly explains that sharia tourism and halal tourism are held based on Al-Qur’an and used as their fundamental [11]. However, the actual reality creates different perceptions from people. One of the Indonesian figures argues that even if it is carried out based on Al-Qur’an, halal tourism provides hygienic and healthy infrastructure, such as restaurants and hotels, while sharia tourism comprehensively implements Al-Qur’an and hadiths in all its tourism aspects. The name of sharia tourism exhibits the robust sharia principal application, so it gives the impression of being less flexible. Society has already presumed that sharia and halal tourism should place Al-Qur’an and hadiths in their development and management [12].

Methods
This study used a qualitative research method that described the potential of halal and sharia tourism in Indonesia and sought to interpret the data. It was selected to investigate the sharia compliance related to the halal tourism establishment. The data were collected from some identification completed through observation, journal articles, interviews with tourism actors, results of FGD, and other references relevant to tourism and its management system [13]. The study used the phenomenology approach, which according to Creswell, is one of the qualitative approaches that observe the related participant to identify the phenomena occurring in their life. The data were collected to be translated into the meaning conveyed by the participants. Essentially, the phenomena of halal tourism development aimed to understand someone’s journey in depth. Meanwhile, the sharia compliance of the tourist, business actors, and tourism destination management became the benchmark of the data collection in this study. The obtained data were described and reported in this article.

Results and Discussion

Sharia Compliance in Halal Tourism Destination Development

In the last three years, the dynamics of tourism is affected by the increase of travel between countries and economic growth, primarily in the Asia Pacific. The number of world tourists in 2014 has reached 1.110 million overseas trips, which shows a 5% growth from the previous year. In that year, more than 300 million (27.1% of the total number of world tourists) went to Asia, of which 96.7% went to Southeast Asia. Meanwhile, in 2015, the world tourist journey still grew by 4.5% during the unstable global situation. That growth is still considered as significant. The global economy started to enhance in 2016 and became the driving factor of tourism growth. Similarly,
Indonesia also recorded 9.3 million tourists in 2014 and 10.4 million in 2015 (increased by 2.9%), while foreign tourists reached 12 million in 2016.

Compared to the other Southeast Asia countries, Indonesia has been placed in the fourth rank of tourism country below Thailand, Malaysia, and Singapore. If observed from the tourist nationality, Singaporean, Malaysian, and Chinese people become the three most significant foreign tourist contributors in Indonesia; meanwhile, the top three non-Asian tourists come from Australia, England, and the United States of America [14]. With this massive advancement in tourism, the public has paid particular attention to the expansion of the national and international halal tourism destinations. The improvement of the halal tourism industry brings an increase in Islamic economic development. Therefore, society’s sharia compliance aids the implementation of regulation and the concept of halal tourism in some destinations. The term halal in the tourism industry will not be perceived as a label or even commercialization anymore if it is equipped with maximum management and supervision.

**Sharia Compliance in Halal Tourism Management Efficacy**

Sharia compliance in the halal tourism management in each destination is crucial since Indonesia has an abundance of tourism potential ranging from a beautiful panoramic view to its great ocean. Halal tourism concept carries some requirements, such as Islamic organization management, sufficient worship places, separated toilets that fulfill the standard of sanctity, an activity limitation among men and women, and so forth. These regulations result in the comfort of domestic and foreign tourists. Furthermore, Al-Qur’an also explains that if humans are willing to pay proper consideration, they will notice that some requirements are implemented within their environment and themselves (physically and spiritually) (as-Sunnah). In the other parts, Al-Qur’an also emphasizes the importance of security assurance and supporting infrastructure in a destination. Therefore, a comfortable and secure atmosphere for domestic and foreign tourists is composed. The sharia compliance should be practiced by the tourists, along with all tourism elements, such as an investor, management, staffs, and other related business actors.

Indonesia is placed in the 50th world position in the tourism competitiveness aspect since its tourist number continuously increases. The improvement in the tourism sector enhances the economic activity and the local society’s welfare. The halal tourism concept will be maximally adopted if supported by sharia compliance of the community. That way, it will generate significant opportunities for local and foreign investors. It is enhanced by society’s consistency and commitment in managing the various natural beauties and potential while also practice the sharia provision as part of their worship.

**Sharia Compliance in the Tourism Human Resources Activity**

The Director-General of Tourism Marketing will conduct human resources training, capacity building, and socialization. Besides, the government also gathers information from other countries which have implemented the halal tourism concept, such as Malaysia, while also held socialization and communication with the Association of Indonesia Tourism Actors (ASPRI) to ensure the halal level of each destination. Halal tourism requires the assistance of facilities and services provided by the surrounding society, local, and central government that follow the sharia principles. Thus, coaching and education on sharia compliance are also needed. Many people
choose halal tourism since it gives products and services that reflect sharia value. Therefore, the human resources involved in this sector should comprehend and has the commitment to practice sharia in their activity. The previous government formulated activity should be carried out, while the human resources in the tourism businesses should be intensively educated and trained.

Islamic teaching places a journey or travel as a part of worship, as the practice of hajj and umrah as commanded in the fifth pillars of Islam. Besides, in Islam, traveling is also counted as knowledge and learning sources, or invitation to worship Allah (Qur'an Surah At-Taubah:112, al-An'am: 11-12, al-Naml: 69-70). The tourism activity demonstrates worship to Allah and the sharia compliance practice.

**Sharia Compliance as Tourist Attraction in society business or Small and Medium Enterprises Empowerment**

Within the Indonesia Law No. 10, The Year 2009 regulates the tourism attraction, area, transportation service, tour, food, and beverage provider, accommodation, entertainment, and recreational activity, meeting organizer, intensive tour, conference and exhibition, tourism information service, tourism consultation, tour guide, and spa. The tourism development is carried out following the integral national, provincial, and local tourism development master plan. Indonesian tourism laws also declare that tourism functions to fulfill the tourists’ physical, spiritual, and intellectual needs while also increasing the country’s revenue in realizing society welfare.

In the explanation of Indonesia Law No. 10, the Year 2009 on tourism, sharia compliance is positioned as an element that easily enhances the attractiveness in the small and medium enterprises (SMEs) field. The related business actors that practice sharia compliance helps the tourist to trust their service and feel secure in purchasing the product. Thus, sharia compliance should be adopted by the SMEs to ensure the improvement of Islamic creative economy activity and social well-being since it reduces unemployment and poverty rate. It is all disambiguated on the consistency to practice sharia values that become the principle of Islamic aqeeda. The security and convenience of the tourism destination are appreciated by both Muslim and non-Muslim tourists since it puts sharia values as rahmat al-lil ‘alamin. As described by the Indonesia Council of Ulema, halal tourism should promote halal and safe products consumed by Muslim tourists. However, non-Muslim tourists can also produce the products. In 2014, the ministry and Indonesia Council of Ulema tried to formulate the halal standards, but it has not been effective. Sharia compliance holds an essential role to be enforced. The Indonesia Council of Ulema has emphasized that sharia tourism is part of da’wah for Muslims, while it becomes healthy and safe tourism for non-Muslim since it has passed observation from the Indonesia National Agency of Drugs and Food Control (BPOM). The enactment of Law No. 33, the Year 2014 on the halal product guarantee, describes that all products should have halal certification to be more appealing for the consumers in the tourism or SME sectors.

