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*Editorial Note*

## Covid-19 Pandemic: A Blessing In Disguise

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### Main Text

The year 2020 was taken over by a global pandemic with a newly identified coronavirus 2019-nCoV (now known as COVID-19 virus) sweeping across continents since its emergence in December 2019 (Letchumanan *et al.*, 2019). The first COVID-19 case was reported in Wuhan, one of the districts in the People's Republic of China. It most probably had originated from a market selling and serving exotic and endangered animal species such as bats, snakes, rats, etc. The genome sequence of this novel coronavirus has been deposited in the GenBank as reported by Letchumanan *et al.* (2019).

In Islamic perspective, Covid-19 can be considered as one of the diseases that can affect human health. Prior to this, people worldwide were infected with diseases such as H1N1, JE, cholera, tuberculosis and malaria. Infection and death, on a global scale, are not new. Basically, all of these diseases appeared due to the over exploitations by the human lifestyle; people neglecting the environmental ecosystem, eating exotic and unhealthy food, producing waste and pollutants from industries, and so on.

An Islamic legal maxim has stated that prevention is better than cure. This is the reason why Allah SWT has prohibited anything that leads to over exploitation of the world's ecosystem and its consequent damage. Everything created by Allah SWT needs to be in a balanced state (*wassatiyyah*). So, it is unnecessary to consume food for the sake of eating, other than for the protection of life (*hifz al-nafs*). In Islamic teachings, protection of life includes consuming 'Halalan' and 'Tayyiban' food. Hence, Allah SWT instructs man not be do things which could bring his own destruction. In the al-Quran, Allah SWT said "*and do not throw [yourselves] with your [own] hands into destruction*" (al-Quran 2: 195).

Besides, we should avoid anything that can be harmful (*madharrah*) to life, such as not avoiding going to places that have an outbreak of the plague. According to Usamah bin Zaid, the Prophet Muhammad PBUH said, "*If you get wind of the outbreak of plague in a land, do not enter it; and if it breaks out in a land in which you are, do not leave it*" (Narrated by Bukhari, 5728).

In addressing the issue, Islam preaches, since its inception 1400 years ago, on the prohibition of eating non-Halal animals. In the al-Quran, Allah SWT says: “*He hath forbidden you only carrion, and blood, and swine flesh, and that which hath been immolated to (the name of) any other than Allah. But he who is driven by necessity, neither craving nor transgressing, it is no sin for him. Lo! Allah is Forgiving, Merciful*” (al-Quran 2:173). This prohibition would save man from consuming harmful food.

In Islam, people are only allowed to consume ‘*Halalan*’ and ‘*Tayyiban*’ products (al-Teinaz *et al.*, 2020). In the al-Quran, Allah SWT stated: “*O mankind, eat from whatever is on earth [that is] lawful and good and do not follow the footsteps of Satan. Indeed, he is to you a clear enemy*” (al-Quran 2:168). While in another verse, Allah SWT says: “*O messengers, eat from the good foods and work righteousness. Indeed, I, of what you do, am Knowing*” (al-Quran 23:51).

Furthermore, everything which are prohibited in Islam is due to the reason (*al-illah*). Regarding to the issue of Covid-19 virus, all the exotic animals from the wet market in Wuhan such as bats, snake, rats and all reptile’s family are non-Halal. The reasoning behind the prohibition of these animals as stated in al-Quran is because they are the source of what is considered as *khabaith* (impure). In the al-Quran, Allah SWT says: “*...for he (the Prophet) commands them what is just and forbids them what is evil; he allows them as lawful what is good (and pure) and prohibits them from what is bad (and impure)...*” (al-Quran 7: 157). Accordingly, it is important for people to have more insight and awareness on the guidelines of ‘*Halalan Tayyiban*’ in consuming safe and healthy food.

Therefore, understanding of the *Halalan Tayyiban* guidelines due to the Covid-19 disease include eating only Halal-slaughtered animals according Shariah principles, avoiding area of infection when the disease appeared, having a good hygiene routine, consuming and producing only *Halalan Tayyiban* food, moving towards a more balanced lifestyle physically, emotionally and spiritually by following the Islamic rulings.

On another note, vaccines developed for the Covid-19 virus must be of a Halal status. According to Usamah Ibn Syarik, the Prophet Muhammad PBUH said: “*Make use of medical treatment, for Allah SWT has not made a disease without appointing a remedy for it, with the exception of one disease, namely old age.*” (Narrated by Abu Dawud, 3855)

Thus, in spite of the various issues arising, Halal industry remains resilient in these challenging times (The Edge Market, 2020a). According to HDC (2020) and The Edge Markets (2020b), the Halal industry should take more serious measures on the implementation of hygiene and cleaning practices throughout the Halal supply chain.

The halal industry has long implemented the concept of *Halalan Tayyiban* in their business operations. This concept will ensure that all the production, packaging, logistics and distribution activities would follow the strict guidelines according to Shariah perspective. So,

the implementation of *Halalan Tayyiban* concept will ensure the industry have a safeguard and a good marketing strategy in order to increase the demand for Halal products.

In summation, people are encouraged to practice good Halal lifestyle and consume *Halalan Tayyiban* products; wholesome, good, hygiene, of quality and integrity.

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Conceptual Article

## Muslim-Friendly Railway Services: Concept and Challenges of Malaysian Electric Train Service (ETS)

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**Abstract:** Muslim-Friendly Railway Services (MFRS) is a service that accommodates Muslims' needs during travel. There are two basic needs of Muslims during travel, which are halal food and place for prayers. Therefore, it is important for MFRS to fulfil these two requirements. Besides halal food, beverage and Muslim prayer facility (*musolla*), other elements that can be included in MFRS are prayer time, Ka'abah direction (*qiblah*), ablution capability (*wudhu*), availability of prayer rug or mat, female prayer apparel, a copy of the Al-Quran, supplication guide (*du'a*), segregation of gender and appropriate entertainment are discussed below. Qualitative research has been used in this study, consisting of data obtained through library research and semi-structured interviews. This paper attempts to study the concept of implementing MFRS in the Electric Train Service (ETS) by Malaysian Railways (KTMB). This study also deliberates on the challenges faced by ETS operation upon implementing the MFRS which are high cost for implementation, negative perception among non-Muslim passengers and the acceptance and implementation of the MFRS in Malaysia might be complicated. This study found that more awareness and knowledge on the MFRS should be increased and disseminated among ETS consumers and railway industry players to enhance transportation services according to Shariah principles. Perhaps this study could help to develop tourism sector in Malaysia thus increase the country's income by attracting many tourists from outside and open many job opportunities.

**Keywords:** Muslim-friendly tourism; Muslim travel; transport; halal industry services; railway

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### 1. Introduction

Halal denotes permissibility in Islam, whereby no restriction exists, as it is allowed by the ultimate lawmaker, Allah the Almighty (Al-Qaradhawi, 2015). However, halal does not only apply to food and beverage, but also to non-food items such as pharmaceuticals, cosmetics, financing, management, logistics, and tourism (Abdullah & Mustafa, 2018). The demand of halal products and services in Malaysia is increasing due to the awareness of the



benefits of halal products and services among Muslims as well as non-Muslims (Razak, Alias & Samad, 2015). Malaysia, also as an Islamic developing country, should consider other aspects in order to develop halal industry, which is transportation services. It is significant in playing the role to fulfil Muslim needs as well as inspire people to live more comfortably. Unfortunately, there is still lack of resources and initiatives in providing *musolla* or prayer places for Muslim passengers and tourists (Hamid *et al.*, 2015).

Recently, there was an issue on social media where some Muslim passengers performed *Fajr* prayer in an open space on a train since the time for *Fajr* is earlier than the previously scheduled (Azza, 2019). This issue attracted many Malaysian citizens, especially Muslims, to realise the need for prayer facilities on trains. Basically, a trip by train, especially on the Electric Train Service (ETS) takes a long time, usually more than 2 hours, depending on the destination. Performing prayers is compulsory for all Muslims, which must be completed immediately upon each prayer time. Thus, Muslim passengers who use ETS for their transportation also need to perform their duty (Md Sham, Hj Tibek & Jurami, 2015). Therefore, it is crucial to provide *musolla* on ETS to accommodate Muslims' needs during travel.

Since the establishment of the ETS in 2010, there had been no *musolla* available, but it was then provided by KTMB after receiving several demands from Muslim passengers. Besides, according to SPAD, the number of passengers has been increasing, showing that ETS is a preferable public transport in Malaysia (Selamat & Zolkiply, 2017). However, there is a lack of study in identifying the feasibility of implementing the *musolla* on trains based on MFRS requirements.

### ***Concept of Muslim-Friendly Railway Services (MFRS) in ETS***

Travel is significant to everyone; and Islam acknowledges the need to travel. The main purpose for travelling in Islam is to inculcate the awareness of being a humble servant to Allah the Almighty (Salleh, Nor & Azmin, 2019). The al-Quran states:

*“It is He who made the earth tame for you so walk among its slopes and eat of His provision-and to Him is the resurrection.” (al-Quran 67:15)*

Nowadays, people travel for many purposes such as for work, worship, business, medical treatment, education, or leisure (Zawawi & Ramli, 2016). Travel is synonymous with transportation because people need the means to move from one place to another. Today, people can choose any kind of travelling modes either by land, water, and air.

The concept of Muslim-friendly travel is preferred in this study. Based on the literature review and interviews with some interviewees, Muslim-friendly service seems to be more suitable because its nature applies to both Muslims and non-Muslims alike. Generally, this mode is more relaxed, friendly, and acceptable to the industry and service providers, who may or may not be Muslims (Zawawi & Ramli, 2017). In addition, the need for Muslim-friendly requirements is less strict in certain areas compared to Shariah-Compliant Services that need to cover other aspects which include management, finance, and other related components. Shariah-Compliance Services (SCS) usually cover the whole operation including financial transactions, which are based on Shariah principles. It is not only limited to serving halal food and beverage but, also includes the requirements for health, safety,

environment, and impacts on the economic aspects of all people, despite race, faith or culture (Ahmat *et al.*, 2015).

Muslim-friendly service refers to the availability of facilities and services that cater to Muslims' needs specifically (Jais, 2017). Muslims have specific needs to be fulfilled in terms of religious obligations (*ibadah*). According to Battour (2018), Muslim-friendly in the context of the tourism industry is defined as an attempt to make tourism experience enjoyable to observant Muslims. Besides, MS2610:2015 stated that Muslim-friendly hospitality services are products or services in the travel and tourism industry guided by Shariah requirements that cater to or provide facilities suitable for Muslim travelers.

Therefore, Muslim-Friendly Railway Services (MFRS) is a railway service that accommodates Muslims' needs during travel. There are two basic needs of Muslims during travel, which are halal food and prayer services. Providing halal food will give satisfaction and loyalty among Muslims because the process meets Shariah rules (Shakona *et al.*, 2015). Battour, Ismail and Battor (2011) also stressed that prayer rooms and halal food availability are considered as the most crucial facilities for Muslims. These needs are to ensure that Muslim passengers' religious obligations can be observed during travel. Besides, the material needs that include food, facilities, and equipment are most important for transport passengers (Peng, Song & Yang, 2017). Therefore, it is important for the MFRS to provide such a service that fulfils these two needs. In addition, other elements can also be included with more details in other sections of the MFRS to provide convenience to Muslims to perform their religious duties anywhere without any excuse. These elements include prayer time notification or schedule, *qiblah* direction, ablution capability, availability of prayer rugs or mats, female prayer apparel, copy of the Al-Quran and supplication guide (*du'a*), gender segregation and appropriate entertainment.

## 2. Materials and Methods

This research applied a qualitative approach in studying the concept of the MFRS. Data were obtained through library research from journals, books, conference and seminar papers, internet resources and official reports related to the field of study. Besides, the primary source of this study was obtained from semi-structured interviews. Several questions were constructed as a guideline to collect data from interview sessions with the interviewees. The duration of each interview session was approximately 45 minutes to one hour and was recorded. The interviews were then transcribed, so that the main points from the verbal text could be determined and classified into themes. After the process, the result was translated into English. Finally, the data were analysed by comparing the themes with the research questions.

## 3. Results

### *Elements in Muslim-Friendly Railway Services*

#### *Halal Food and Beverage*

Providing halal food and beverage is a vital element in the MFRS. Halal food and beverage do not only suit Muslims but also non-Muslims because it is believed to be able to provide good quality, integrity, hygiene and safety (Baharuddin *et al.*, 2015). One of the facilities on-board the ETS is the F&B Bistro. The bistro has already been certified halal by

JAKIM, allowing KTMB to become the first halal-certified F&B train service in the world (Arbee, 2015).

The standard that needs to be applied in order to be certified halal is MS1500:2019 Halal Food-General Requirement, which is a standard specifically developed to ensure only halal food is produced and served. Therefore, the ETS complied with the requirements stipulated in the document for the production, preparation, handling, and storage of halal food and shall continue to be verified from time to time through site inspections as deemed necessary by the relevant authority (Jais, 2019).

In addition, Quantaniah, Noreina & Syakinah (2013) stated that halal certification is not only an examination of food processing in its preparation, slaughtering, cleaning, processing, handling, disinfecting, storing, transporting, and managing practices but, it also covers all aspects in the food supply chain, as well as personal hygiene, clothing, utensils, and working area. By adhering to all the requirements, halal certification can enhance the level of integrity and satisfaction among ETS users.

### *Musolla*

According to Bahardeen (2014), Muslim travellers need to have food services and prayer facilities for performing prayers (*solah*) in many common tourist attractions such as shopping malls, theme parks, hotels and other tourist sites. Obtaining halal food and performing 5-time prayers a day are compulsory for all Muslims throughout the world (Kamarudin & Ismail, 2016). Allah the Almighty said:

*“And be steadfast in prayer, practice regular charity, and bow down (in worship)” (al-Quran 2:43)*

Therefore, as a common tourist-attractive mode of transportation, the ETS needs to provide *musolla* in order to facilitate Muslim travelers or passengers in performing their religious duty. Kamarudin and Ismail (2016) mentioned that in terms of performing prayers, the government should provide good facilities as to ensure the comfort of Muslim travelers to stay longer with the ability to maintain a good quality of their prayers.

According to the Mufti of Wilayah Persekutuan, Dato Seri Dr Zulkifli Mohamad al-Bakri, Muslims are allowed to perform prayers on the ETS since a trip takes a long time over a great distance and passengers do not have the opportunity to stop for the purpose of performing prayers until they have reached their destination (Rusli, 2018). Muslims are also allowed to perform *jama'* (combined) and *qasr* (shortened) prayers during travel as to ease them (Yunus, 2005). In Islamic teaching, these called allowances or *rukhsah* during a Muslim's travel to shorten and combine the prayers (Hariani, Rahmanita & Ingkadijaya, 2017). This reason is to ensure that Muslims can fulfil their obligations and seek blessing from Allah the Almighty during the travel.

Travelling is one excuse for a Muslim to shorten one's prayer of four *rak'ahs* (unit of prayer) to only two *rak'ahs*, as stated in the al-Quran, Sunnah, and consensus of Muslim scholars (*ijma'*) (Musharraf, 2016). As mentioned in the al-Quran, Allah the Almighty said:

“And when you travel throughout the land, there is no blame upon you for the shortening of prayer....” (al-Quran 4:101)

Moreover, it is permissible for a traveler to combine the *Zuhr* (noon) prayer and the *Asr* (Afternoon) prayer at either due time, and/or combine the *Maghrib* (sunset) prayer and the *Isha* (night) prayer at either due time. Based on the researchers’ observation, KTMB has already provided the *musolla* on the ETS to provide space for Muslim passengers to perform prayers, but unfortunately, the space is narrow and is not segregated between men and women, as shown in Figure 1 below.



**Figure 1.** The *musolla* and place of ablution in ETS located in one space for men and women.

Source: Official web site of KTMB (retrieved from <https://www.ktmb.com.my/OnboardKomuter.html>)

Based on MS2610:2015 (5.2.3 Public *Musolla*), one of the requirements for the implementation of a Muslim-friendly policy is the segregation between men and women in the service provided (Department of Standards Malaysia, n.d.). Mokhtar (2011) stated that it is preferable for males and females to be given segregated spaces or access for prayer. Therefore, the MFRS is established to provide this facility for Muslims to perform their obligations in a comfortable environment with appropriate facilities while safeguarding their religious requirements (Hariani, Rahmanita & Ingkadijaya, 2017).

### *Prayer Time*

The MFRS should provide information on prayer times. It is difficult for Muslim passengers to perform prayers without knowing the exact time. Information on an imminent prayer time is an approach to assist Muslim passengers to perform prayers at a fixed time (Saffinee, 2017). With this in mind, prayer time information is also considered as prayer facilities (Hashim, Murphy & Hashim, 2007). Thus, on the ETS, a specific time for prayer can be announced or shown on LCD monitors that should be provided.

## *Qiblah*

Facing the *qiblah* during prayers is one of the compulsory requirements to perform a prayer (Mokhtar, 2009). Muslims around the world should face the Ka'abah during their daily prayers. As mentioned by Tarabishy (n.d.), facing the *qiblah* i.e. directly toward the Ka'abah in Makkah is highly crucial for performing a complete prayer (*solah*). Muslims have been ordered specifically to turn towards the sacred mosque. As mentioned in the al-Quran, Allah the Almighty stated as below:

*“And from wherever you go out for prayer, turn your face toward al-Masjidil al-Haram. And wherever you believer may be, turn your faces toward it, in order that the people will not have any argument against you, except for those of them who commit wrong: so, fear them not but fear Me. And (it is) so I may complete my favour upon you and that you may be guided.”* (al-Quran 2:50)

The *qiblah* on the ETS might change regularly based on the train's movement and location. According to the Mufti of Wilayah Persekutuan, Dato Seri Dr Zulkifli Mohamad al-Bakri, on the ETS, Muslims should attempt to face the *qiblah* to perform prayers (Rusli, 2018). In the al-Quran, Allah the Almighty said:

*“Turn the face in the direction of the sacred Mosque: where you are, turn your faces in that direction.”* (al-Quran 2:144)

Nevertheless, if Muslim passengers are not able to ascertain the precise direction of the *qiblah*, they should face the direction that is most probably direct to the *qiblah*. In such a condition, when Muslim passengers are unable to locate the exact *qiblah* direction to perform the prayer, they should pray in whatever direction the vehicle is heading. However, they need to perform the prayer again or replace it (*qada'*) once they have reached their destination.

## *Ablution*

Ablution or the Arabic term *wudhu'* must be performed as a prerequisite for prayer and the procedure involves freshwater contact with certain parts of the body in particular steps according to the right sequence (Hamid *et al.*, 2015). In the al-Quran, the importance of ablution is stated by Allah the Almighty as follows:

*“O you who have believed, when you rise to (perform) prayer, wash your faces and your forearms to the elbows and wipe over your head and wash your feet to the ankles. And if you are in a state of unclean then purify yourselves. But if you are ill or on a journey or one of you comes from the place of relieving himself or you have contact with women and do not find water, then seek clean earth and wipe over your faces and hands with it. Allah does not intend to make it difficult for you, but He intends to purify you and complete His favour upon you that you may be grateful.”* (al-Quran 5:6)

The concept of *wudhu'* is one of the disciplinary acts that should be adopted by each Muslim individual to stay hygienically clean whether at a private or public place (Abdul Rahim, 2005). Therefore, it is important to provide a well-designed facility for ablution (Mokhtar, 2011), preferably installed near or within the prayer area. The ablution facility should be dedicated and separated between genders. Furthermore, to perform prayers comfortably, a good ablution facility and space are important, because the aspect of cleanliness is emphasized in Islam, especially when someone wants to pray (Hamid *et al.*, 2015).

KTMB has already provided the ablution space in the *musolla* to ease Muslim passengers to perform ablution, but unfortunately, the *musolla* is accessible for men and women, meaning that it is not segregated, as shown in the figure 1 above. Thus, KTMB should be more concerned with this issue, and provide comfort and satisfaction for the passengers.

#### *Provide Prayer Rug or Mat*

Prayer rug or mat, known as *sajjadah al-solah*, is generally used by Muslims to perform their *solah* (prayer) (Department of Standards Malaysia, n.d.) and/or the acts of prostration done during Islamic prayers (*sujud*), and is found in every Muslim home and is often a constant travel companion that goes with the worshipper (Rym Ghazal, n.d.). Since daily prayers must be performed on a clean surface, the prayer mat serves this purpose and must always be kept clean.

Nonetheless, providing prayer rug or mat is an additional facility that may provide extra convenience to Muslims in performing prayers. According to Saffinee (2017), al-Imam al-Shatibi recommends beautifying, improving, and refining additional needs for Muslim-friendly products and services without breaching the ethical-moral standards.

#### *Women's Apparel for Prayer*

A proper apparel is one that covers the *aurah* i.e. the private parts (Saffinee, 2017). Much like the prayer mat, women's apparel for prayer is also an additional element that assists female Muslim passengers in performing prayers. Prayers still can be performed without women's apparel for prayer with certain conditions that should fulfil the requirement of covering the *aurah* (Mustafa, Tasir & Jusoh, 2018). In fact, the female parts that need to be covered are the entire body except for the face and the wrists to the fingertips.

#### *Copy of the al-Quran*

The al-Quran is the religious scripture for the followers of Islam. Based on the Muslim-Friendly Hospitality Services-Requirements (MS2610: 2015), a copy of translated al-Quran should be made available upon request by the Muslim guest. Islam encourages Muslims to recite the al-Quran in a pure condition at any place (Battour *et al.*, 2011). Therefore, providing al-Quran on the ETS is a good initiative that can motivate and educate Muslim passengers to ponder (*tadabbur*) on the meaning of Quranic verses.

### *Supplication (Du'a)*

*Du'a* or supplication is a way of communicating with Allah the Almighty, when a Muslim requests for blessing, protection, guidance and mercy, with high expectations and hope (Adua, 2015). Allah said in the al-Quran:

*“And your Lord said: Supplicate to Me, I shall answer you”* (al-Quran 40:60).

Whenever a Muslim sets out for a journey, Islam encourages the recital of *du'a* for protection, safe return (Quran Academy, 2017), and blessing from Allah (Zulkifli, 2017). Hence, the ETS can provide *du'a* recitation guidance on LCD monitors as a reminder for the passengers.

### *Gender Segregation for Facilities*

Gender segregation will provide extra comfort for Muslim passengers, especially for women. The segregated facilities for women would have an impact on Muslim tourists' choices (Cetin, 2018). Besides, it is also a religious obligation to prohibit gender integration as to prevent the cause of *“fitnah”* i.e. temptations or trials which imply evil consequences of lust or aroused desires, indecent acts and false practices (Battour, Ismail & Battor, 2010). Islam prohibits people from committing sins, such as *zina* (adultery/fornication), which is considered a major sin and one of the paths to evil (Karamah, 2011). Thus, anything that can lead to *zina* is prohibited, as stated in the al-Quran:

*“Nor come nigh to adultery: for it is a shameful (deed) and an evil, opening the road (to other evils).”* (al-Quran 17:32)

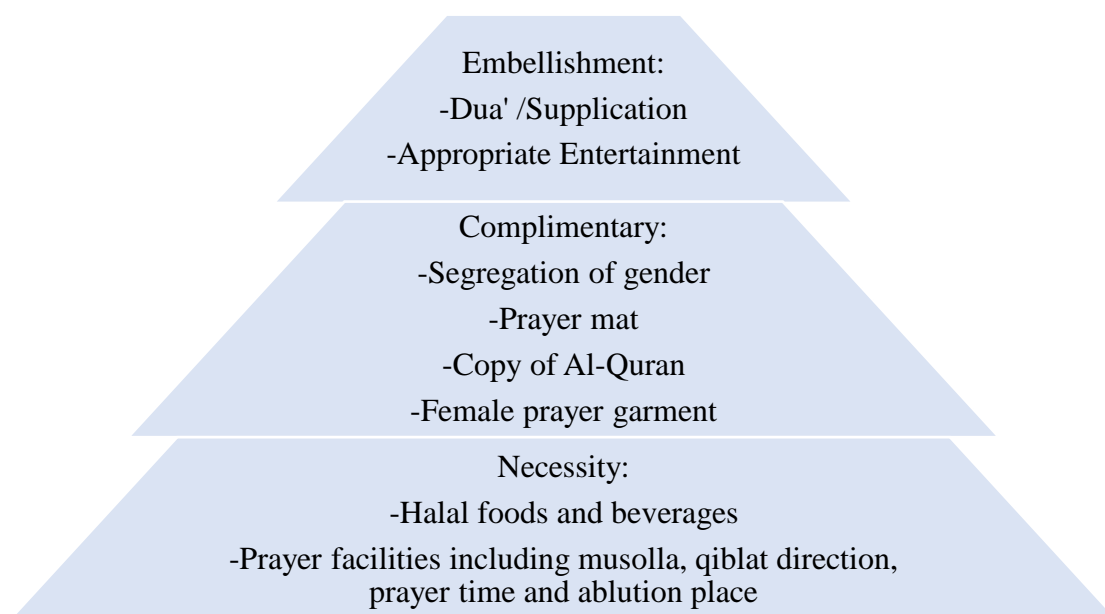
Therefore, gender segregation on the ETS is one way to prevent *zina*. KTMB can segregate passengers according to gender, as has already been implemented on KTM *Komuter* in the form of the “female coach only” (Arbee, 2015). KTMB can upgrade the ETS coach into female, male, and family, in order to separate them. The system of purchasing tickets needs to take note of the status and gender of the passengers to provide seats according to gender and other preferences.

### *Appropriate Entertainment*

In general, the aim of entertainment is to refresh the soul, relieve tiredness, and minimize boredom (Saffinee, 2017). Entertainment is a broad concept and the preferable forms of entertainment on the ETS are watching television, reading, and listening to the audio, all of which are categorized as passive entertainment forms which do not involve movement (Daud, 2018). Hence, providing the appropriate entertainment on the ETS could contribute to the feelings of happiness and relaxation during a trip. Any entertainment must be strictly supervised to ensure it is Shariah-compliant. Therefore, KTMB can identify and provide general non-sensitive entertainment that should suit all kinds of passengers from children to adults, of any race, or religious background. Certain types of entertainment must be avoided, especially those that promote unlawful transgressions such as the exposure of female *aurah* or private parts, as mentioned in the al-Quran:

“And tell believing women to reduce (some) of their vision and guard their private parts and not expose their adornment except that which (necessarily) appears thereof....” (al-Quran 24: 31)

Overall, these MFRS elements can be arranged according to the level of necessity, as shown in the figure below.



**Figure 2.** The MFRS elements according to the level of necessity

This section can be divided up into subheadings. This will provide a detailed and concise description of the experimental observations, their interpretation and the experimental conclusions which can be drawn.

#### **4. Discussion**

##### ***Challenges of the MFRS***

MFRS is still a new concept to be implemented in Malaysian Railways. There are many challenges or difficulties, such as the high cost for implementation. In order to achieve Muslim-friendly services, several aspects could surely be changed or upgraded. For example, gender segregation requires high cost, as supported by COMCEC (2017), which mentioned that upgrading existing facilities to become Muslim-friendly is a challenge in the implementation. In the context of MFRS, to provide *musolla* and ablution facilities that segregate men from women might consume more space and might also affect the number of seats. Therefore, to convert from the conventional to a Muslim-friendly service could reduce revenue and consume a lot of money. However, this challenge can be overcome with well-



managed operations as providing effective facilities can ease tourists and will also make Malaysia as a top destination choice (Abdul Rahman, 2018).

Another challenge that the MFRS might encounter is the negative perception among non-Muslim passengers of the ETS, since such a service might not fulfil their taste or demand and might cause dissatisfaction. This could lead to a biased perception toward the service, and worst, toward Islam, fuelling Islamophobia i.e. hatred, negative stereotype, and prejudice toward Islam and Muslims (Tiung *et al.*, 2018). Some non-Muslim travellers may prefer alcoholic beverages as their norm and leisure without restriction. As mentioned by Fletcher and Spracklen (2014), alcohol is permissible by law and tradition and is a part of popular culture. As such, non-Muslim passengers might not be satisfied with the ETS service and might refuse to choose the MFRS for travelling.

Moreover, the acceptance and implementation of the MFRS in Malaysia might be complicated because the ETS is managed by the government sector compared to other hospitality services offered by the private sector, where Muslim-friendly services can be implemented with little controversy. Since there is no competition with other companies in the long-distance train service, it is not compulsory for the government to enforce the MFRS as a new standard, which may either be accepted or rejected. Meanwhile, private sector companies have been competing with each other to offer the best services to attract more customers; the Muslim-friendly standard is one of the services being offered. They are willing to convert from the conventional service to a Muslim-friendly service (COMCEC, 2017) to attract more Muslim tourists.

## 5. Conclusions

The Muslim-Friendly Railway Services is introduced to accommodate Muslim travelers' basic needs, which are halal food and prayer facilities. These are the core purposes of the MFRS, although other elements are categorized as additional benefits that can provide comfort to Muslim travelers. According to COMCEC (2017), Muslim-friendly policy preserves the integrity of tourism products and services through the application of the standard and enhances Muslim customers' satisfaction by meeting their needs and requirements.

However, establishing the MFRS involves challenges such as high cost of implementation and the perception of non-Muslims in terms of accepting the implementation. Since this study is still new and has limited resources, a further in-depth research is required to seek for solutions that can overcome the obstacles. Furthermore, more studies should explore the logistics and supply chain in the KTMB cargo service because it is a more familiar area to be scrutinized (Azmin & Zailani, 2017).

**Conflicts of Interest:** The authors declare no conflict of interest.

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*Original Research Article*

## Determinants of Intention to Purchase Halal Cosmetic Products: A Study on Muslim Women in West Malaysia

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**Abstract:** The demand for the global halal cosmetics market is anticipated to reach USD 53 billion by the end of 2023. The increase of worldwide Muslim population along with their responsiveness to religious obligation, a consciousness of the cosmetic ingredients, process and packaging and the rising awareness about the percutaneous essence of conventional cosmetic products has made purchasers shift to “halal” cosmetics. Malaysia is one of the countries that provides full support to promote the “halal” certification process. Products certified “halal” by JAKIM are Halal products as they are safe to purchase, nutritious and the products are quality controlled. Parallel to that, the purpose of this research is to determine the halal cosmetic purchase intention among Muslim women in West Malaysia. As aforementioned, this study has identified five factors that influence purchasers’ intention in purchasing halal cosmetic products. These factors served as independent variables namely functional value, conditional value, social value, epistemic value and emotional value which are guided by the Theory of Consumption Value (TCV). This research employed a structured online survey targeting approximately 400 Muslim women from the age of 16 to 60 years old in West Malaysia. Data obtained were analysed using Partial Least Square-Structural Equation Modelling (PLS-SEM). The findings revealed that conditional value, emotional value and epistemic value are positively and significantly related to the halal cosmetic purchase intention. On the other hand, functional value and social value are discovered to be insignificantly related to the intention to purchase halal cosmetic products. Practically, the findings will be beneficial to halal cosmetic manufacturers in determining consumer purchase intention. In terms of socio-economic, this study offers insight on halal cosmetic market and feedback from the Muslim community on halal cosmetic products. Theoretically, this study provides a comprehensive theoretical framework on the intention to purchase halal cosmetic products.