**Conclusions**

Halal tourism destinations can be established by maximally implement sharia compliance. Society’s sharia compliance creates substantial opportunity and power within halal tourism development. Halal tourism should always regard sharia compliance and implement sharia values. Indonesia has strong and numerous natural and cultural potential, along with the iconic
Muslim majority religious tourism. These considerable halal tourism potentials can be enhanced by (1) sharia compliance in the tourism destination development; (2) sharia compliance in halal tourism management efficacy; (3) sharia compliance in the tourism human resources activity; (4) sharia compliance as the tourist attraction in the social business or SMEs since most of the tourist in visit the religious destination in the top 50 tourism destination in Indonesia. Sharia compliance becomes one of the Muslim identities, as proven from the Islamic clerics’ role in the scientific forums and studies that declare the establishment of halal tourism destinations carries substantial opportunity to enhance society’s economy and well-being. Therefore, sharia compliance is a robust factor in developing halal tourism destinations in Indonesia.

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Tilapia fish collagen: Potential as halal biomaterial in tissue engineering applications

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Abstract
Collagen is a natural bioactive polymer widely utilized in tissue engineering applications due to its biocompatibility and biodegradability. Collagen derived from mammalian sources such as porcine and bovine is commonly used as biomaterials. However, due to religious concerns, the halal status of collagen must be put into consideration. Since most of the mammalian collagen is hampered by its haram origins, marine collagens are widely investigated as alternatives for mammalian collagen in tissue engineering applications. Even though the marine collagens are safe and easy to extract, these sources of collagen are hindered by their low denaturing temperature. Tilapia fish (Oreochromis niloticus) has long been studied for its potential to substitute mammalian collagen for biomedical purposes due to its higher thermal stability compared to other marine sources. We herein review the potency of tilapia collagen as a biomaterial for tissue engineering applications. In this review paper, we mainly focus on the application of tilapia collagen in the skin, bone/dentin, neural and corneal tissue engineering.

Keywords: Tilapia fish collagen, tissue engineering, halal biomaterial, biomedical.

Introduction
In Islam, halal is defined as permissible (not forbidden by Shariah), whereas haram is defined as not permissible. Halal is no longer considered a mere Muslim’s responsibility, but it is considered a way of life for Muslims as well as non-Muslim worldwide. The halal status is not limited to only dietary intake, but it covers a lot of other areas such as cosmetic, pharmaceutical, and medical device products. In 2019, the Department of Islamic Advancement of Malaysia (JAKIM) has expanded halal certification for medical devices, and the standard was published as “MS 2636 2019 Halal Medical Device-General Requirement” by Standards Malaysia due to demand
in proposals for specific new products, changing in the classification of medical products and the use of critical ingredients in manufacturing medical devices.

Collagen is known as a critical ingredient in the development of various medical devices including devices derived from tissue engineering (TE) technology due to its nature of origins. Traditionally, most of the collagen is extracted from mammalian sources such as porcine and bovine. However, these sources are hampered by limited applications due to religious concerns (halal status) and the risk of diseases such as bovine spongiform encephalopathy and aphthous fever disease [1]. Therefore, a variety of marine sources were identified as a safe source of collagen and now replacing mammalian collagen for TE purposes. Moreover, the extraction of collagen from the fish by-products would lessen the environmental impact created during the decomposition process and gives an added value to these wastes. However, unlike collagen from terrestrial sources, that of aquatic origin have few disadvantages in terms of sources dependent composition variation and low denaturation temperature [2]. Thus, improvement of physicochemical and biological properties of marine collagen are required so that they can be effectively employed as scaffolds for biomedical applications.

Tilapia fish (*Oreochromis niloticus*) is one of the main fish groups used to develop biomaterials for TE due to its higher denaturation temperature than other marine groups. Over the years, more research has proved the potential of the collagen extracted from skins, scales, and bones of tilapia in substituting mammalian collagen for TE purposes. We herein review the potency of tilapia collagen as a biomaterial in TE applications.

**Tilapia fish collagen**

The tilapia fish species are native to Africa and Middle East and now has been cultivated and crossbreed in almost all tropical climate countries and subtropical regions. Tilapia species has become the most important food fish and was known as aquatic chicken due to their fast growth rate, adaptability to a wide range of environment conditions, high rate of reproducibility, easy feed and processing [3]. Oreochromis is the most common genus being cultivated and crossbreed producing hybrids. Nile tilapia (*Oreochromis niloticus*), blue tilapia (*Oreochromis aureus*), and tilapia from Mozambique (*Oreochromis mossambicus*) are the common tilapia species being cultivated in most of the countries. During industrial processing, approximately 60%-70% of by-products are being produced, including skin, scales, and bones [4]. These parts are rich in collagen and other bioactive molecules. Most of the time, collagens are extracted from Nile tilapia (*Oreochromis niloticus*) species.

**Tilapia fish collagen – applications in TE**

Tissue injury or organ failure due to severe disease or trauma becomes a major healthcare problem. The available options such as tissue or organ transplantation are limited by the accessibility of a compatible donor and could be very costly [5]. Therefore, TE, an integration of biological science and engineering to regenerate biological substitute for repairing or replacing a damaged tissue or organ, gives a better alternative. TE involves three components; cells, scaffold (3D polymeric matrix), and growth factors [6]. Among these three components, scaffold acts as an important medium for restoring, maintaining, and improving tissue function [7]. Scaffold plays its role in tissue repair and regeneration by providing an appropriate platform, allowing
the essential supply of numerous factors related to survival, proliferation, and differentiation of cell [8,9]. Thus, the scaffold requires particular characteristics such as it must be biocompatible and biodegradable, possesses mechanical properties comparable to the replaced tissue, and support cell attachment and growth [10]. Most of all, it should mimic the ECM in terms of the morphological structure and chemical composition for the cell attachment, proliferation, and differentiation to be occurred [11]. The selection of biomaterials to construct 3D scaffold must be carefully carried out as it has direct influences on cellular behaviors.

Skin tissue engineering

Extreme loss of skin function and structure due to injury and disease may lead to physiological disturbances and subsequently major disability or even death. Current advances in TE catalyze the development of improved cultured skin tissue substitutes. Tissue-engineered skin substitutes for wound healing have progressed enormously over the last couple of years. There are several skin scaffold types such as porous, fibrous, hydrogel, microsphere, composite and acellular [12]. Synthetic and highly biocompatible natural materials have been used to develop skin substitutes and become alternatives to traditional wound-healing strategies and tissue regeneration.

In the field of skin TE, collagen-based skin substitutes are effective in accelerating wound healing by supporting a suitable environment for fibroblast and keratinocyte proliferation [13], [14]. The most commonly utilized forms of collagen-based biomaterials for wound healing and TE purposes are the fibril-forming collagen [15]. In this fibrillar collagen, fibrils are formed from the assembly of tropocollagen triple helices, which then agglomerate to form fibers [15]. Numerous studies have reported the use of tilapia fish collagen in different types of collagen-based scaffold formulations for wound and burn to repair, including collagen-based sponges, electrospun collagen nanofibrous, collagen composite film, and drug-loaded collagen hydrogel. The presence of tilapia collagen in the composite scaffolds enhanced several properties of the skin scaffolds. For instance, composite porous scaffolds made of chitosan, tilapia fish skin collagen, and glycerine were proved to facilitate fibroblasts and keratinocytes infiltration, adhesion, proliferation, and support new tissue development [16]. In addition, the high amount of fish collagen and glycerine improved the porosity, mechanical strength, biostability and cytocompatibility of the scaffolds [16].

In a similar study, better properties of chitosan-collagen (derived from tilapia fish skin) porous scaffolds were obtained by incorporating zinc oxide nanoparticles [17]. In this study, the 2.0% zinc oxide chitosan-collagen porous scaffolds were shown to have the highest fibroblast proliferation [17]. In a different study, electro spun PCL/ collagen (tilapia fish skin collagen) composite scaffolds with different contents of Nile tilapia skin collagen were fabricated and investigated for their biological activities [18]. The results indicated that L929 mouse fibroblasts were actively grown during the 5 days of cell culture without experiencing cytotoxic effects [18]. Due to the synergetic effects of PCL and collagen, the proliferation of L929 fibroblasts were found to be significantly higher on the PCL/collagen scaffold compared to that of control group [18]. The scaffolds with a collagen concentration of 8% and 10% were proved to be superior to others in cell adhesion and biocompatibility [18]. The fish skin collagen might affect intracellular signaling and cell response. In a different study, the hydrophilicity of Poly(3-hydroxybutyrate-co-4-hydroxybutyrate) (P(3HB-co-4HB)) films was significantly increased by incorporating
tilapia fish collagen [19]. Subsequently, the collagen blend scaffold surfaces were found to have higher fibroblasts adhesion and growth than that of the control. In addition, improved cytocompatibility was reported in the collagen blend film [19]. Incorporating collagen with other polymer materials may result in better properties for skin tissue substitutes. The RGD peptide sequence found in collagen is recognized by the cell surface, allowing the attachment of cells to ECM.

**Bone/dentin tissue engineering**

Critical-sized defects in bone mainly caused by traumatic injury, bone-related diseases, primary tumor resection, or orthopedic surgery have in many cases may not be capable of repairing themselves by means of mechanical fixation alone. These defect scenarios need a substitutionary material to fill the bone defect. Several bone TE strategies, including acellular scaffolds, gene therapy, growth factor delivery, cell transplantation, and stem cell therapy, have been applied to address the above issues. Practically, bone TE requires the combination of the listed strategies. A tissue-engineered scaffold that mimics the complicated physiochemical attributes of bone may serve as a platform to incite the body’s natural biological response to tissue damage and promote a natural healing process that does not occur in critical-sized defects. Various biomaterials, including ceramics, metals, polymers, and composites, have been studied for their potential as bone scaffold materials. Natural polymers especially collagen has been widely utilized in bone scaffold development due to its biological features, network and porous structures and mechano-elastic behavior suitable for bone TE purpose [20]. In addition, collagen fibers become the principal sources of tensile strength of bone tissues by providing a framework for hydroxyapatite deposition for further remodeling [21]. Collagen can be combined with other biomaterials such as hydroxyapatite, chitosan, calcium phosphate, and alginate to form scaffolds with different mechanical and biological properties [22]. Fish collagen becomes an emerging player for biomedical applications due to the pathological risk of mammalian collagen [23]. Furthermore, fish collagen peptides were proved to promote posttranscriptional modification for collagen maturation and gene expression for osteoblasts differentiation [24,25].

Unlike skin TE that utilized tilapia collagen mostly from the skin part, collagen derived from tilapia scales is commonly employed in bone TE applications. For instance, 3D porous scaffolds were fabricated by a combination of tilapia scale collagen and microbial transglutaminase (mTGase) enzyme to manipulate human mesenchymal stem cells to form osteogenic cells [26]. In this study, mTGase acted as a catalyst to preserve the inherent properties of collagen. The study was conducted by comparing the performance of tilapia scale collagen and porcine collagen on the biological properties of the fabricated scaffolds. The ALP activity of tilapia scale collagen-coated dish and scaffolds with or without mTGase were significantly higher than that of porcine collagen samples [26]. These results indicated that osteoblastic differentiation was greatly enhanced in the presence of tilapia scale collagen with/without mTGase. Furthermore, the late osteoblastic differentiation stage of hMSCs was shown 30-fold higher in the mTGase crosslinked tilapia scale collagen scaffolds than in the mTGase crosslinked porcine collagen scaffolds after being cultured for 3 weeks [26]. The early stage of osteoblastic differentiation in hMSCs was remarkably accelerated on a tilapia collagen surface due to specific fibril formation of tilapia collagen [27]. A fibrous collagen membrane was shown to have higher ALP activity than a non-fibrous collagen membrane even before adding osteoblastic differentiation medium, suggesting that the degree of the fibril formation of tilapia collagen affected the osteoblastic
differentiation of hMSCs. In addition, calcium deposition increased significantly in hMSCs cultured on tilapia collagen-coated dishes compared with porcine collagen-coated dishes, indicating tilapia collagen could facilitate the deposition process [27]. Effect of type I collagen derived from tilapia fish scale on odontoblast-like cells was also investigated [28]. Biocompatibility study of the collagen showed two-fold enhancement of the attached cells as compared to control. The cells were greatly induced to differentiate toward odontoblast lineage as proved by increased ALP activity on day 7, improvement of ALP, BSP mRNA expression on day 7 and 10, as well as enhanced mineralization on day 9 [28]. Biocompatibility of tilapia scale collagen was also evaluated for tissue regeneration in the oral-maxillofacial area [29]. Odontoblast proliferation, differentiation, and mineralization in tilapia scale collagen exhibited comparable performance to porcine collagen [29]. Since the future use of mammalian collagen may be hampered by religious restriction, bovine spongiform encephalopathy (BSE), foot and mouth disease, underutilized tilapia scale collagen offers a potential alternative for the mammalian collagen and might be useful for bone and dentin-pulp regeneration.