**Keywords:** Halal; cosmetic; knowledge; reliability; Theory of consumption Value (TCV); Theory of Planned Behavioural (TPB)

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## 1. Introduction

The Muslim population all over the world is increasing over time. The Muslim population in Malaysia is taking up around 65 % of the total population and is forecasted to be increasing in the future. Owing to this, demands and consumptions of Halal products are also increasing. One of the current demands and consumptions of Halal products is Halal cosmetics (Norafni *et al.*, 2015). In today's world, Muslims comprise one of the biggest world markets for Halal products (Hajipour *et al.*, 2015).

The new term of Halal cosmetics was urbanised in recent years, yet some of the Muslims in Islamic countries including Malaysia are still unfamiliar with these Halal cosmetic products as they only recognise the Halal term just for food and beverage products; not for cosmetic and healthcare products. Previous research has been carried out by Ajitha and Sivakumar (2017), Ambali and Bakar (2014), Aziz and Wahab (2013), Jalil *et al.* (2018), and Ruslan *et al.* (2018) on Halal food, but lack of study is focused on Halal cosmetic products which currently catch the purchasers' and manufacturers' attention.

Besides, the attitude to use cosmetics is changing from conventional cosmetic products to halal cosmetic products. At present, most women emphasise the importance of personal grooming. This also includes working women and those who are having higher incomes who often interested to buy cosmetic products (Hassali *et al.*, 2015).

Therefore, this study is carried out to determine the intention of Muslim women in West Malaysia in purchasing Halal cosmetic products.

### *Halal Cosmetic Industries in Malaysia*

The Halal term refers to what is allowed or permissible by the Shariah law. It is the basic requirement for Muslims to adhere to, which can consist of foods and goods consumed or/and used in daily life. Cosmetic products are also included as the materials, ingredients used, usage of raw materials right up to the marketing, and delivery of products to purchasers must be in halal aspect guidance. It also emphasises the safety and product efficacy evaluation. Thus, halal cosmetic standards, halal certification and halal logo can be applied as guidelines for halal compliances (Hashim & Mat Hashim, 2013).

Malaysia established the Halal Industry Development Corporation (HDC) to develop and facilitate the halal industry. In fact, manufacturers must follow several requirements that are restricted mostly from the ingredients until the packing to ensure they are categorised as halal products that can be consumed by Muslims (Aziz & Wahab, 2013).

In 2006, Malaysia started following a holistic approach towards being halal because Malaysia realised that the halal sector would be a new contributing factor for the economic growth in the country. Besides, Malaysia is one of the early countries that moved towards Halal cosmetics. From 2006 to 2010, Malaysia has synchronised its strategies on developing halal products and enhancing the service industries (Salleh & Hussin, 2013). The growth of halal cosmetic products can be seen from the Malaysian halal cosmetics and personal care export value for 2017 that rose to RM2.9 billion.

### ***Halal Certification in Malaysia***

Malaysia is the only country that provides full support in promoting halal certification process on its products and services. Halal is urged by the Shariah Law. In Malaysia, the agency which is vital and plays a major role in handling halal certification is the Department of Islamic Development Malaysia (JAKIM). Products certified by JAKIM are halal and safe to purchase as they are also supported for their nutrients and quality (HIDC, 2017).

For cosmetic and personal care products which also require halal certification, the products must comply with the standard of MS 2200:2008 purchaser goods requirements. According to MS 2200:2008 purchaser goods guidelines and requirements, cosmetic products must be safe and non-hazardous to the purchasers.

Apart from it, these products must comply with the Shariah law. In brief, halal cosmetic products should not contain any human parts as ingredients; should not contain any animal that is prohibited to Muslims or has not been slaughtered according to Shariah law; no genetically modified organism (GMO) which is decreed as *najs*; no alcohols used from alcoholic beverages (khamar); no contamination during preparation, processing, manufacturing and storage, and they should be safe for purchasers (Salleh & Hussin, 2013). Hence, for halal cosmetic products, the formulation and the quality of the products must comply with the Islamic requirements and also the requirements of the National Pharmaceutical Control Bureau, Ministry of Health Malaysia.

This study is organised in the following manner. The next section includes a literature review followed by the theory of consumption behaviour. Subsequently, it describes the methodology and results of this study. The conclusion is made at the end of this paper.

## **2. Literature Review**

This study applied the Theory of Consumption Value (TCV) developed by Sheth et al. (1991) for the formation of the conceptual framework. According to Sheth et al. (1991), the Theory of Consumption Values (TCV) generally explains why purchasers make their choices.

This theory is centrally connected to five main values, specifically via (i) Functional value (ii) Conditional value (iii) Social value (iv) Emotional value and (v) Epistemic value towards purchasing intention on halal cosmetic products. Functional value is acquired from the utilitarian or physical performance, and this is reflected in the characteristics of the products such as the price, durability and reliability of the products.

In a recent paper, Yeo et al. (2016) treated functional value via (i) quality value and (ii) price value. The quality value is articulated by the quality and texture of the cosmetic product itself. Whereas, price value is described as the reference price for customers to consider when buying halal cosmetic products. Similarly, Hashim and Musa (2014) have also found that the price, the content of the products, packaging and Halal logo from JAKIM are the most influencing factors for customers to purchase halal cosmetic products.

The durability of cosmetic products often refers to the minimum date of the products once unsealed. Furthermore, there are certain conditions such as (i) storing under appropriate conditions (ii) making non-mandatory for products to be used more than 30 months and (iii) labelling using symbols on the “minimum date” + expiry date (month and year, or the day, month and year) also uphold the condition of the products. It is also vital for customers to be aware of the period time after unsealing the products to ensure the products are safe to use without causing harm to the customers. Labadie (2012) suggested that reading the labels of cosmetic products is the best solution to identify if the product complies with the new European Regulation on Cosmetic products which came into effect in 2013.

The reliability of cosmetic products depends on the halal cosmetic certification. Unsurprisingly, Rahman et al. (2015) identified the reliability of halal cosmetic products is highly dependent on the Halal label and Halal logo printed on the outer layer of the products. Annabi and Obe (2017) studied if halal certification assured the quality of halal cosmetic products in the United Kingdom. Unfortunately, the research underpinned that there is a failure to adopt a holistic halal terminology in the industry of halal cosmetics in the United Kingdom. In Malaysia, the reliability of Malaysian Halal Cosmetic products does agree with the Halal Cosmetic Standards as announced by the Malaysian government in June 2010 due to the major concern of Halal Cosmetic Standards which reflects on cosmetic ingredients and materials used in Halal cosmetic products (Aoun & Tournois, 2015).

Additionally, conditional value derives from a specific condition of using particular products. Baumann (2012) posited that purchasers should avoid buying and using wrong cosmetic products without seeking any advice from cosmetic dermatologists. The drawbacks of using wrong cosmetic products can cause several skin problems such as allergies, melasma, and skin cancer. Nevertheless, in this study, the following indicators are recommended (i) purchasing halal cosmetics for weddings (ii) attending special occasions and (iii) purchasing it as gifts, to be considered as the measurements for conditional value.

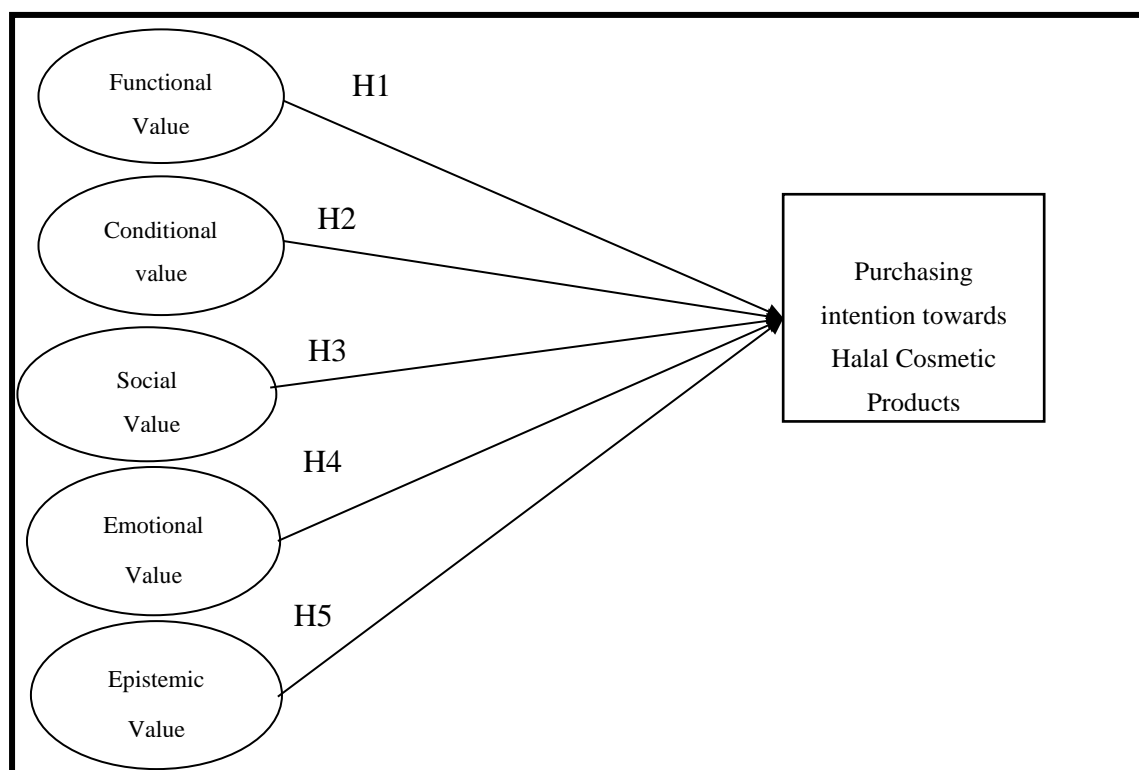
Next, social value is identified by demographic factors, cultural influences and social-ethnic groups. Ajitha and Sivakumar (2017) revealed social status is symbolised by purchasers' desire to ensure their social presence through the consumption of luxury brands will satisfy their needs to be accepted within professional visibility. Kim et al. (2013) and Rahim et al. (2015) used demographic indicators such as religion, monthly income, monthly spending on cosmetic products and make-up occasions for measuring Halal cosmetic products. In the same vein, Bonne et al. (2007) noticed religion as a very important motivator for the halal cosmetic market. Briliana and Mursito (2017) embraced that religion plays an influential factor that influences customers' attitude and intention in purchasing halal cosmetic products. They also confirmed that multi-religion societies like Indonesian Muslims are more conscious of halal and permitted products. Briliana and Mursito (2017) assessed the cultural factor by using in-depth interviews and surveys for both purchasers and producers. The application of social-ethnic group indicator could be seen in the work by Mukhtar and Butt (2012). Mukhtar and Butt (2012) confirmed the difference between Muslim purchasers and Western purchasers is based on local culture which includes names, symbols and also the particular brands of Halal cosmetic products.

On the other hand, emotional value is associated with the extrinsic aspect of consumption in terms of the ability of the products to affect the buyers' emotional conditions. Thus, our



studies have identified that the emotional value of purchasers is related to being confident, happy, intelligent, satisfied and also guilty. This can be measured through questionnaire items such as (i) I am happy to use the Halal cosmetic products most of the time (ii) I feel confident to choose Halal cosmetic products (iii) I feel satisfied if I use Halal cosmetics (iv) I make my decision according to my feelings (v) I feel excited to use Halal cosmetic products. Our choices of emotional value indicator were based on the study by Rahman et al. (2015) because of their dependent variable is also into the intention to purchase Halal cosmetic products. This was reflected in their questionnaires for the attitudes towards Halal cosmetics. Questions were asked to the respondents which included (i) I like to choose Halal cosmetic products (ii) I always look for Halal label when I buy cosmetic products (iii) Halal cosmetic products are important (iv) Using Halal cosmetic products is my own choice and (iv) Most people who are important to me use Halal cosmetic products. Rahman et al. (2015) identified the intention in purchasing Halal cosmetic products was mainly derived from the following questions such as (i) I am willing to pay more for cosmetic products with an authentic Halal logo (ii) I am willing to wait longer to buy cosmetic products with an authentic Halal logo (iii) I am willing to shop around to buy cosmetic products with an authentic Halal logo (iv) I am willing to travel a long distance to buy cosmetic products with an authentic Halal logo and (v) I intend to purchase Halal cosmetic products in the near future. Last but not least, epistemic value requires the products to create and arouse curiosity or purchasers' propensity to adopt new products.

Based on the theory, the research framework was formed as Figure 1 below.



**Figure 1.** Conceptual Framework

Thus, the hypotheses were formed as below:

**H1:** There are significant relationships between functional value and intention in purchasing Halal cosmetic products.

**H2:** There are significant relationships between conditional value and intention in purchasing Halal cosmetic products.

**H3:** There are significant relationships between social value and intention in purchasing Halal cosmetic products.

**H4:** There are significant relationships between emotional value and intention in purchasing Halal cosmetic products.

**H5:** There are significant relationships between epistemic value and intention in purchasing Halal cosmetic products.

### **3. Methodology**

The data were collected through a survey using a structured questionnaire. Academic and admin staff in Universiti Tunku Abdul Rahman (UTAR) carried out the survey. A total of 500 questionnaires was distributed through convenience sampling. As a result, a total of 278 completed questionnaire sets was successfully collected. The gathered questionnaires were keyed in into the SPSS software to access the demographic information of the respondents as summarised in Table 2. The survey instrument was developed by adopting validated questions used in previous studies which were assessed using the 5-point Likert scale. The questionnaire comprising two sections was used in this study. Section A consists of respondents' details such as age, status, occupation, educational level, income level, monthly expenses on purchasing halal cosmetic products, frequency of buying halal cosmetic products and the duration of usage of these products. Section B consists of 20 measurement items; 3 items for functional value constructs; 3 items for conditional value constructs; 4 items for social value constructs; 4 items for emotional value constructs; 3 items for epistemic value constructs; 3 items for the intention of purchasing halal cosmetic products as dependent variables. All measurement items are explained in Table 1.

### **4. Results**

The empirical result consisted of an online survey which obtained 278 total responses from June to October 2018. As shown in Table 2, 64.03 % of the respondents were married ranging from the age of 25 to 38 years old. More than 49 % of respondents hold an executive level with the income of more than RM 4000 per month. These respondents purchase halal cosmetic products more than twice in a year.

**Table 1.** Measurement Items

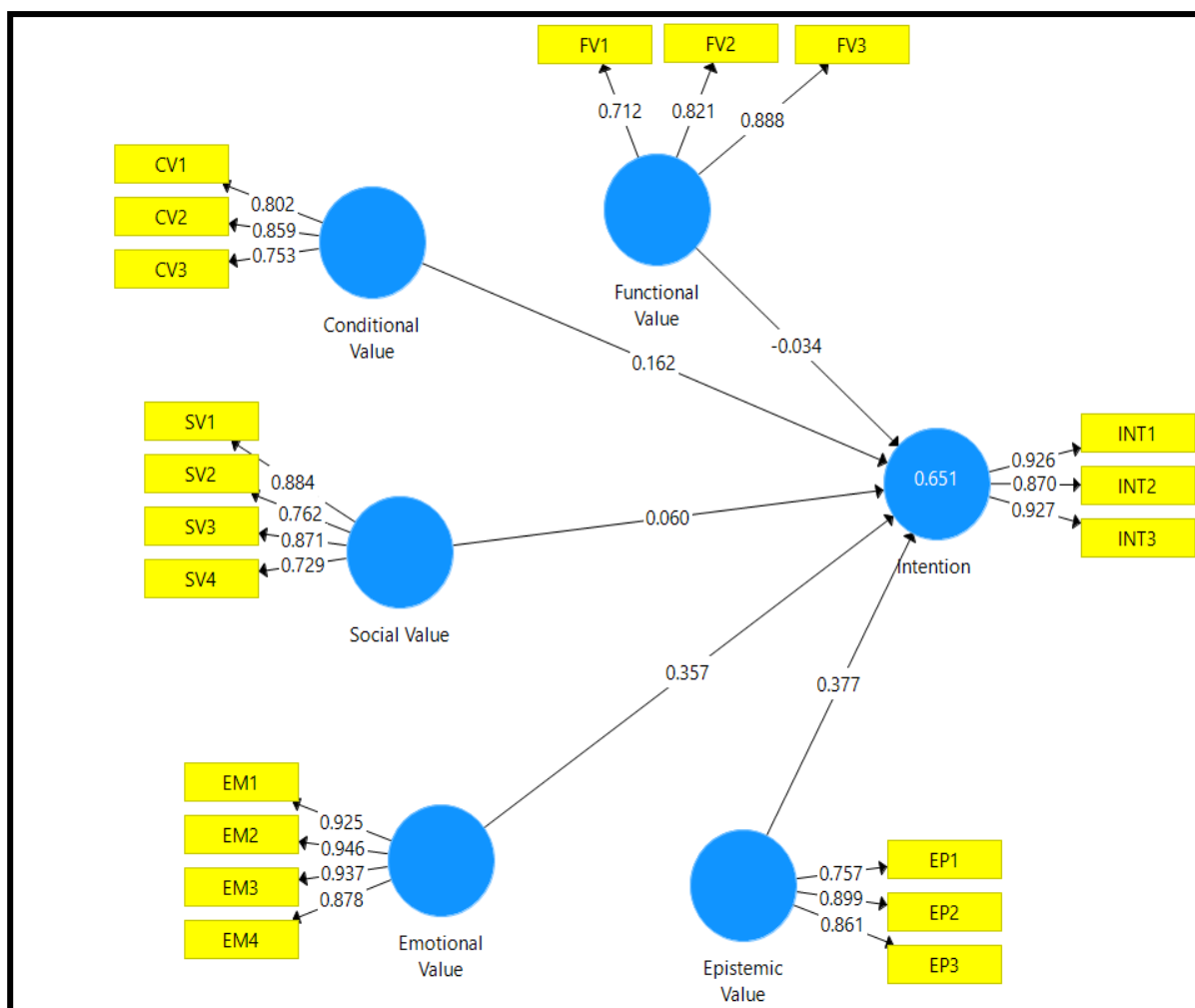
| <b>Constructs</b>                     | <b>Items</b> |   |
|---------------------------------------|--------------|---|
| Conditional value                     | CV1          | I am using Halal cosmetic products for my special occasions.  |
|                                       | CV2          | I purchase Halal cosmetic products as gifts.  |
|                                       | CV3          | I will only purchase Halal cosmetic products which are verified by Jabatan Kemajuan Islam Malaysia (JAKIM). |
| Emotional value                       | EM1          | I am happy to use Halal cosmetic products most of the time.   |
|                                       | EM2          | I feel confident to choose Halal cosmetic products.   |
|                                       | EM3          | I feel satisfied if I use Halal cosmetic products.  |
|                                       | EM4          | I make my decision according to my feelings.  |
| Epistemic value                       | EP1          | It is important for me to know the ingredients of Halal cosmetic products.                                  |
|                                       | EP2          | I will gather reliable information about different Halal cosmetic products before purchasing.               |
|                                       | EP3          | I often search for the latest information about Halal cosmetic products.                                    |
| Functional value                      | FV1          | Halal cosmetics are perceived to be safe.   |
|                                       | FV2          | Some Halal cosmetic products could be purchased online.   |
|                                       | FV3          | I am willing to spend on expensive Halal cosmetic products.   |
| Intention to Purchase Halal cosmetics | INT1         | I will try to use Halal cosmetic products in the near future.   |
|                                       | INT2         | I like to shop around looking for cosmetic products with an authentic Halal logo.                           |
|                                       | INT3         | I intend to purchase Halal cosmetic products in the future.   |
| Social value                          | SV1          | I like the idea of using Halal cosmetic products.   |
|                                       | SV2          | People around me will influence my preferences on Halal cosmetic products.                                  |
|                                       | SV3          | I spend little time exploring how to use new Halal cosmetic products.                                       |
|                                       | SV4          | I am hesitant to try out new Halal cosmetic products.   |

**Table 2.** Descriptive analysis on the respondents' profile

|                                | <b>N</b> | <b>Percentage</b> |
|--------------------------------|----------|-------------------|
| <b>Age</b>                     |          |                   |
| 16 – 24 years                  | 20       | 7.19              |
| 25 – 31 years                  | 80       | 28.78             |
| 32 – 38 years                  | 106      | 38.13             |
| 39 – 45 years                  | 42       | 15.11             |
| 46 – 50 years                  | 18       | 6.47              |
| More than 50 years             | 12       | 4.32              |
|                                |          |                   |
| <b>Status</b>                  |          |                   |
| Single                         | 100      | 35.97             |
| Married                        | 178      | 64.03             |
|                                |          |                   |
| <b>Highest Education Level</b> |          |                   |
| SPM and below                  | 4        | 1.44              |
| STPM/Diploma                   | 24       | 8.63              |
| Degree                         | 112      | 40.29             |
| Master                         | 118      | 42.45             |
| PhD                            | 20       | 7.19              |
|                                |          |                   |
| <b>Monthly Income</b>          |          |                   |
| Less than RM 1,000             | 14       | 5.04              |
| RM 1,001 – RM 2,000            | 16       | 5.76              |
| RM 2,001 – RM 3,000            | 36       | 12.95             |
| RM 3,001 – RM 4,000            | 50       | 17.99             |
| RM 4,001 – RM 5,000            | 76       | 27.34             |
| RM 5,001 – RM 6,000            | 56       | 20.14             |
| RM 6,000 and above             | 30       | 10.79             |
|                                |          |                   |
| <b>Occupation</b>              |          |                   |
| Student                        | 14       | 5.04              |
| Housewife                      | 8        | 2.88              |
| Non-Executive                  | 78       | 28.06             |
| Executive                      | 138      | 49.64             |
| Managerial                     | 40       | 14.39             |
|                                |          |                   |

|  | <b>N</b> | <b>Percentage</b> |
|--|----------|-------------------|
| Monthly expenses for Halal Cosmetic products         |          |                   |
| Less than RM 100                                     | 128      | 46.04             |
| RM 101 – RM 200                                      | 96       | 34.53             |
| RM 201 – RM 300                                      | 40       | 14.39             |
| More than RM 400                                     | 14       | 5.04              |
|  |          |                   |
| Frequency of buying Halal Cosmetic products per year |          |                   |
| 1  | 52       | 18.71             |
| 2  | 38       | 13.67             |
| 3  | 70       | 25.18             |
| 4  | 28       | 10.07             |
| 5 and more   | 90       | 32.37             |
|  |          |                   |
| Duration of usage                                    |          |                   |
| Less than 3 months                                   | 48       | 17.27             |
| 3 months – 6 months                                  | 110      | 39.57             |
| 6 months – 1 year                                    | 62       | 22.3              |
| More than 1 year                                     | 58       | 20.86             |

Data were analysed and interpreted in two stages. The measurement model was used in the first stage, while the structural model was used in the second stage. The measurement model evaluated the relations between observed items and latent variables. The measurement variable model examined through the assessment of the validity and reliability of the construct measures in the model. This is to ensure that only reliable and validated construct measures were used to assess the nature of relationships in the overall model.



**Figure 2.** Factor loading in measurement model.

**Measurement Model**

*Convergent validity*

The convergent validity was tested as it is the agreement to which the multiple items that were used to be measured. As suggested by Hair *et al.* (2010), factor loading, composite reliability and average variance extracted were the indicators used to access the convergent validity. The loading of all items exceeded the recommended value of 0.6 (Chin *et al.*, 1997). The composite reliability (see Table 3), which is depicted in the degree to which the construct indicator indicated the latent construct, ranged from 0.712 to 0.946, which exceeded the recommended value of 0.7 (Hair *et al.*, 2010). The average variance extracted, which reflected the overall amount of variance in the indicators accounted by the latent constructs, were in the range of 0.650 to 0.825, which exceeded the recommended value of 0.5 (Hair *et al.*, 2010).

**Table 3.** Factor loading and reliability

| Items | Factor Loading | Composite Reliability | Average Variance Extracted | Cronbach Alpha |
|-------|----------------|-----------------------|----------------------------|----------------|
| CV1   | 0.802          | 0.847                 | 0.650                      | 0.729          |
| CV2   | 0.859          |                       |                            |                |
| CV3   | 0.753          |                       |                            |                |
| EM1   | 0.925          | 0.958                 | 0.850                      | 0.941          |
| EM2   | 0.946          |                       |                            |                |
| EM3   | 0.937          |                       |                            |                |
| EM4   | 0.878          |                       |                            |                |
| EP1   | 0.757          | 0.878                 | 0.708                      | 0.790          |
| EP2   | 0.899          |                       |                            |                |
| EP3   | 0.861          |                       |                            |                |
| FV1   | 0.712          | 0.850                 | 0.656                      | 0.740          |
| FV2   | 0.821          |                       |                            |                |
| FV3   | 0.888          |                       |                            |                |
| INT1  | 0.926          | 0.934                 | 0.825                      | 0.893          |
| INT2  | 0.870          |                       |                            |                |
| INT3  | 0.927          |                       |                            |                |
| SV1   | 0.884          | 0.887                 | 0.663                      | 0.830          |
| SV2   | 0.762          |                       |                            |                |
| SV3   | 0.871          |                       |                            |                |
| SV4   | 0.729          |                       |                            |                |

*Discriminant validity*

Discriminant validity is the extent to which the measures do not reflect other variables and it is indicated by low correlations between variables by examining and comparing the average variance extracted (AVE). Based on the formula by Fornell and Larker (1981), it is required that the square root for each construct's average variance extracted (AVE) is to be higher than all its correlation with other constructs. As shown in Table 4, the squared correlations for each construct were less than the square root of the average variance extracted. This further indicated that inferred constructs have a good level of validity. Furthermore, Table 5 below shows the output from heterotrait-monotrait (HTMT) analysis. If the HTMT value is greater than the value of 0.85 (Kline, 2011), there is a problem of discriminant validity. All the HTMT values in Table 5 are below than 0.85, it shows that collinearity problems are free from this study.

**Table 4.** Inter-construct correlation

|                   | <b>Conditional Value</b> | <b>Emotional Value</b> | <b>Epistemic Value</b> | <b>Functional Value</b> | <b>Intention</b> | <b>Social Value</b> |
|-------------------|--------------------------|------------------------|------------------------|-------------------------|------------------|---------------------|
| Conditional Value | 0.806                    |                        |                        |                         |                  |                     |
| Emotional Value   | 0.631                    | 0.922                  |                        |                         |                  |                     |
| Epistemic Value   | 0.580                    | 0.648                  | 0.841                  |                         |                  |                     |
| Functional Value  | 0.539                    | 0.587                  | 0.513                  | 0.810                   |                  |                     |
| Intention         | 0.620                    | 0.727                  | 0.719                  | 0.489                   | 0.908            |                     |
| Social Value      | 0.535                    | 0.738                  | 0.579                  | 0.555                   | 0.609            | 0.814               |

**Table 5.** HTMT results

|                          | <b>Conditional Value</b> | <b>Emotional Value</b> | <b>Epistemic Value</b> | <b>Functional Value</b> | <b>Intention</b> | <b>Social Value</b> |
|--------------------------|--------------------------|------------------------|------------------------|-------------------------|------------------|---------------------|
| <b>Conditional Value</b> |                          |                        |                        |                         |                  |                     |
| <b>Emotional Value</b>   | 0.763                    |                        |                        |                         |                  |                     |
| <b>Epistemic Value</b>   | 0.767                    | 0.754                  |                        |                         |                  |                     |
| <b>Functional Value</b>  | 0.727                    | 0.700                  | 0.666                  |                         |                  |                     |
| <b>Intention</b>         | 0.762                    | 0.793                  | 0.842                  | 0.585                   |                  |                     |
| <b>Social Value</b>      | 0.673                    | 0.823                  | 0.703                  | 0.675                   | 0.690            | -                   |

*Structural Model*

Once the reliability and the validity of the measures were assured, the path coefficients were reported based on the results of a PLS structural model. Table 6 shows the significance in the path coefficients. The t-value can be compared with the critical value from the standard normal distribution to decide if the coefficients are significantly different from zero. For instance, the critical value for significant levels of 5 % probability of error is 1.96 (two-tailed test). In this study, the results revealed that conditional value, emotional value and epistemic value significantly affected the intention of purchasing halal cosmetic products.



**Table 6.** Summary of the structural model

| Description                    | Hypothesis | Path Coefficient | T-Value | Result        |
|--------------------------------|------------|------------------|---------|---------------|
| Functional Value -> Intention  | H1         | -0.034           | 0.677   | Not supported |
| Conditional Value -> Intention | H2         | 0.162            | 3.294*  | Supported     |
| Social Value -> Intention      | H3         | 0.060            | 0.754   | Not supported |
| Emotional Value -> Intention   | H4         | 0.357            | 3.899*  | Supported     |
| Epistemic Value -> Intention   | H5         | 0.377            | 5.162*  | Supported     |

\* $p \leq 0.05$ 

## 5. Discussion

The findings showed that conditional value, emotional value and epistemic value contributed positively and significantly on the intention to purchase halal cosmetic products. On the other hand, functional value and social value did not contribute significantly on the intention to purchase halal cosmetic products. The positive significant association between conditional value and intention to purchase a product is in line with the research findings conducted by Mohd Noor and Wen (2016). With regard to this study, it revealed that people intended to purchase halal cosmetic products for special occasions and with the condition that the products are Halal-certified by authorised bodies. This is an assurance that the products have been thoroughly examined in accordance with the rules and regulations.