**Neural tissue engineering**

The nervous system is the most important system in the body since the sensory and motor functions are highly dependent on this system. Injuries to this system affect the body's functions and could be lethal for humans. However, due to the complexity of this system and its restricted ability to regenerate, the restoring process has always been a challenge for neurobiologists and neurologists. To date, several scientific approaches have been suggested to restore the function of a damaged nervous system, including cell therapies and TE [30]. Novel strategies that combined biomaterials, cells, and growth factors provide a potential solution to tackle these neurological disorders. Induced pluripotent stem cells (iPSCs) hold great potential for cell therapies and TE [31]. The ability of iPSC to differentiate and develop into functional cells is one of the crucial component in developing regenerative medicines [31]. A combination of biochemical factors and mechanical properties of the ECM could determine the fate of stem cells. Tissue stiffness of the ECM is one of the mechanical properties that affect the determination of iPSCs fate toward specific cellular subtypes [32]. For iPSCs to differentiate into neural lineage choice, the stiffness condition of living brain tissue must be reproduced in vitro. A study by Iwashita et al. has successfully mimicked the stiffness of living brain tissue in vitro using tilapia skin collagen gels [32]. The tilapia collagen gels were crosslinked with a combination of 1-ethyl-3-(3-dimethylaminopropyl)-carbodiimide (EDC) and N-hydroxy succinimide (NHS) to produce a steady softer range of collagen gel that mimics brain tissue. A stiffness of 150-1500 Pa (like adult brain stiffness) with high reproducibility was obtained at a ratio of NHS to EDC is 0.1. Pluripotent cells were shown to differentiate into neural lineage and promoted the production of dorsal cortical neurons when exposed to the tilapia collagen gels [32]. These findings demonstrate that the tilapia collagen gel could be used for neural induction from pluripotent cells and provide a crucial development for neural regenerative applications.

**Corneal tissue engineering**

Corneal damage is a major cause of blindness worldwide, second only to cataracts. Trachoma, corneal opacities, and childhood blindness could lead to corneal blindness [33]. Currently, corneal transplantation is considered the main method for visual restoration treatment in corneal blindness patients. Full-thickness replacement of penetrating keratoplasty was the first
method used to perform corneal transplantation and prevails as the most common method [34]. Nevertheless, the availability of corneal donor tissue becomes the fundamental problem with the corneal replacement method. A severe shortage of donor tissue, limited access to drugs such as steroid and antibiotic, and lack of skilled surgeons, resulting in increased number of untreated patients [33]. Therefore, artificial corneal substitutes have been studied to overcome the shortage and problems associated with human donor corneas.

Synthetic prostheses and tissue-engineered constructs were developed to facilitate the regeneration of the host tissue and restore the cornea’s refractive function [35–37]. 3D scaffolds made from biomaterials could mimic the corneal stroma and provide a suitable environment for the patient’s own corneal cells to repopulate and regenerate [35,38,39]. The scaffolds can be synthetically fabricated or harvested in an almost ready state. The human corneal stroma comprises mainly of type I collagen, organized in orthogonal lamellae, resulting in enhanced tensile strength in the cornea [40]. Thus, collagen could be the most suitable material used to construct an artificial corneal scaffold. In addition, the already existing collagen scaffold in nature may reduce the fabrication cost and promise an adequate resource for clinical transplantation [41]. Fish scales are primarily composed of connective tissue protein and collagen (up to 81%), covered with calcium phosphate and calcium carbonate. Therefore, acellular and decalcified fish scales may serve as an effective collagen scaffold that induce regeneration of the damaged cornea by emulating the functions of the highly natural ECM scaffolding of the cornea.

Tilapia fish scales are known to have parallel-arranged collagen fibers, mimicking the human corneal stroma [42]. Several previous studies have reported the potential of decalcified tilapia fish scale collagen scaffolds for corneal regeneration [34,41–45]. Lin et al. developed decalcified tilapia scale collagen scaffolds to serve as an in vitro template for culturing the corneal cells [42]. The natural 3D microstructure sustains its initial structure even after being acellularized and decalcified. The fabricated scaffolds displayed good rabbit corneal cell proliferation and biosynthetic activity after 7 days of cultivation [42]. The micropatterned structures of the decalcified scales are not only facilitating cell attachment but also guiding cell migration through multiple parallel channels [42]. In a different study, the light-scatter and light-transmission properties of tilapia fish scale collagen matrix were investigated. The amount of scattered light was similar to that seen in an early cataract. Meanwhile, the light transmission was comparable to the transmission through the human cornea [41]. Rat keratoplasty model was used for corneal transplantation studies at three different surgical sites (anterior lamellar keratoplasty-ALK, interlamellar corneal pocket-IL, and subconjunctival-SC). Different degrees of haziness, pupil obscureness, and inflammation were generally seen at those implanted sites [41]. This experiment showed that the fabricated decellularized scaffold has sufficient light transmission values and is suitable for use in keratoplasty. The same research group performed an in-depth study to determine the suitability of a tilapia fish scale-derived collagen matrix for corneal reconstruction [45]. The results showed no cytotoxicity effects, normal phenotype markers, and no inflammation or sensitization. Moreover, the implanted corneal led to a transparent cornea, healthy epithelium, and no immunogenic response [45].

In a separate experiment, morphological and physiological properties of decalcified tilapia scale collagen implants were studied using 6 months of follow-up of rabbit model [34]. The implanted
cornea displayed a clear surface with no haze and ulcer detected up to 6 months postoperatively. In addition, no immune response, dissolution, fragmentation, and degeneration were observed after a long-term evaluation [34]. The potential of acellular and decalcified tilapia fish scale collagen as an ideal artificial cornea substitute was also proved by investigating its biocompatibility towards primary human corneal endothelial cells (HCEnCs) [44]. In line with the previous research, the scaffolds displayed correct morphology, cytocompatibility, and no toxicity for HCEnCs [44]. Previous studies revealed that the new approach of using acellular and decalcified tilapia fish scale collagen scaffold might yield an ideal artificial cornea substitute for long-term inlay placement. However, regulatory compliances like that of advanced therapy medicinal products are needed for further clinical use.

Conclusions

The review clearly narrates that tilapia fish collagen has potential uses in TE. Considering the factors involved in scaffold fabrication, such as denaturation temperature and issues related to biological safety, collagen originating from tilapia fish is thought to be a suitable biomaterial to replace mammalian collagen for use in clinical regenerative medicine. The higher thermal stability of tilapia fish collagens compared to other marine sources justifies its utilization in TE. However, further animal experiments are needed before the collagen can be applied clinically.

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Mapping Out Halal Certification in Indonesia and Malaysia: Challenges, Opportunities, and Comparative Advantage

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Abstract

This study sought to map out the institutions and processes of halal certification in Indonesia and Malaysia by investigating the history, procedures, challenges, and opportunities. Data were gathered through interviews with those working in halal certifying related institutions, such as MUI and BPJPH in Indonesia, and JAKIM in Malaysia, in addition to several halal auditors from universities in both countries. A close reading of primary documents issued by halal certification institutions and secondary documents, academic articles, and online resources was conducted to better understand the issues at hand. The results suggest that while historically halal certification in Indonesia and Malaysia came from two different trajectories, the two finally converged in acknowledging the important role of the state and government in terms of Muslim consumer protection in relation to their halal needs. Nonetheless, their differing evolutionary paths, which was partly the function of the relative status of Islam in both, had eventually shaped the character of their halal certification. Originating from an organic civil society movement, halal certification in Indonesia traversed through a more stable and culturally consolidated process, while in Malaysia, it took the political highway with its attendant ups and downs. If Indonesia managed to create “umbrella halal law” overseeing other lesser provisions, Malaysia had to accept the fact that federation had some imprint on its vast array of dispersing halal provisions, if often compensated with some mending for improvement. Finally, the character and size of the population of each contributed to making Indonesia be more inward-looking and Malaysia outward-looking in their halal certification management.

Keywords: Halal certification, challenges, opportunities, comparative advantage.
Introduction

The global halal industry has grown exponentially due to the significant growth of the Muslim population, their awareness of Islamic rulings on halal and haram [1], the increase of purchasing power among Muslim consumers [2], and the expansion of halal market itself that has now included non-Muslim as both consumers and players [3]. The steady rise of halal demand has accordingly created a variety of international halal assurance initiatives, especially through the establishment of halal certification bodies and the ratification of halal laws in different countries, Muslim and non-Muslim alike [4].

The implementation of halal assurance system is essential in order to ensure the effective and efficient production of halal products and services [5], the key component of which is a halal certification process [6]. Halal certification is the process of certifying products or services to be compliant with the shariah law [7], in terms of permissibility, in addition, in certain cases, to other standards of quality [8], such as health, hygiene, environmental friendliness, and respect for animal welfare. While initially it was enforced on products and services for Muslims’ consumption, primarily due to religious requirements, halal certification is now considered a certification standard for quality in general [9].

Halal certification, however, did not actually start in the Muslim countries, but in the United States in the mid-1960s, initiated by food and technical Muslim experts, primarily to serve the need of Muslims in fulfilling their religious obligation and to preserve their identity in the midst of other, non-Muslim, communities [6]. In the beginning, halal certification applied almost exclusively to food products and beverages, but over time it began to include nonfoods, such as cosmetics and pharmaceutical products, and even services, such as logistics, travel, and tourism [3,10,11]. Today, halal certification is the prerequisite for entering the global halal market [6]. Furthermore, the present halal market is non-exclusive to Muslims but has gained increasing acceptance among non-Muslim industry players and consumers, who associate halal with ethical consumerism [8]. Thus, halal accreditation serves as a benchmark for food safety, quality assurance, and other useful indicators, not only for Muslim but also non-Muslim customers [12], [13]. Unexpectedly, the largest exporting producer of halal and poultry, for instance, were non-Muslim countries, such as New Zealand and Australia [3].

This paper aims to map out the halal certification process in Indonesia and Malaysia, probe the historical development, identify its institutions and procedures, scrutinize the challenges and opportunities, and, finally, weigh on the comparative advantage to one another. It is important to study halal assurance system whose implementation is essential to ensure the effective and efficient production of halal products. Halal assurance system is developed based on three zero’s concepts, which are zero limit (no haram material used in the production), zero defect (no haram product is produced) and zero risk (no disadvantageous risk should be taken by the producer or company). Consequently, the structure for halal assurance systems plays a vital role in integrating the processes that assist the establishment of value within firms and across the supply chain [5].

Methods

This study of halal certification in Indonesia and Malaysia was conducted through a combination of interviews, document analysis, and literature review. Interviews were undertaken with
personnel who were working in halal-related institutions in both countries, including MUI and BPJPH in Indonesia, and JAKIM in Malaysia, in addition to some halal auditors in universities, such as Universitas Airlangga and Universiti Putra Malaysia. Official documents analyzed were those officially issued by both governments and halal certifying institutions, accessible in print and online. The literature review was accomplished by surveying a number of secondary sources, especially relevant published academic articles, gained through http://link.springer.com, https://www.sciencedirect.com/, http://tandfonline.com/, and https://scholar.google.com/. Issues addressed included the evolution of halal certification efforts, institutions, and procedures, in addition to some challenges faced and opportunities expected. All gathered data were then confronted with each other, which eventually led to a comparative analysis that delineated the relative comparative advantage of halal certification management in Indonesia and Malaysia.

Results and Discussion

History of Halal Certification in Indonesia and Malaysia

In terms of its origin, the initiative for halal certification in Indonesia and Malaysia came from two different paths. In Indonesia, the idea of halal certification was generated within, and subsequently run, by the Indonesian Council of Ulama (MUI, Majelis Ulama Indonesia), which was a non-governmental socioreligious institution, while in Malaysia, it was cultivated by government and used to be the only one in the world with the government full support in this respect [14]. The more likely reason for that was the different status of Islam within each state [15]. While both are equally Muslim countries, Malaysia has made Islam as the official religion of the state, and Indonesia is politically secular, in that it treats all officially recognized religions, including Islam, on an equal footing [16]. Consequently, the next trajectory of halal certification in Indonesia and Malaysia, once again, took different dynamics.

In Indonesia, the history of halal certification has taken a relatively linear route, consisting of two major phases, namely before and after the promulgation of Law No 33 of 2014 about Halal Product Assurance (UUJPH, Undang-Undang Jaminan Produk Halal) [17]. Before UUJPH came into existence, MUI was the sole institution responsible for halal certification in Indonesia [9]. Two of its sub-body, LPPOM MUI (the Assessment Institute for Food, Drugs, and Cosmetics, Lembaga Pengkajian Pangan, Obat-obatan, dan Kosmetika), established in January 1989, and the Fatwa Commission, played a major role in this task. LPPOM carried out the examination of the ingredients contained in a product, while the Fatwa Commission determined the compliance of the product at hand with the Shariah law [18].