Furthermore, the outcome on the positive correlation between emotional value and intention to purchase a product is consistent with the research findings by Asshidin *et al.* (2015). The possible justification found that purchasers perceived fulfilling their happiness and satisfaction from their intention to purchase halal cosmetic products. Additionally, purchasing halal cosmetic products accomplishes one of the Muslims' obligations. Subsequently, the positive significant results on epistemic value and purchase intention are parallel with the research findings by Hur, Yoo and Chung (2012) as they created high curiosity when halal cosmetic products were newly introduced in the market. People purchase these products to gain more information. On the other hand, functional value is not significant on the intention to purchase Halal cosmetic products. These findings were consistent with the research findings of Yang *et al.* (2017) as it is interpreted that the function of long-lasting cosmetics, safety and quality of the products do not influence customers' purchase intention.

In the same disposition, the social value was found not contributing significantly on the purchasing intention. Indirectly, it showed that customers are not influenced by family, friends and media advertisement to purchase halal cosmetic products. Customers are more concerned about gratifying their Muslim responsibility to purchase Halal products rather than following social attraction in accordance with their surroundings. This shows that other

components of social influences such as cultural influence across social-ethnic groups affect the intention to purchase Halal cosmetic products as found in the studies by Ajitha and Sivakumar (2017), Kim *et al.* (2013) and Rahim, Shafii and Shahwan (2015). Hence, the study proves that conditional value, emotional value and epistemic value influence the Muslim women's intention to purchase Halal cosmetic products.

## 6. Conclusions

Currently, the trend of Halal cosmetic products in the global industry is blooming. Thus, producing Halal cosmetic products has drawn many cosmetic manufacturers' attention. The manufacturers need to be alert on the current trend of Halal cosmetic products to remain in this industry. Based on the findings from this study, conditional value is significant on the intention to purchase Halal cosmetics. This implies that manufacturers should produce cosmetics that are certified by an authorised body such as JAKIM. Existing and potential customers will be more confident if the products are certified by an authorised body. The usage of the certification of Halal cosmetic products should be monitored to avoid any misuse. This is consistent with the outcome that epistemic value has a significant relationship with the purchase intention. The procedures, guidelines and regulations on producing and packaging the Halal cosmetic products should be transparent to enable the public to receive precise and up-to-date information. In conjunction with the finding on the positive relationship between emotional value and intention to purchase a product, managers should offer the Halal cosmetic products that are satisfying and convenient to the consumers. For example, the managers may offer an easy wash cosmetic product as it leads to convenience in performing ablution. Coupled with that, they may introduce cosmetic products that can be applied during Muslim prayers after considering the solat regulations. The innovation and development in introducing halal cosmetic products will benefit the Halal market industry and consumers.

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*Original Research Article*

## **Influencing Factors for Malaysian Muslim Women Consumers in Purchasing of Non-Certified Halal International Brand Makeup Products in Mid Valley Megamall Kuala Lumpur**

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**Abstract:** Malaysia is expected to witness a greater demand for halal products due to increasing awareness of Islamic practices among the citizen. Malaysian Muslim women consumers spend more on cosmetics especially on those makeup products by international brands. For a Muslim, it is an obligatory to practice using only halal cosmetics for makeup products. Unfortunately, the halal awareness of non-food (cosmetics) is lacking among the consumers as compared to food products. This reason being that food is considered as consumable goods, while cosmetic is to be used on face and body; for external application and nothing internal. The main issue surrounding this strict practice (makeup products on face and body) concerns on the source of ingredients, either from halal or haram source. Ingredients sourced from haram materials will nullify the daily prayers of a Muslim. A study has shown that the customer's intent to purchase cosmetic with non-certified halal is without a doubt if the halal products are not made available in the market. This eventuates to the infrequent use of halal logo by companies that produce makeup products and existing incidents of fraudulent pertaining to the halal logo in the market. Thus, the purpose of this study is to identify the factor influencing Malaysian Muslim women in purchasing of non-certified halal international brand makeup products. This study applied a qualitative approach based on library study and face-to-face interview with 20 Malaysian Muslim women consumers. The interview was recorded, transcribed, and applied to a content analysis. As a result, the findings demonstrated that the factor influencing Malaysian Muslim women in purchasing of non-certified halal international brand makeup products are divided into two, which are the (i) internal and (ii) external factors. Internal factors include quality, trust, brand, loyalty, price, effectiveness, safety, confidence, variety, and ingredients while external factors derived from the influencers such as makeup artists, internet celebrity, public figures, well-known entrepreneurs, bloggers, and Instagram-famous figure.

**Keywords:** Halal cosmetics; international makeup products; Malaysian muslim women; and Halal awareness

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## 1. Introduction

Cosmetic products that manufactured by non-Muslims are widely used among Muslims all over the world (Swidi *et al.*, 2010). Unfortunately, majority of the Muslims are not giving enough attention on the halal ingredients in the cosmetic products which pose serious challenges afterwards. Where the awareness is increasing, Muslim consumers started to have a shift of behaviour by having demand for halal cosmetic products (Hashim & Musa, 2013; Mohezar *et al.*, 2016). Thus, many companies in the cosmetic industry are gearing towards producing halal cosmetic products according to the Shari'ah to fulfil the demand. Unfortunately, in general nowadays, halal certified makeup products are still inferior in quantity and are hardly available for purchase. Most of the Muslim consumers will eventually purchase products without halal certification when there are no halal products available (Ahmad *et al.*, 2015). This finding has also been supported by Hunter (2012) as cited in Kaur (2018), which stated that when there is no other choice, Muslim consumers intent to buy products that do not have halal certification.

Halal is no longer a purely religious issue. It is in the realm of business and trade, and it is becoming a global symbol for quality assurance and lifestyle (Hassali *et al.*, 2015). Indonesia, Thailand, Philippines, Vietnam and Malaysia are the five countries under the Association of Southeast Asian Nations (ASEAN) which are intensively promoting halal cosmetic variants such as in skincare, makeup, fragrances and hair care products (Kaur, Osman & Maziha, 2014).

In Malaysia, cosmetic industry existed since about 30 years ago (Swidi *et al.*, 2010). Cosmetics which consists of makeup, perfume, toothpaste, shampoo, and deodorant is used for enhancing features without causing any problems to the body (Zaidun & Hashim, 2017). Cosmetics come in a very wide range of products from cleanser, toner, serum, moisturizer to foundation, powder, lipstick, eye liner, eye shadow, blusher including mascara and it will not end there. Instead, the variants will keep on increasing from time to time, based on the customer's demand (Teoh & Md Harizan, 2017). Essentially, makeup is one of the confidence factors in empowering how most ladies feel on an average everyday living. Cosmetics are more frequently devoured by ladies than men as the objective clients of restorative organizations are among the female customers (Hashim & Musa, 2014).

Cosmetic products are comprised of both local and international brands. Some of the local brands in cosmetic products are owned and manufactured by local companies and several others are of that produced abroad. While some of the international cosmetic brands are also owned by the international companies, they are also manufactured locally and only several of the products are manufactured abroad. Besides, several imported brands of cosmetic products recorded an increased in number securing its place in the local Malaysian market. This is due to the overwhelmed emphasize among local consumers on the beauty and personal appearance towards international cosmetic brand (Ghafur, 2017).

Given the significance of halal labelled cosmetics, the implementation of halal logo and marketing strategies towards it are still barely evidenced in the Malaysian cosmetic industry (Majid *et al.*, 2015). The misuse of halal logo is a growing concern because it will affect the customer's trust towards halal products entirely. Thus, it is vital to educate customers on how to distinguish fake halal logos.

Besides, Kaur (2018) stated that halal is not a supreme priority to the consumers when purchasing the cosmetic products as they are more concern on the affordable and cheaper price, material of a good quality and those from the in-trend, popular brands. This shows that the level of halal awareness among the consumer in Malaysia towards halal cosmetics is still low. Therefore, halal cosmetic is associated with numerous requirements and factors according to the Shari'ah, such as halal principles, product reliability, product commitment, intention to choose halal cosmetic products, trust, environmental friendliness, attitude, religious belief, and product innovation. This research will study on the factors that influence Muslim consumers on choosing non-certified halal brand makeup products.

The purpose of the study is to determine influencing factors for Malaysian Muslim Women Consumers in Purchasing of Non-Certified Halal International Brand Makeup Products.

## **2. Methods**

A qualitative research that focused on a descriptive study had been conducted. A descriptive research aims to depict an occurrence and its features (Nassaji, 2015). In order to achieve the research objectives, (i) opinions, (ii) attitudes, and (iii) perspectives of an individual must be collected through interview sessions. The data was composed and analysed qualitatively.

### ***Sample***

Interview type that used in this study is structured interviews based on set of questions (Tim, 2011). Basically, interviewer would ask the same questions to all the informants and then to compare the answers between them thus highlighting results from the interview. This method has some ground rules which the interviewer will have to explain the questions in a standardized way, and it must be done within the interview session. In this case, the interviewer could not be bias. The interviewer could not give any answer or hint to the interviewee. The questions must be finalized in a way that it could not be changed. The participants were selected based on the criteria of Malaysian Muslim women and user of international brand makeup products.

Besides, this study also used purposive sampling. Babbie (2016) explains the purposive sampling as one of the non-probability sampling. In this purposive sampling, the researcher selects the informants that are useful and could represent the study through the

researcher's basic discretion includes gender, background and type of consumer. General open-ended questions are asked to allow the participants to create options for responding or voicing their experiences and perspectives. After that, information is recorded, and transcribed for analysis. The interview questions were prepared based on the research objectives and the literature review.

The interview session was conducted in Mid Valley Megamall. The Megamall is selected because it is adjacent to the Federal Highway, the busiest highway in Klang Valley during rush hour as it connects people from/to Kuala Lumpur. Even though it is not the biggest mall in Klang Valley, it has more public transportation options; Keretapi Tanah Melayu Berhad (KTMB), RapidKL LRT Kelana Jaya Line, public bus service and Mid Valley Megamall's free shuttle bus. Mid Valley Megamall comprises of 247 tenants that includes 202 stores and 44 kiosks. This mall has been visited by 60,000–70,000 shopper's weekdays while the number can be up to 100,000 shoppers for weekends and a total of 3 million shoppers per month. So, the selection of this area will get a representative of perception among Malaysian Muslim women consumers regarding on purchasing of non-certified halal international brand makeup products.

### *Demographic and Descriptive Analysis*

Table 1 shows the demographic information of informants based on characteristics, category and frequency.

**Table 1.** Demographic Information of Informants.

| CHARACTERISTICS | CATEGORY        | FREQUENCY |
|-----------------|-----------------|-----------|
| Age             | 20–25 years old | 12        |
|                 | 26–30 years old | 6         |
|                 | 31–35 years old | 1         |
|                 | 36–40 years old | 1         |
| Education       | STPM            | 1         |
|                 | Diploma         | 8         |
|                 | Degree          | 11        |
| Hometown        | Selangor        | 5         |
|                 | Kelantan        | 7         |
|                 | Johor Bharu     | 2         |
|                 | Perak           | 2         |
|                 | Penang          | 1         |
|                 | Pahang          | 2         |
| Negeri Sembilan | 1               |           |



|                                    |                    |    |
|------------------------------------|--------------------|----|
| Salary Range                       | Student/Housewife  | 3  |
|                                    | Less than RM 2,000 | 8  |
|                                    | RM 2,000–RM 4,000  | 8  |
|                                    | RM 4,000–RM 6,000  | 1  |
| Periods of Staying in Kuala Lumpur |                    |    |
|                                    | Below 1 year       | 3  |
|                                    | 1–10 years         | 15 |
|                                    | 11–20 years        | 1  |
|                                    | 21–30 years        | 1  |

For this study, there were total of 20 informants who were selected based on these following criteria: (i) Malaysian Muslim women and (ii) User of international brand makeup products. As illustrated from the table 1, the age of informants varies from 20 years old to 37 years old. They came from various educational backgrounds as well, STPM, Diploma, and Degree. Table 1 also portrays that most of them came from another state, and only 5 of them were from Selangor. Even so, they spent most of their life here as shown in the table, 15 of them were staying in Kuala Lumpur for 1 to 10 years. The precursor factor that influenced awareness of using halal cosmetics seems to be the socio demographic profile (Phuah & Jusoh, 2013).

### ***Instrument***

The instrument used in this study was interview. The interviews were conducted by the researcher and the interview questions were designated by the researcher based on the theoretical framework and the literature review. At the beginning of the interviews, the participants were asked for some demographic questions such as name, age, hometown, education, salary range, and periods of staying in Kuala Lumpur. The interview questions consist of two parts align with the research objectives. The first part of the questions was related to the consumer's purchasing factor of international brand makeup products while the second part was related to the consumer's awareness on halal certified makeup products. All the interview questions were translated by the researcher into Bahasa Melayu as the informants were Malaysian. The interview questions were then validated by expert for improvement.

### ***Data Analysis Procedure***

Data analyses should be based on the research questions and the research design selected for the study. The researcher had specified the procedures for reducing and coding the data. In this study, content analysis was applied to transcribe and interpret the interview result.

### ***Interview Analysis***

The structured of interviews were transcribed and analysed using the method of qualitative analysis. In the organizing and the familiarizing stage, the interviews were transcribed and translated into English from Bahasa Melayu. In the coding and reducing stage, informant responses were grouped according to the research questions. After that, the codes were formed in relation to the type of informants purchasing factors of international brand makeup products such as “quality”, “long lasting”, “brand”, “trust”, “affordable” and “confident”. These codes were selected because it has been frequently mentioned by the informant. In the interpreting and representing stage, the data were reported using narratives.

## **3. Results and Findings**

### ***International Brand Makeup Products***

Basically, 2015 marked a total of US\$2.24 billion trade volume for personal care and cosmetic products in Malaysia. The main exporters for personal care and cosmetics products to Malaysia are China, Thailand, France, EU28, the United States, South Korea and Japan. The demands for cosmetic sectors are expected to be positively increasing starting 2016 onward (Lee *et al.*, 2019).

Cosmetics or makeup can be defined as “articles intended to be rubbed, poured, sprinkled or sprayed on, introduced into or otherwise applied to the human body for cleansing, beautifying, promoting attractiveness, or altering the appearance” (FD&C Act, 2012). International makeup products are also known as imported makeup products. In this case, the imported products are from worldwide exporters to Malaysia. Makeup is mostly applied on the face. Other makeup’s cosmetic includes nail enamel. Face makeup has become into the category of base makeup and point makeups. Foundation, Face powder, Lipstick, Blusher, Eye Shadow, Eye Liner, and Nail Enamel are all categorized as makeup product (Ali, Halim, & Ahmad, 2016).

According to Hornby (2010) makeup is a substance used to make the face more attractive or to change the appearance and it is mostly used by women. Therefore, the purpose of producing makeup products is the same be it manufactured locally or abroad. The difference is more on the acceptance and the needs for consuming the brand either international or local makeup products although, there are several differences between range and functions of a makeup product.

### ***Range and Functions of Makeup Products***

Every single person in this world would have a different range of makeup products according to their own preferences and their needs. Some would only use basic products such as foundation and lipstick. Instead, the influencers and makeup artists used a wide range of makeup products. Basically, the arrangement of the products was according to its functions.