In so doing, MUI signed a memorandum of understanding (MOU) with the Ministry of Religious Affairs, which was followed by the issuance of the Decree of the Minister of Religious Affairs (Keputusan Menteri Agama, KMA) No 518 of 2001 and KMA 519 Year 2001, which strengthened MUI position as the halal certifying institution with an authority to examine/audit, issue fatwa, and publish a halal certificate. In addition, LPPOM-MUI worked hand in hand with BPOM (Agency for Food and Drugs Control, Badan Pengawasan Obat dan Makanan), Ministry of Religious Affairs, Ministry of Agriculture, Ministry of Cooperatives and Small and Medium Enterprises, Trade Ministry, Ministry of Industry, Marine and Fisheries Ministry, Ministry of Tourism and Creative Economy, and several universities. Regardless, it was MUI that had the full authority for halal certification, while its relation with the other institutions was largely
coordinative as well consultative [14]. Halal Certification Standard of LPPOM MUI was based on the Halal Assurance System Concept on Food, Drugs, and Cosmetic (HAS 23000), Guidelines of Halal Assurance System Criteria of Slaughterhouses (HAS 23103) and Requirements of Halal Food Material (HAS 23201) [14].

When UUJPH came into existence, the Indonesian government had since taken over the authority for halal certification in the country [19]. Based on the mandate of the new law, the Indonesian government, in October 2017, established a state-owned institution, namely BPJPH (Badan Penyelenggara Jaminan Produk Halal, Halal Product Assurance Organizing Agency) as the new main body responsible for halal certification [20]. The promulgation, in Indonesia, of Law No 33 2014 on Halal Product Assurance has brought about legal certainty in terms of halal assurance, especially through halal certification. Sociologically, the presence of such law created a sense of comfort and safety in society, especially Muslims, about production and consumption. Economically, the same law of Halal Product Assurances opened up new revenues and business possibilities [21].

Although the authority for halal certification in Indonesia has formally been transferred, on the basis of Law No 33 of 2014, from MUI to BPJPH, this does not necessarily rule out the significant role that MUI could play in the future [22]. MUI has been successful in building its highly respected reputation as a trusted halal certifier, domestically and internationally, through its LPPOM [9]. In fact, MUI had created a viable model of halal certification institution that BPJPH inherit and may improve it where necessary. Therefore, while retaining much less authority than it had previously had, MUI could still maintain a vital role, as stated in Article 10 of UUJPH, about halal auditor certification, stipulating halal status of a product, and LPH accreditation.

Meanwhile, the evolution of halal certification in Malaysia, including its institutions, nomenclatures, regulations, and scope of authority, has been unstable and confusing, to say the least, and it was further complicated by the fact that Malaysia is a federal state that acknowledges the existence of dual government at the central and state level, which has accordingly affected the management of halal certification. Institutionally, it started in 1968, when the Malaysian Council of Rulers decided that there was a need for a body that could mobilized the development and progress of Muslims in the country. As a result, the Secretariat of the National Council for Islamic Affairs of Malaysia was formed to protect the purity of faith and teachings of Islam. The Secretariat was later expanded to become the Religious Division, under the jurisdiction of the Prime Minister. Given the important role of the body to maintain and preserve the interests of Muslims, this religious division was then upgraded to become the Islamic Affairs Division (BAHEIS, Bahagian Hal Ehwal Islam), which began to issue halal recognition letters for food and consumables, produced by local entrepreneurs, in Malaysia since 1974. Starting in 1994, Halal certification was no longer in the form of recognition, but in the form of a certificate, together with Halal logo, to be used or displayed on the goods. On January 1, 1997, the Islamic Development Department of Malaysia (Jabatan Kemajuan Islam Malaysia, JAKIM) was established by the government to take over the role of BAHEIS [23,24]. Irrespective of further internal dynamics [25], today JAKIM is the core body that controls the administration of the Malaysian halal certification and issues halal logos [1,9]. However, apart from JAKIM whose jurisdiction is on the federal level, the State Islamic Religious Department (JAIN, Jabatan Agama Islam Negeri) or State Islamic Religious Councils (MAIN, Jabatan Agama Islam Negeri) are
also accepted bodies for halal certification on the state level. If JAKIM has the authority to issue a halal certificate for domestic and multinational products, JAIN/MAIN is to issue a halal certificate for domestic products only [9,12,26]. Prior to the year 2009, there used to be different halal logos that the states applied. However, the Malaysian government then did some harmonization and adopted only Malaysia halal logo for all states [9].

To complicate even further, in addition to JAKIM, JAIN, and MAIN, there are other public institutions that deal with halal related matters, namely Halal Industry Development Corporation (HDC), Ministry of Domestic Trade, Co-operatives and Consumerism (MDTCC), Ministry of Health (MOH) and Ministry of International Trade and Industry (MITI). Together, these seven agencies share huge responsibility for halal assurance in Malaysia, and they all play a certain role, albeit, intriguingly, acting according to their own terms of reference [24]. Apologetically, the involvement of so many different agencies in handling halal industry was due to its broad scope, in which a jurisdiction overlap is inevitable. Objectively, however, it is the absence of a single legislation, which specifically regulates this industry as a whole, that led to the involvement of the various government agencies in it [26]. However, the two main agencies that are often associated with Halal certification in Malaysia are JAKIM and HDC. JAKIM is focused on halal certification and compliance with halal standards, while HDC is focused on the development of local and global halal industry and marketing of halal products [23].

Malaysia does not have Laws concerning halal products, but it has 13 sets of provisions to support halal certification and also 9 standards for the development of the halal industry: 1) Trade Act of 2011 (Trade Law of 2011), 2) Food Act 1983, 3) Food Rules of 1985, 4) Regulations on Food Hygiene of 2009, 5) Animal Rules, 6) Animal Act of 1953, 7) Animal Regulations of 1962, 8) Animal Slaughtering, 9) Public Livestock Progress of 1983, 10) Law on Public Livestock Progress of 1983, 11) Law of Kastam 1967 (Prohibition of Import in 1998), 12) Law of Kerajaan Tempatan 1976 (Deeds 171), and 13) Local Government Act (PBT), Act/Enactment of Islamic Administration; and Trade Stamp Certificate 1976 [12]. In addition, there are more than 20 certificates that can be referred to the halal certification in Malaysia, formulated for different government agencies with different rights and powers [12,23,24]. There is no ‘umbrella law’ that serves as the supreme law of halal related matters in Malaysia.