The range for most of the international brand makeup products and their functions are as below (Hornby, 2010):

a) Primer

This product is used to create an extra layer between the skin and makeup. Eventually, it helps makeup to last all day long, smoothen the skin's surface for an easy application of the makeup afterwards and produce an even skin tone. Hornby (2010) defines primer as a type of paint placed on a wood or metal before it is painted to make it stay longer on the surface. The primer could be applied to the face, eyes, lips and lashes. Basically, this product acts as the first step in makeup process as it will prime the skin before the actual makeup starts. They come in different types such as illuminating primers, mattifying primers, colour-correcting primers, long-wearing primers, hydrating primers and pore-minimizing primers.

b) Foundation

Foundation is a skin-coloured cream used on face before putting on anything else. Foundation's range comes in stick, liquid, cream and powder form. Despite its different range, the functions remain the same. It was used to even out the skin tone, cover the flaws and to some extent, changing the original skin tone. In addition, it will make the skin to be uniformed in colour as well. The foundation comes in variety of shades and it is applied right after the primer.

c) Concealer:

Concealer is a skin-coloured cream as well, but it is to cover the marks on the skin or dark circles under the eyes. Concealer also called as a colour corrector, is a bit thicker than the foundation. It is used to cover dark circles, age spots, large pores and also the visible blemishes. It comes in liquid and powder form and has wide shades to suit the skin colour.

d) Powder

To set up the makeup after applying the foundation and concealer, powder is used with the purpose of controlling the oil and gives a matte finishing effect on the skin. It should be absorbed into the skin well. The usage of a face powder will help to reduce the visibility of wrinkles and lines. It was supposed to cover the minor imperfections on one's face and in some cases, will stay longer on the face so that the re-powdering is unnecessary. Moreover, it will also enhance the skin appearance by reducing the visibility of discoloration as well (Elmarzugi *et al.*, 2013; Hamedi *et al.*, 2019).

e) Blusher or Rouges

Blusher is also called as rouges or blushes and it is basically used to make the cheeks red or pink. It is to set off the younger and healthy skin with the effect of rosy freshness as well.

This blusher comes in various shades and types such as in liquid, cream and solid. Rouges that come in a solid form are convenient to use rather than in other forms. Some people prefer their cheeks to look natural while others prefer it to be the centre of attraction. They applied rouges on both cheeks using a specific makeup brush or a puff. The usage of a blusher will make one look younger and pretty (Hamedi *et al.*, 2019).

#### f) Eyeliner

Eyeliner is used in makeup to make the eyes look smaller or wider. It can be drawn above upper lashes or at the lower lashes as well and to some extent inside the water lines itself. Eyeliner is considered as makeup, usually black in colour that is drawn around the eyes either at the upper or lower lashes to make it more appealing and pleasing. It could change the eye shape and draw attention to it. The common colour ranges for eyeliner are black, brown, and grey while others such as pastels, frosty silver, gold, white and glitter colour.

#### g) Eyebrow Pencil

A makeup process is considered incomplete without the eyebrows' grooming. The function of eyebrow pencil is to groom the eyebrows into a certain shape that preferred by the user itself (Hornby, 2010). Eyebrow pencils are used to darken the eyebrows, typically in black. The proportion of waxes in the eyebrow pencils gave the hard effect which makes it easier to be constructed into a perfect point of eyebrows (Hamedi *et al.*, 2019).

#### h) Eye shadow

Eye shadow comes in plenty of colours and textures which could be applied on the eyelids and under the eyebrows. Usually, eye shadow is made in a form of powder such as compressed or loose powders, but it could also in certain cases made from liquid, pencil cream, emulsions, sticks and mousse. (Hamedi *et al.*, 2019).

#### i) Mascara

Every woman wished to have long eyelashes and that is where the mascara comes into place. It will thicken the eyelashes and to a certain degree, the eyebrows as well as to make it more appealing. Basically, most users will choose the black mascara because it looks natural and it could also come in another colour such as purple, and pink to create an extraordinary look.

#### j) Highlighter

The highlighter in makeup products is used for face contouring. It will create angles and depth on one's face. It comes in many forms but the most frequently used is in the powder form. It is applied to cheekbones, nose and jawline to make it more appealing and create a difference in features.

k) Lipstick

Lipsticks usually come in way more various range of colours than other makeup products. It will add colour and texture to the lips and in some cases, it will even make the lips become matte, satin, and lustre. According to (Hamedi *et al.*, 2019) lipstick helps in brightening the lip’s colour and will reduce irritation to the lips.

***Type of Muslim Consumers of International Brand Makeup Products***

Based on the interviews, types of Muslim consumers that chose international brand makeup products are among those women with career. Most of them are working in Kuala Lumpur and had been staying in Kuala Lumpur for quite some time now. Their range of age was around 20 to 37 years old, respectively.

***Factors Influencing Malaysian Muslim Consumers in Choosing International Brand Makeup Products***

Table 2 below shows internal and external factors which influence Malaysian Muslim consumers on choosing international brand makeup products.

**Table 2.** Internal and External Factors influencing Malaysian Muslim Consumers on choosing International Brand Makeup Products

| No. | Internal Factors | External Factors   |
|-----|------------------|--|
| 1.  | Quality          | Influencers (makeup artists, internet celebrities, public figures, well-known entrepreneurs, bloggers, and insta-famous) |
| 2.  | Trust            |  |
| 3.  | Brand            |  |
| 4.  | Loyalty          |  |
| 5.  | Price            |  |
| 6.  | Effectiveness    |  |
| 7.  | Safety           |  |
| 8.  | Confidence       |  |
| 9.  | Variety          |  |
| 10. | Ingredients      |  |

Table 2 portrays the internal and external factors of Malaysian Muslim women in choosing international makeup products. Internal factor derives from the person in the light of one’s own commitments, desires or goals. Quality is the most frequent answers for

selecting the international brand makeup products. There are 14 out of 20 informants chose quality as the internal reason, while others indicated trust, brand, loyalty, price, effectiveness, safety, confidence, variety, and ingredients as the factors mentioned.

Consumer's satisfaction derives from a high-quality product. Even so, quality from the perspectives of the manufacturer and the customer could differ. In fact, a product is perceived as high quality if the consumers are satisfied upon consistently using of certain products. Quality is defined as a whole feature, product attributes and the effect given by the product altogether. In addition to this, if the price does not match with the quality, the possibility of customers in choosing another product is high. Price determines the consumer's satisfaction which eventually lead to the purchase makeup products (Jamaluddin & Ahmad Anuar, 2018). Products with a well-established brand name are the most preferred by the customers to be purchased. This is due to the trust and loyalty that the brand invokes in them to consume. From the interview conducted, R1, R3, R4, R6, R7, R8, R9, R13, R15, R16, R17, R18, R19, and R20 chose quality as a factor of purchasing international brand makeup products as compare to other factors.

While R5, R6, R10, R13, R14, R15 and R19 reflect effectiveness is the factor in purchasing international brand makeup products. The effectiveness of makeup products includes the compatibility of the skin, reducing skin problems, covering wrinkle spots and the absence of negative effects. As a result, those makeup products will be safe to purchase and consume.

Then, the next factor of choosing international brand makeup products is the high level of confident that the products provide to the consumer. R11 mentioned that the international brand makeup products increased the confidence level upon consuming it. The respondent felt safe and *halal* ingredients will make them loyal to continue consuming the makeup products.

Besides, R2 and R6 mentioned that the international brand makeup products possess a wider range of selections of the products. The respondents felt that they could choose from the type of products itself or based on the functions of the products.

For the external factors, R2, R7 and R8 mentioned that influencers, such as makeup artists, internet celebrities, public figures, well-known entrepreneurs, bloggers, and Insta-famous convinced them to choose international brand makeup products over the local one. One of the respondents said: "... At first, I wanted to try it because the influencers reviewed the products, and after I used this brand, it becomes my favorite products instantly...".

Thus, most of the respondents consumed the products due to the review from the influencers they followed. They tend to trust the influencers rather than identify the status of products initially. Besides, the respondents described that the brand awareness also influenced the purchasing decision. R9 and R12 stated: "... I choose this product because it

is a well-known brand and lots of my friends used it....” While, R11’s described: “These products have been established and a lot of research has been done on it and that is why I trusted this brand”.

### ***Challenges on Non-Certified Halal International Brand Makeup Products***

Despite the overwhelming demand for international makeup products, those non-certified ones could not deny the challenges which arises from the issues of *halal* certification and the ingredients, just to name a few.

#### *Halal certification*

Some of the international makeup producers and manufacturers did not apply for *halal* certification or *halal* logo on their products (Arbak *et al.*, 2019). Given the significance of *halal* labelled cosmetics, the implementation of *halal* logo and marketing strategies are still hardly in place in the Malaysian cosmetics industry (Majid *et al.*, 2015). Meanwhile, Hussin *et al.* (2013) stated that the labelling of *halal* logo and its significance to the purchase intention of *halal* products is positive. In a way, the faith in the authenticity of *halal* logo will increase the purchase intention of the consumers on *halal* products.

#### *Ingredients*

Oils, fats and proteins are the examples of crucial ingredients in cosmetics products that should be paid great attention to. Those ingredients must be detected to ensure if it is following the Islamic law. This is because cosmetics products which contains or contaminated with porcine-derived products is not *halal*. It is hard to identify international makeup products because of their questionable ingredients (Hashim & Mat Hashim, 2013).

## **4. Conclusion**

Back in the past, cosmetics were claimed to be used since Stone Age by Archaeological excavations (REF). For ancient people, the use of cosmetics were mainly for safety, sunlight’s protection and for religious perspective. As the time passes, the purpose of cosmetics also changes. The modern people used cosmetics to make life more enjoyable and rewarding. This is where the international makeup products take place. Thus, many issues need to be tackled in *Halal* Cosmetics industry as it involved in the non-certified *halal* makeup products which been widely used among the Muslim consumers. Based on the findings, the factors influencing Malaysian Muslim women in choosing international makeup products are divided into internal and external factors. Internal factors include quality, trust, loyalty, effectiveness, brand, price, safety, ingredients, confident and wide range of products while for the external factor is solely from the influencer. This paper aims to create more market demand from those Muslim consumers for *halal* makeup products so that the international cosmetic companies will produce and adopt the *halal* certification requirements.

Besides, it will increase the confidence of Muslim consumers in using international makeup products.

### Conflict of Interest

The author declares that there is no conflict of interest in this work.

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## A Critical Analysis of Halal Marketing in Malaysia's Multi-Level Marketing (MLM) Industry

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**Abstract:** The concept of *Halalan Toyyiban* is very important in Muslims' lives in their servitude to Allah. The business itself is broken down into many different kinds, one of those which has become the trend nowadays is Multi-Level Marketing (MLM). MLM business is a business model that involves selling and recruitment of new distributors into the company. Multi-Level Marketing is seen to be good as it helps many people to achieve their dreams, the contrary, it is observed as a medium of cheating. With its players reaching 2 million in Malaysia since its establishment in the early 1990s, MLM's presence in the business industry should not be taken lightly. This research attempts to analyse the current MLM system and its factors that can be categorised as *Halalan Toyyiban*, as well as the factors which lead to the destruction. This factor includes the system itself, manufacturing, the distribution channels, the after-sales service, and the long-run vision of the company. By doing this, it is aimed that the doubtful (*Syubhah*) or even the impermissible (*Haram*) practices of MLM can be eliminated and abstained by the Muslim players, and it is expected that better MLM companies can be established, using proper S.O.P and guidelines. The purposes of the research are gained through a qualitative approach from the library research and interviews.

**Keywords:** Multi-Level Marketing; *Halalan Toyyiban*; Halal Industry; *Syubhah*; Haram practice; Opportunity; Ethic

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### 1. Introduction

Marketing is the backbone of any business operation. The achievement of key performance index (KPI) is based on the success of marketing. In global economic trends today, industry 4.0 marketing shows an important role to enhance the business opportunity (Vassileva, 2017). Goldsmith (2004) stated the current and future trends in marketing study are based on four main topics that are globalisation, technology, personalisation, and integration in the business world. There are three areas in marketing which are marketing management, marketing research, and marketing theory (Day & Wensley, 1983). The main arguments are the effects of globalisation, technology, and non-free personalities, but they

interact to influence the way marketing will be practised and taught within the next decade. The scenario of marketing business basically can be approved in two types of practices that are single-level marketing (trading) and pyramid system (Frambach & Schillewaert, 2002).

In Malaysia, Multi-Level Marketing (referred to as MLM) is one of the rapid growing industries. However, the conventional practice of marketing is doubted to be fair to the people. Therefore, the Islamic principle stresses justice should be implemented to overcome the injustice practices in this field. The application of Halal marketing is still not established and there is less discussion in literature from the Shariah perspective (Ahmed *et al.*, 2014; Aziz & Chok, 2013; Islam & Chandrasekaran, 2013). Many MLM companies in Malaysia still practise the hit and run concept even though MLM rules and guidelines have been established (Harden, 1987). In 2017, a total of 1993 companies applied for a license under direct sales, out of this number, around 1501 to 1545 companies were doing health products, food, cosmetic and pharmaceutical (Kiaw & Run, 2007).

The application of conventional marketing is based on 4P's Model (Product, Price, Place and People) (Constantinides, 2002). According to Act 500 (direct selling deed and anti-pyramid scheme 1993), MLM is a "door-to-door sale" which means the sale of goods or services is carried out in the way that members get members to sell products such as one-to-one approach or through online. Several issues related to ethics and value of marketing such as fraud, usury (*riba*), oppression (the up line gaining more for less effort) and misunderstanding have been practised in operation and marketing department which do not follow the Shariah guidelines (Abdul Cader, 2015).

Shariah Compliant Marketing should be implemented in Halal Industry based on Shariah guidelines (Alserhan, 2015). Lack of information on the operation of companies would create many problems, such as the case of Pak Man Telo and money laundering activities in MLM business. These cases show that the marketing methods they used in MLM were the traditional ones, which are one-to-one approach, online marketing and systematic data sets and also every data obtained was controlled by a computerised system of Pak Man Telo or they called it the Ponzi scheme; money was collected from the downlines, and they were promised to be paid double within 90 days by purchasing foreign postal coupons. This investment was successful in the beginning but then failed and was unable to pay to later investors. By doing so, it created a huge problem, which caused a loss for the stakeholders.

Each company is responsible to understand the customers' needs and demands for competitive advantage in the Halal industry (Bohari *et al.*, 2017). The customers will support the company to maintain the value and satisfied customers will design the future market offered based on customers' needs. Marketing can help a company to work and survive in this complex, changing and turbulent environment. The main objective of marketing is to maintain customer satisfaction and create reasonable profit for the company (Shamsudin & Rahman, 2014). However, the marketing process must be Halal that is in line with Islamic principles.

Just like other aspects of life, Islam promotes Halal in everything (Saeed, *et al.* 2001) including business. Shariah provides guidelines on how businesses need to be promoted in accordance with Islamic ethical codes. So, the effect of global halal marketing increases the speed and the accuracy of marketing decisions and the amount of information used (Izberk-Bilgin & Nakata, 2016). It requires the conventional marketing to incorporate Shariah compliance into marketing activities (Abdullah & Ahmad, 2010). The increase of the knowledge of stakeholders on Islamic marketing (Abuznaid, 2020) establishes more qualified commission and enhances the profitability of the company according to Shariah (Tameme & Asutay, 2012).

**2. Disucussion**

***An Overview of Multi-Level Marketing Industry***

In Malaysia, MLM was established in the past thirty years. According to the Ministry of Domestic Trade, one hundred sixty-seven companies actively and legally run MLM businesses (Kiaw & Run, 2007), they practise the pyramid system where members will find new members and gain a bonus as a profit paid in an oppressive manner (Constantin, 2009). MLM is a method of sales promotion in which a commission is paid not only to the seller responsible for making the sale but also to several levels of sellers that are responsible for distributing knowledge of the product to the seller making the current sale (Siahaan et al., 2014). MLM companies sell and promote health products, food and pharmaceutical, skincare and household products (Kiaw & Run, 2007). Table 1 shows the system of Multi-Level Marketing pay-out calculation using a system symbol on selling products and services (Taylor, 2000).

**Table 1.** System Symbol in Multi-Level Marketing.

| NO | SYSTEM SYMBOL | EXPLANATION  |
|----|---------------|--|
| 1  | PPS's         | (wherein no products are offered) and product-based pyramid schemes (PPS's), operating as MLMs. They are now appearing by the hundreds on the internet and established MLM companies are expanding into overseas markets   |
| 2  | FTC           | concentrate on the commissions you could earn just for recruiting new distributors and which (2) generally ignore the marketing and selling of products and services   |
| 3  | RVE-EHI       | RVE-compensation systems lead to extreme horizontal inequality<br>EHI-in payout over the entire network of distributors-huge payouts to a tiny percentage of participants, while the vast majority wind up losing the money and effort they invested over a period of time |

Tapp & Spotswood (2013) started the 4P’s reconfiguring the social marketing mix as a tool in MLM activities which can be implemented in Halal Marketing. Marketing Mix 4P’s which includes Price, Product, Place and Promotion is basic marketing in a managerial approach (McCharty, 1965).

Besides, the elements of 4P’s in social marketing have been stretched beyond the breaking point. Originally, 4P’s were designed for social marketing mixes that contained products and prices. 4P’s are no longer fit in an age where social marketing interventions are so wide-ranging (Tarmudi, 2009). For example, the number of Muslims in Malaysia is 16,581,000 people and they are very concerned about Halal in each aspect of life (Baharuddin *et al.*, 2015). Besides, Goi (2009) provided an idea of marketing principles to the marketers which can be used as tools to assist them in pursuing their marketing objectives especially in incorporating Halal elements into their business.

Furthermore, Constantinides (2002) added the 4P’s web-marketing can be a mixed model to enhance the marketing strategy. Electronic commerce such as social media like Instagram, Facebook, Twitter and YouTube research and applications are 4P’s marketing mix model. Halal Marketing framework can be proposed and applied as a traditional and online marketing system as assurance where there is no doubt in marketing activities. Table 2 shows the different concepts of 4P’s.

**Table 2.** Different concepts of 4P’s.

| 4P’s      | TRADITIONAL  | SHARIAH MARKETING   |
|-----------|--|---|
| Product   | Most products used for selling to Multi-Level Marketing company do not necessarily implement Halal certification.    | All products in Multi-Level Marketing have Halal certification. The products must be <i>Halalan Toyyiban</i> .          |
| Place     | Office or centre of sale can open anywhere, no thoughts about cleanliness.   | Office or centre of sale must be a clean place, which does not have any non-halal product sold in the surrounding area. |
| Promotion | Does not follow ethic and value in its explanation to members. The focus is only about the high quantity of sale.    | Always give the right explanation to the members, no pressure to achieve selling performance.                           |
| Price     | The agreement in the selling of product or services is not based on the Islamic entity. The focus is on high profit. | Follow Islamic guidelines. Always do the right calculation to avoid unlawful interest.                                  |

### *Pyramid scheme*

The phenomenon known as multi-level or pyramid sales plans first emerged in the mid-1960s. The appeal is the time-honoured, great American dream of opportunity for the little guy to escape from mediocrity. The “plan” is presented as his chance to be his own boss, in his own business, making untold profits for little or no work (Ella, 1973).

MLM schemes designed by companies do not give justice to agents or members for high bonuses or commissions. Agents get more when they can create a pyramid group underneath. The more participants we earn, the more revenue we will generate. This Pyramid scheme shows that agents who acquire members of the public will receive bonuses, commissions and facilities without hard work. This is where oppression and injustice occur during unbalanced marketing. Many deals with scams involve excessive pricing and profit for a marketed product (Shyam, 2017).

### *Marketing plan*

Payment methods in MLM companies are distributed by percentage (Albaum & Peterson, 2011). Marketing plans created and stored in the data system by auto-pay can be misleading and invisible in the marketing plan. Disclosure and application of good values in a presentation or even a defined marketing plan must have high integrity and value to ensure that lies and deception do not occur (Bloch, 1996).

### *Traditional structure*

This is an old payment method in MLM where distributors can recruit as many people as possible without a layout structure. The traditional system involves a lot of recruitment to generate more sales and make more profit. This method enables distributors to appoint multiple agents to ensure that the products being marketed are high in sales and commissions are also high. This traditional system is safer and does not involve high risk where the distributor or agent is clear with the marketing plan set by the company. Here, all shareholders will be given training as well as knowledge products to avoid confusion and inaccurate calculations (Sparks & Schenk, 2001).

### *Binary system*

This is a type of marketing plan in which couples need to be created for the distributor to make a profit. It has a heating period in the system. A binary system is a bonus payment system that involves the left and right sides of the bonus calculated and paid according to the left and right calculations (Daduya *et al.*, 2016). In the estimation of bonus payments through this binary system according to Halal marketing, it is not legally Halal and illegal. Referring

to this SOP, JAKIM binary system does not recognise this due to doubts regarding the calculation of the profit and payment of the bonus.

### *Muslim Friendly*

Muslim Friendly is a business activity carried out under Islamic law and consumer interests. The term is used to show that the business is fulfilling the major needs of Muslims when doing business.

### ***Guidelines on Islamic Marketing***

Islamic marketing is the wisdom of satisfying the needs of customers through the good conduct of delivering Halal, wholesome, pure and lawful products and services with the mutual consent of both seller and buyer for achieving material and spiritual well-being in the world here and hereafter and making consumers aware of it through the good conduct of marketers and ethical advertising (Arham, 2010; Antara, *et al.*, (2016). In al-Quran, Allah SWT says: “Then eat of what Allah SWT has provided for you which is lawful and good. And be grateful for the favour of Allah SWT, if it is indeed Him that you worship” (al-Quran, 16:114). The al-Quran also mentions: “O you who believe! Eat not *Riba* doubled and multiplied, but fear Allah SWT that you may be successful” (al-Quran, 2:130). Munadi & Iswanto, (2020) quoted a hadith by ‘Abdullah ibn ‘Umar who narrated that the Prophet Muhammad PBUH, said: “Pay the labourer his wages before his sweat dries” (Saheeh Ibn Maajah, 2443).

The Principles of Islamic marketing fill a gap in international business literature covering the aspects and values of Islamic business thought. They provide a framework and practical perspectives for understanding and implementing the Islamic marketing code of conduct (Alserhan, 2015). Halal marketing in Islamic marketing MLM will give stakeholders, marketers, advertisers (Purnama & Safira, 2017), staff and members the knowledge to understand all marketing strategies and marketing plans clearly without fraud.

### *4P's in Islamic marketing*

There are differences between conventional and Islamic marketing. They are as follows:

#### 1. Product

Products at a conventional marketing company will usually produce the maximum profit at a low cost. Sometimes by looking at the product, we are sceptical of the quality of the product. Presentations on the product reflect the quality of the product, as well as the content that is usually in minimum quantity, and the quality of the product is different each time it is supplied. The price of a product also varies according to the suitability of the product. In MLM the price placed is too high and unreasonable. This indicates that there is no adequate and accurate planning for pricing due to inexperience in dealing with

price fluctuations and market inflation. As a result, the price of the product is not set correctly. The owner then realises this and will then do some trick on the product to get the profit margin he wants. Good profit margins for food and beverage products are usually around 30–40% while on groceries, margins are usually between 25–30%. Good marketing companies usually set margins at 50–70% so that more profits can be achieved. This is to ensure a good profit margin. Product owners can quickly lower prices when there is more competition in the market. The company will make some changes and adjustments to the product to make it look more attractive and more expensive so they can earn more profit. Islam has set the general rule that the product cannot be marked up too much for the price. There are two opinions; first, the profit margin should not exceed 200% (Jawaid, 2010) and the second, any price is reasonable as long as there is an agreement between the two parties.

## 2. People

Islam believes in getting the right people for the right purposes. People stand as an essential element in Islamic Marketing. By putting prophet Muhammad PBUH as the anchor in trade by Siti Khadijah Khuwailid (the prophet's wife), with his character of *amanah* (honest), *siddiq* (truthful), *tabligh* (conveying) and *fatonah* (intelligent), the trade by Siti Khadijah had gained profit many times fold and the reasons for these successes were related to prophet Muhammad's PBUH excellent characteristics.

According to Sahih Muslim, Prophet Muhammad PBUH was a trustworthy and honest to the extent that when he was asked the cost price of the item, he would say it. This is the reason why Khadijah's business was successful when Prophet Muhammad PBUH anchored it.

## 3. Place

In determining the place of business of a marketing site company, it is very important to determine that the business is operating systematically and adhering to Shariah. Determining the place of business is whether the surrounding area sells non-halal goods or non-halal food. This will affect Islamic customers who are concerned about the business environment and even mistakenly choosing the right place can affect their business performance.

## 4. Promotion

Promotions play an important role in introducing products. The ethics of promotion are important to be within Shariah limits. There are different types of promotions in product marketing, including through billboards, social media, television, radio and more. The ethics of the promotion are to inform the product in its entirety without any deception and to conceal the contents of the product, for example, the product that uses non-legal



material, but which is concealed and causes fraud on the product. Great promotions can increase sales by large quantities and bring huge returns to the company. Promotions that use sexy female models are unethical and will have a devastating impact on the company's reputation. In the promotion, one must consider Shariah-compliance so that every promotion carried out will have a good effect on the user.

### *Ethics of Multi-level Marketing Industry*

A pure value-based marketer must be in the spiritual conduct not to commit a breach of ethics in the marketing exercise (Tybout & Zaltman, 1974). Halal marketing ethics from an Islamic perspective identify the salient features of the Islamic framework of marketing ethics. It highlights the capabilities and strengths of this framework in creating and sustaining a strong ethical marketing culture (Massey *et al.*, 2013). In Multi-Level Marketing industry, the Islamic framework of ethics, self-motivation and value will give an impact of economic growth on industries and employees (Saeed & Mukhtar, 2001; Rahman *et al.*, 2016).

Based on the literature review conducted, the researchers found gaps, which mark the doubts on the Halal status of MLM marketing activities. A study is conducted to identify the essential Halal marketing strategies in the MLM company.

### ***Law and Fatwa Related to Multi-Level Marketing***

According to JAKIM (2013), Multi-Level Marketing direct sales business guide according to Shariah 21, MLM companies that have the following features are likely to be involved in either haram (forbidden) or *syubha* (doubtful) transactions.

#### *Elements of the pyramid scheme under law & regulation by Endrew Bloomenthal*

- a) The scheme involves either a degree of *maysir* or *qimar* using money game. Newly recruited downlines will lose their participation fee if they cannot find other people to join the scheme.
- b) No written agreement between the company and the participants.
- c) The scheme only focuses on recruitment, rather than selling products that are beneficial to society.
- d) The main income of the company is from the participation fees paid by the downline, rather than from the revenue of the products sold.
- e) Participants must purchase a minimum order or certain goods specified by the company or pay a minimum sum (regularly) to enjoy the bonus or other benefits arising from downline or personal sales.

- f) Participants must implement “inventory front-loading”. This is where the MLM company requires participants “to purchase an unreasonable amount of inventory that cannot realistically be resold and/or used within a reasonable amount of time” (Duriat, 2014).
- g) Membership rank can be bought (with money). In an MLM business, members are promoted based on their working experience in generating sales or training the downlines.
- h) A rigid and unfair reward system based on the hierarchical structure and there is a prohibition from a level-entry participant to earn more than the upline although the former has worked harder to get more sales than the latter.
- i) No refund or buy-back policy and participants cannot withdraw from this scheme.

*Elements of deception, manipulation, exploitation in the marketing plan and incentive scheme*

- a) No fair dealing in the management of dealing with marketing and consumers or members do not care about the right ethics, what is often the case is a one-sided advantage that the MLM company only has. Hard-working members or consumers are paid just as much, even payments that do not match up to network marketing.

*Elements of coercion*

According to Gaski (1986), the elements of coercion are described as:

- a) Hard selling that involves a degree of force undesired by the consumers.
- b) Insufficient time is given to consumers to evaluate the product after an explanation is given by the sellers.
- c) Participants are not given the choice on the type and quantity of products to buy and they can only buy in fixed packages.

*Elements of wastage*

- a) A few participants may buy the goods in large quantities with wholesale prices hoping to profit by selling at the retail process, but they do not have a credible strategic business plan.
- b) Purchase of goods is unrealistic i.e. not based on actual consumption and capability of the participants to sell them. If those products cannot be sold, they may have to be thrown away if they are perishable, or the participant may have problems returning the goods to the company as there is no clear refund policy.
- c) The promise of fixed rewards even without effort.

- d) Any MLM company that promises fixed rewards either in the form of commission or bonus without any effort is repugnant to Shariah principles as this contains an element of *riba*.
- e) The author would equate this as the absence of *khiyar*. In a real business transaction, contracting parties have the option of rescinding or terminating the contract in the absence of certain conditions.

### 3. Conclusion

There are many types of MLM companies with many different structures and benefits. There are different opinions and interpretations of the benefits of each type. It solely depends on the thinking of the founding fathers of the companies who are mainly non-Muslims. From the research done, it was found that it is rather hard for the research to dictate whether a company is to be called Shariah Compliant or not. This is because there are numerous sections of activities that one must consider to recognise something as Shariah-compliant. It could be easier to do so in banking and food industries, but, an MLM industry is huge as the process involves manufacturing, knowledge management (Shaw *et al.*, 2001), leadership (Graebner, 2004), internal (Varey & Lewis, 2000) and external marketing, long-run vision, and purpose of the companies. To make it worse, the majority of the MLM companies in Malaysia are not owned by Muslims. The purpose of existence is usually merely to make money, lead a lucrative life and without the intention of serving God and Islamic purposes.

Therefore, it is not suitable to measure these Multi-Level Marketing companies on their Islamic practices when they are not Muslims in the first place. For that reason, to regard certain businesses as being Shariah Compliant, the founders of the companies must be Muslims, and only then, it is understandable and imposable for them to follow the Shariah (Abdullah & Ahmad, 2010) It is hoped that the Muslims would understand this situation and strive to make an MLM company that can be of international level and at par with the pre-existing MLM companies. Therefore, it is concluded in this paper that such existing companies are eligible to be acknowledged as ‘Muslim-friendly’ MLM.

#### Conflict of Interest

We declare that we have no conflict of interest.

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*Original Research Article*

## **Relationship Between Awareness, Knowledge, and Attitude of Behavioural Intention Towards Halal Jobs among Malaysian Muslim University Students**

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**Abstract:** In the emergence of the global halal market, developing halal human capital with provisions of knowledge and skills is indispensable for professional efficiency in management and implementation, especially for Malaysia as the world's leader in the halal industry. Therefore, it is important to determine the awareness among Muslim university students on job opportunities and their intentions to choose career paths in the halal industry. The objectives of this study were to determine the level of Muslim university students' awareness, knowledge and attitude towards halal jobs as well as to determine the relationship between awareness, knowledge and attitude of behavioural intention towards halal jobs. A structured questionnaire was used as a research instrument to collect responses from 1,454 final year Muslim university students in public and private universities located in Klang Valley, Malaysia. Data were analysed using descriptive analysis and Pearson correlation methods. Results of the study revealed that the Muslim university students have a high level of awareness, an adequate level of knowledge and an adequate level of attitude towards halal jobs. Besides, there was a moderate relationship observed between awareness and attitudes among Muslim university students. The present study concluded that positive awareness, knowledge, and attitude towards halal jobs influenced significantly on the respondents' behavioural intention towards their halal job preference. This study contributes to the growth and development of halal industries and halal jobs for the Muslims community to explore and reduce unemployment among Muslims with satisfactory human resources management practiced by the employers.