**Halal Certification Procedure in Indonesia and Malaysia**

The promulgation of UUJPH was a milestone in the history of halal certification in Indonesia, distinguishing its two major phases. Prior to the existence of UUJPH, halal certification in Indonesia was voluntary, administered by a non-governmental institution, i.e., MUI. After the advent of UUJPH, halal certification in Indonesia became mandatory. In fact, when it is fully implemented, Indonesia would be the first country in the world to require halal certification for every product in its market [17].

The establishment of BPJPH in 2017 by the Ministry of Religion of the Republic of Indonesia was a fulfilment of one of the mandates of UUJPH. BPJPH will facilitate the general administration process of halal certification [27], including registration, testing, and certification process. Based on the UUJPH, the procedure for obtaining a halal certificate will involve BPJPH, LPH and MUI. First, business actors must submit a complete document as well as a written application for a
halal certificate to BPJPH. Business actors can also choose LPH based on the preference or proximity of their business location to the LPH and BPJPH. BPJPH then determines LPH who has the right to test the halal of the product within a maximum period of 5 working days from the date the complete application document is submitted. The next stage is checking the halal production process by halal auditors at the business location. If there are ingredients or materials that are vague in terms of their halal status, further testing will be carried out in the laboratory. After obtaining the results, LPH will give the report to BPJPH, which will then be submitted to MUI. MUI would determine the legal status of the product in the fatwa commission session, held no more than 30 working days after MUI received the documents from BPJPH. Once the decision was made, the final document regarding the establishment of halal status of the products is then signed by the MUI to be the basis for BPJPH in issuing halal certificates, within 7 working days after MUI’s final decision. The issuance of the halal certificate must then be published by BPJPH; thus, its use can be monitored by the public.

Figure 1. The Process of Halal Certification under BPJPH [17]

While initially it was planned that by October 17, 2019, UUJPH would be fully implemented but, due to lacking some supporting legislation and infrastructure, BPJPH has yet to wait longer before it could finally operate as expected. In the meantime, the halal certification process in Indonesia is de facto run by MUI, during this transitional period [17]. Overall, the registration steps are the same as before the promulgation of UUJPH, with one notable addition, in that the applicant must, at the same time, send the application to both BPJPH and LPPOM MUI.

Figure 2. The Process of Halal Certification during the Transition Period (https://www.halalmui.org/mui14/main/page/prosedur-sertifikasi-halal-mui)
The transfer of authority for halal certification from MUI to BPJPH yields a number of significant impacts [17]. First, with the government overseeing halal certification, the process is expected to be more efficient, transparent, and accountable, as it can orchestrate all related parties to work in tandem and share the responsibility. Second, the cost is expected to be less expensive since the government has more schemes that can help the applicants, especially when they are classified as micro and small businesses, as stated in Article 44 of UUJPH. Third, the handling of halal certification by government will facilitate more effective multinational cooperation’s due to the relatively high degree of accountability and trust, including mutual recognition of halal certificates between countries, thus eliminating the practice of recertification of products from abroad, which was common in the old system.

In Malaysia, while halal certification is carried out by public institutions, be it on the federal or state level but, unlike in Indonesia, it remains voluntary [28]. Nonetheless, Malaysian government involvement in the halal certification since its inception has made the country highly respected worldwide, and its halal certification is one of the best internationally [26]. Some of the reason for that was inclusion of some evaluating measures that, while not immediately halal-related, improved the quality of the certified product, such as the Hazard Analysis and Critical Control Points (HACCP) standard of quality, and Good Manufacturing Practices (GMP) to enhance to the credibility of halal food in the market, in addition to Good Hygiene Practices (GHP) and the Malaysian Standard MS1500:2004 [1]. Within the array of disperse provisions, the enactment of the Trade Description Act 2011 and two relevant subsidiary legislations, namely the Trade Description (Certification and Marking of Halal) Order 2011 and the Trade Description (Definition of Halal) Order 2011, has been commendable for they have been able to define more clearly the halal concept and to situate better the relations of several halal certification bodies in existence [28,29].

According to the MPFMHC 2014 [30], there are three groups of professionals involved in the process of halal certification, namely the halal auditors, the halal executives, and the halal certification panel. The halal auditors, with qualifications in either Islamic or food technology science, carry out the halal audit. The halal executive, who must be Malaysian Muslim citizens and having a background in Islamic Studies or has undergone a halal executive training, is the person in charge and responsible for managing the halal certification application put in by the company/industry. The halal auditor, after receiving an application from a halal executive of the applicant company, would review the documents, ensure fee payment, conduct compliance audit at the premise, prepare the report, and submit the results to the halal certification panel during their meeting for approval. When performing an onsite audit, the halal auditor would make the necessary report. Any nonconformance must be recorded and detailed out in a Non-Conformance Report and corrective action must then be taken by the halal executive. Once the corrective action is completed and all requirements are fulfilled, the halal executive will resubmit the completed halal certification application to the halal auditor. The final stage of the halal certification process is to forward the application to the Malaysia Halal Certification Panel (HCP) for approval. The decision made by the HCP is final and shall be recorded and kept for future reference. The applicants will then be notified of the status of their application [28].

In February 2006, the e-halal system was launched to enable an online application for halal certification. The purpose of this system was to enhance productivity in the halal certification
process, to give priority to halal certification applications from the industry, and to also serve as a database of companies, businesses, restaurants, hotels, and products. In April 2014, the e-halal system was rebranded as MYeHALAL, which segregated the halal application into seven different categories: (i) Food and Beverages Products; (ii) Consumable Products; (iii) Food Premises; (iv) Cosmetics and Toiletries; (v) Pharmaceuticals; (vi) Logistics; and (vii) Slaughterhouse (under the monitoring and supervision of JAKIM for domestic as well as international products). This application is accessible through JAKIM’s website [28].

Challenges, Opportunities, and Comparative Advantages

There were two types of challenges that halal certification process faced in Indonesia and Malaysia. Internal factors were those emerged in relation to employers or employees within the organization, while external factors were factors that came from outside of the organization.
Internal factors, in this regard, were those related to the halal certifying institutions, such as quality of human resources and services, and legal infrastructure. Meanwhile, external factors problems were those faced or generated by applicants and competitors.

Of the internal factors, the most frequently mentioned were the low competence that the employees of the certifying institutions demonstrated, particularly in terms of their job performance. For instance, lack of manpower was lamented quite often in Malaysia, and it led to workload, and eventually mental stress. On different occasions, lack of manpower was mentioned to be the main reason for poor communication between halal executive and halal auditors. Moreover, halal auditors’ incompetence and lack of skills and knowledge in performing their task, especially when asked certain questions by applicants, had discouraged entrepreneurs to proceed further with their application. Many viewed that such incapable auditors were due to disparity in the recruitment process by Federal and State governments in Malaysia. It became more complicated with the introduction of new schemes, such as halal certification for logistics and pharmaceutical industries that required further learning. Many believed that, if not immediately addressed, this lack of competency could ruin the credibility of the halal authority. Interestingly, the above issues did not apply to Indonesia, as suggested by some Malaysian, stating that the auditors of Majelis Ulama Indonesia (MUI) were knowledgeable in terms of, for instance, the cosmetic scheme, and were fully trained. Similar views expressed in terms of the practicality of online application for halal certification, comparing between MYeHALAL System in Malaysia and MUI’s CEROL system in Indonesia, the latter of which was deemed more reliable. The halal executives voiced out their dissatisfaction with MYeHALAL system, which seems to be outdated and very unstable, as they had often faced technical problems with the system, such as its saving capability and the absence of the person in charge.

On the other hand, MUI’s CEROL system was thought to be much more user friendly. In addition, the applicants in Malaysia were also required to submit the application manually, which was hassle for the halal executives. In terms of legal infrastructure, many applicants complained about the fact that Malaysian halal certification did not have “umbrella law”, which coordinated the wide array of halal provisions. This was a consequence of the fact that halal related matters in Malaysia were governed by different entities with different rights, duties, and powers as well as conflict of jurisdiction. While JAKIM was the main body involved in halal certification and enforcement in Malaysia, it was, however, supported by several other agencies, in which each agency has its own role, jurisdiction and legislation. This issue did not occur as much in Indonesia since halal certification was run by MUI/BPJPH, acting as the supreme leader of halal assurance in Indonesia in general. Any relations and cooperation’s that MUI/BPJPH had with other agencies were mostly coordinative and consultative, and the final decision was within the authority of MUI/BPJPH. Thus, after submitting the application, halal certification applicants in Indonesia did not have to bother with what transpired behind the main door of MUI/BPJPH.

About issues pertaining to applicants especially related to inability to fulfill the requirements of halal certification there was a perception that halal certification was money and time consuming, and complicated. In addition, the lack of proper knowledge in terms halal certification process among applicants was equally rampant in both countries. The same can be said with respect to offences and violation against halal certification provisions. However, the mental
impact that such offences brought about among the consumers was arguably different in the two countries. Malaysian consumers were seemingly more affected than their Indonesian counterparts, which accordingly affected how each perceived the halal authorities and institutions in their respective countries. While in Malaysia JAKIM was often blamed for any offenses occurred in Malaysia, to an extent that consumers might build up some distrust, in Indonesia consumers tended to be more relaxed, and treated such an offense simply as an accident and no representative of something normal and pervasive. This may have something to do with the immediate, or lack of, actions taken by the authorities [23,26,28,32,33].

In terms of competition with other foreign halal certifications, the attitude of Indonesian halal authorities also seemed to be more relaxed than those in Malaysia, more likely due to the different size of domestic halal market in both countries. The sizeable domestic halal market in Indonesia generated some sense of security among its halal authorities, while in Malaysia export was so targeted, for a larger revenue, given the relatively small domestic halal market that it had. Furthermore, Indonesian halal authorities were seemingly confident about the reliability and accessibility of its halal certification considering, among many other, the fact that many companies from Malaysia applied for the halal logo from MUI, because they thought MUI provided proper guidelines, its documentation checklist was comprehensive, and its halal auditors were competent. Comparatively, it was probably justifiable to state that Indonesian halal certification was more accessible than the one in Malaysia, provided the general perception that the latter was much stricter, which was not necessarily a bad thing, for it also required the satisfaction of other standards not directly halal related, but more about refined quality of products. Besides, Indonesian halal logo could be used in Malaysia [8,8]. Finally, self-perception of Malaysian halal certification as the pioneer might contribute something to creating a sense of being chased; meanwhile, as a late comer, Indonesia had no such qualm and, instead, was always eager to catch up.

Regardless, there were commendable assets in Malaysian halal certification that should make Indonesia envy, namely its international campaign through an institution such as HDC and its commitment to produce the best, by including measures that not immediately halal related, such as such as the Hazard Analysis and Critical Control Points (HACCP) standard of quality, Good Manufacturing Practices (GMP), and Good Hygiene Practices (GHP). The combination these are more likely to be more profitable in the future.

Conclusions
Indonesia and Malaysia are equally Muslim countries, but they adopted two different political arrangements, especially about Islam. The unitary state, Indonesia opted to appreciate unity in diversity thus choosing a secular orientation that allowed all recognized religions, including Islam, to be on an equal footing with the rest, regardless of its ascendancy. Malaysia, on the other hand, chose to make Islam as its officially political garb. This political choice had impacted how halal certification was managed in both. In Indonesia, on the one hand, halal certification began as a civil society movement and only much later, when it had been relatively solidified through MUI efforts, it started to render it to the government. In Malaysia, on the other hand, halal certification took a high, if winding, road in its attempts to accommodate the halal needs of Muslims there. Therefore, relatively protected from the fast pace of political Islam of the state, halal certification in Indonesia took a cultural approach in consolidating its halal aspirations by
building a strong foundation upon which further development, albeit gradual, might launch. Malaysia, on the other, proceeded speedily to an extent that progress was more important than solidity. As a result, halal certification in Indonesia was able to solidify by creating mother law to which all other halal provisions refer. Meanwhile, in Malaysia, perhaps under the influence of its federal system, halal certification took a forward direction without a little chance to consolidate internally. The absence of mother law on halal in Malaysia had resulted in the fact that a range of halal provisions that came into existence were, at times, overlapping and conflictual with each other. If the leader institution of halal certification in Indonesia was supreme and the rest follow suit, in Malaysia the Federal government and the States were seldom in competition with one another. Similarly, while the evolution of halal certification in Indonesia took a linear and much simpler route, before and after the promulgation of UUJPH, its Malaysian counterpart often experienced sudden turns, following the dynamic high politics of the state. Eventually, this has impacted the management of halal certification in both, including the mechanism of and attitudes to facing challenges and seizing the opportunities. While halal certification in Indonesia seemed to be more reliably accessible, even in the eyes of many Malaysian Muslims, the halal certification in Malaysia, while aiming at the finest, in the name of a refined quality, was often perceived as strict yet riddled with problems and anxiety.

**Data Availability**

Most, if not all, of data here, read, studied, and interpreted were available and accessible online. As can be seen in the bibliography, each reference has a link to trace.

**Conflicts of Interest**

“The authors declare that there is no conflict of interest regarding the publication of this paper. Any analysis and interpretation presented thereby carries no prejudice to anyone or anything, but completely the consequence of the available data leading to a certain understanding. Therefore, any conclusions made are contestable and open to criticism and revision, as evidence leads”.

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