**Keywords:** awareness; knowledge; attitude; Muslim university students; halal jobs

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## 1. Introduction

Halal and haram are the rules and spines in Muslims' daily lives in accordance with Islamic Shariah. The term halal covers a broad scope from food and beverage consumptions, human relations, business, trade, finance, to every aspect of behaviours (Samori *et al.*, 2014). According to Al-Qaradhawi (2014), *Al-Halal* (the lawful), which is permitted, with respect to which no restriction exists, and the doing of which the lawgiver, Allah, has allowed. Hence, halal means whatever is allowed and wholesome for humanity, while haram means whatever is forbidden, and harmful (Maqsood, 1998). The word halal means what is acceptable by Islam and what is not acceptable by Islam (Hashim & Mat Hashim, 2013). In contrast, '*haram*' or '*haraam*', in Arabic words strictly means illegal, prohibited, forbidden or illicit, interdicted, illegal, or banned and they are regarded as *najis* (unclean) from the perspective of Islamic law (Shariah). Thus, halal and haram are entailing with food and drink, behaviours and manners, styles and fashions, careers, or jobs to cover the daily lifestyle. Shariah is an integral part of Islam and the practical guidance for Muslims' lifestyle also connotes 'Islamic Laws'. Shariah from utterance '*Syara*', which is explained and demonstrated by Islamic pledge, means to accept something legitimate. Shariah is also the law or the rules governing the relationship between all mankind. Every aspect of Muslims' life is regulated by Islamic Law (Shariah). The Shariah Law is based on the al-Quran (i.e. the Holy Book of Islam), Hadith and Sunnah, (i.e. habits and approvals of Prophet Muhammad (PBUH)), *Ijma'* (i.e. consensus of *Ulama's*), and *Qiyas* (i.e. deduction or analogy) according to various Islamic School of Thoughts (*Mazhab*) or *fatwa* approved by the relevant Islamic Authorities (Che Man & Abdul Latif, 2002; Alanazi *et al.*, 2018).

Malaysia has continued to flourish in the halal industry (MITI, 2016). In 2017, Malaysia recorded RM 43.3 billion in halal exports which made up RM 935.4 billion (4.6%) of the nation's total exports. Among the top importers of halal products from Malaysia were China (RM4.9 billion), Singapore (RM 4.9 billion), Japan (RM 2.8 billion), the United States of America (USA) (RM 2.7 billion), and Indonesia (RM 2.2 billion) (MIHAS, 2019). Malaysia External Trade Development Corporation (MATRADE) was expected a 5% increase in 2019 for the export value of halal products and services in fulfilling the significant global demand (MIHAS, 2019). According to the Department of Standards Malaysia (2017), there are a total of 568,481 small and medium enterprises (SMEs) in Malaysia, in which 347 SMEs are certified with Hazard Analysis and Critical Control Points (HACCP), 133 accredited with ISO22000, while 7,217 are certified with ISO9001 (Chik *et al.*, 2018). Based on the numbers, 5,500 of the SMEs are halal-certified companies (SME Corporation Malaysia, 2016; Arsat, 2016; Chik *et al.*, 2018). Halal Industry Master Plan (HIMP) (2008-2020) highlighted three main key performance indicators (KPIs) of halal: (1) to achieve halal export revenue amounting to RM 19 billion; (2) to create additional employment in the halal industry to 300,000 employments in 2020; (3) to achieve positive annual growth rate compared to 2010 (Halal Statistics, 2015). Halal RM 10.2 billion worth of incomes were recorded in 2015 compared to RM4.8 billion in 2010 with an average annual growth of 16.3%.



The halal industry sector is one of the major contributors to Malaysia's future economic growth. It is considered as one of the most important trading halal products or services in all of the economies and sectors that have generated many job opportunities. However, the halal industry depends on the quality and skills of human capital in ensuring the halal industry a success (MOHR, 2009). According to the Halal Industry Development Corporation (HDC), the job domains in the halal industry cover five sub-sectors following Malaysia Standard Industrial Classification (MSIC), which are comprised of Halal Logistics, Livestock Production, Food Manufacturing, Meat Processing, and Industry Management Services (HDC, 2018). There are 12 job areas in the halal industry such as halal compliance, purchasing, production, quality assurance, research and development, slaughtering operation, warehouse, transportation, livestock farming, livestock breeding, and livestock product (HDC, 2018). There are also 52 job titles in the halal industry with 18 job titles that have been identified as critical under five sub-sectors. All job titles are registered under the Malaysia Standard Classification of Occupations (MASCO). In 2017, HDC established 'Halal Talent Portal' as a platform that provides information on halal talents and employment availability, both domestically and globally. The platform also serves as a job portal with vast options and opportunities. It is also a channel that ensures industry flow with the network connection of qualified advisors and experts such as halal auditor, analyst, tourist guide, executive, trainer, Syariah advisor, marketing, chef, and health and personal care (HDC, 2017). In 2018, the 'Halal Talent Portal' registered a total of 1,997 talents and 55 companies as employers with 171 facilitations (HDC, 2018).

Halal human capital development requires intensive collaborative inputs, thoughts, and expertise from halal industry such as halal-certified companies, logistics, and supply chain organizations, authorities, and institutions of learning and training (Shariff *et al.*, 2016). Halal human capital development consists of four main elements, namely knowledge, skills, abilities, and Shariah (Shariff *et al.*, 2016). Halal human capital with provisions of knowledge and skills for professional efficiency in management and implementation is crucial in Malaysia (Muhammad *et al.*, 2009; Shariff *et al.*, 2016). It is also an important asset that determines the success of operational performance particularly in protecting the integrity of halal products (Gurcharan & Mohamad, 2016). The costs of training local talents are the main issue resulting in a shortage of talents (HDC, 2016). Lack of halal-based orientation workers is identified as one of the challenges faced in the halal industry (MOHR, 2009).

The need for halal talented workers is highlighted as a priority, parallel with the improvement of the industry playmakers in the halal industry. According to Alina *et al.* (2013), the major challenges faced by the halal industry in Malaysia are the shortage of skilled workers and semi-skilled workers that understand the Shariah requirements and implementing Shariah knowledge into actual industrial practice to maintain the halal integrity. Hence, having these skilled and knowledgeable workers are critical to ensure the sustainable growth of the halal industry. Furthermore, the increasing demands of halal human capital such as halal executives, auditors, and committee members are driving the increasing number of halal training services (Shariff *et al.*, 2016). Higher education institutions must

bear the responsibility to provide an adequate workforce for the halal industry. Therefore, halal awareness, knowledge, and skills should be deliberately emphasized academically in higher learning institutions in universities and colleges to ensure the efficiency of halal skilled workers are created to produce halal products and services (Ahmad *et al.*, 2011).

Since the introduction of Malaysian Halal Certification, the need for halal professionals has increased significantly which leads to the demand for competent halal executives and committee members (Jais, 2014; Che Hashim & Mohd Shariff, 2016). In 2015, the Department of Islamic Development Malaysia (JAKIM) has reiterated the requirement for at least two Muslim skilled workers with permanent posts, full-time workers, and Malaysian citizens in the food handling or processing section. The appointment of halal executives is also required for halal certification. It is likely that lack of awareness, knowledge, or encouragement and reassurance among companies on halal certification that limit the halal talent availability and career options to university students. Thus, the awareness, knowledge, participation, and exposure for university students are crucial in producing skilled workers in the halal industry.

Nevertheless, studies on halal talents in relevant industries are still lacking and previous studies have only emphasized on halal food (Awan *et al.*, 2015; Bashir *et al.*, 2018; Yunus *et al.*, 2018), cosmetics (Abd Rahman *et al.*, 2014; Majid *et al.*, 2015), and training and education (Jais, 2014; Rafida *et al.*, 2013; Shariff *et al.*, 2016; Ahmad *et al.*, 2011). Furthermore, there is a lack of emphasis on measuring awareness, knowledge, and attitude among Malaysian students towards halal jobs. Consequently, the major challenge for government and the halal industry playmakers in developing talents from Muslim university students is to harness the capabilities and knowledge that they naturally embodied for halal jobs.

The influence of initiatives towards halal jobs among Muslim university students is yet to be evaluated. Moreover, research on halal jobs is important in understanding the awareness, knowledge, and attitude of behavioural intention towards halal jobs, as it also reflects the effectiveness of government initiatives in this aspect. Analysis of feedback from future potential workers could also improve the initiatives from the Malaysian government in strengthening halal talent workers. This could provide further support for future planning in promoting halal talent workers in Malaysia. The determinants of Muslim university students' behavioural intention towards halal jobs could provide students with their knowledge, understanding, and benefits. Therefore, the objectives of this study were: (i) to determine the level of Muslim university students' awareness, knowledge, and attitude towards halal jobs; (ii) to determine the relationship between awareness, knowledge, and attitude of behavioural intention towards halal jobs.

## **2. Literature Review**

In accordance to the fundamentals of halal work or jobs, Islam has prohibited certain professions to all Muslims involving harmful and destructive acts, which are against the

beliefs, morals, honour, and well-being of the society and surroundings such as manufacturing intoxicants and drugs, prostitution, dancing or erotic arts, involving usury (*Riba*'), making statues and similar activities. In short, any work or business that yields no benefit or harmful is prohibited. On the contrary, any job or business that is fair, beneficial to others, and obeys the rights of Islamic justice and wisdom is permissible. Any forms of earning money that involves dishonesty, cheating, deceit or fraudulent, bribery, robbery or burglary, hoarding in a negative way, exploitation, artificial surgery due of dissatisfaction of God's creation, anything to do with alcohol, gambling or lotteries, sexual degradation or any immoral practices or any other means of making profit by exploiting others is forbidden to the Muslim (Maqsood, 1998). The aforementioned profession or job is strictly prohibited in Islam as it may affect and even harm the society in terms of faith, morale, self-esteem, honour, and courtesy (Shahid, 2017). Thus, all jobs and businesses which are permissible, halal, should not involve any prohibited acts (i.e. haram) in Islam. The great scholars and jurists have postulated the term obligations as "the obligations of sufficiency" (*fardu kifayah*), where Muslim community must engage in every essential science, industry, and profession to meet its needs (Shahid, 2017). Imam al-Ghazali justified *fardu kifayah* as all knowledge that is essential to the world, such as doctoral science, as it is necessary to maintain the health of the body. In addition, mathematics for daily businesses and the division of legacies and inheritance and what not also uses the practice of "the obligations of sufficiency".

Awareness is the ability to perceive, to feel, to be conscious, and to imply understanding and perception towards specific situations (Aziz & Chok, 2013). According to Merikle (1984), awareness equates with the ability to make a forced-choice decision above the chance level of performance. Awareness is subjective and simply equates awareness with self-reports indicating that an observer "consciously sees" a stimulus (Henley, 1984). Further, according to Nguyen and Watanabe (2019), awareness pertains to an observer's consciousness and ability to discriminate among several possible stimulus states. Besides, awareness can be described as a level of attentiveness or realization among Muslim entrepreneurs towards halal production (Ambali & Bakar, 2014). Awareness comprises education and skill requirements, types of job availabilities, regulations, and expectations of industry (Nasir & Lin, 2013). Every Muslim has a different level of awareness depending on their religious belief, halal exposure, logo, and health reason in terms of Muslim awareness towards halal consumptions (Ambali & Bakar, 2014). Aminrad *et al.* (2013) revealed an insignificant relationship between awareness and attitude among students. Furthermore, Salman and Siddiqui (2011) stated that religious people may not necessarily have a high level of awareness. Awareness factors among Malaysians have been acknowledged to be increasing, yet their level of awareness is still low compared to other countries such as Indonesia and Thailand (Yusoff & Adzharuddin, 2017). A study conducted by Rafida *et al.* (2013) revealed that there is a moderate and positive relationship between consumers' awareness of halal goods and certification. It implies the increment of level in awareness towards halal issues is correlating with the increase of their perceptions towards halal certification.

Awareness is significantly correlated with information-seeking behaviour among Muslims and information-seeking action is sparked by curiosity and awareness of the existence of the knowledge gaps. In addition, Muslim's awareness is a great power to educate the workers or halal human capital in producing halal market (Yusoff & Adzharuddin, 2017). However, level of awareness among Muslim workers towards the granting of halal certification is very low (Tawil *et al.*, 2015). Besides, there is also halal awareness initiated by certain bodies of authorities who provide training to increase the level of awareness on the principles and concepts of halal, educating the importance of proper sourcing of raw materials and production of halal food and consumer products and sharing the knowledge in halal industry. Training will ensure the realization in creating awareness and integrity of halal process (Che Hashim & Shariff, 2016).

Knowledge is referred to as an understanding of a subject which is obtained through experience, while halal knowledge is how individuals or Muslims should digest and practice Islamic teachings regarding halal and haram (Sadeeqa *et al.*, 2013). Knowledge is an important influence on halal purchase intention (Shaari & Arifin, 2010). Lack of knowledge, awareness, and understanding on halal concept affected the loss of appreciation on halal among Muslims and product manufacturers (Wahab, 2004). Awareness, knowledge, and attitude towards food labels, subjective norm, and perceived behavioural control are factors that influence intention to purchase (Latiff *et al.*, 2016). Said *et al.* (2014) revealed that there is a lack of initiative and disclosure of halal knowledge, information, and education from government agencies.

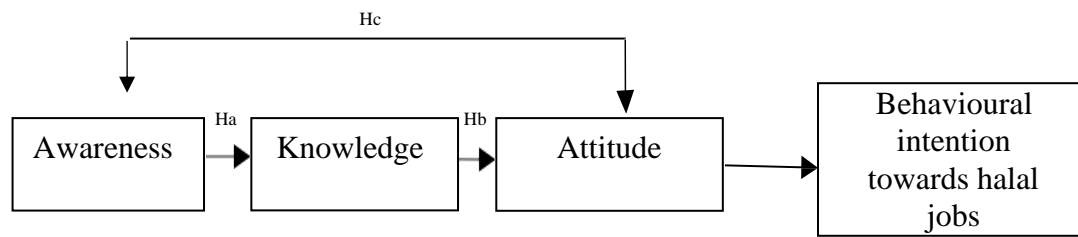
The awareness and knowledge among students on the halal concept are crucial in ensuring the continuity of halal education among university students (Elias *et al.*, 2016). Muslim students demonstrate a positive relationship between awareness, knowledge, and intention towards producing halal products and possess a high level of halal awareness and knowledge to motivate them to become a Muslim entrepreneur. Meanwhile, the best predictor of consumer purchase intention towards halal food is their knowledge on halal processes such as slaughtering, storage, and packaging (Yusoff *et al.*, 2015). Unfortunately, the familiarity concept of halal especially among Muslim students is inhibited by the extremely low level of awareness and knowledge towards halal certification and branding (Rajagopal *et al.*, 2011). Abd Rahman *et al.* (2014) indicated that the relationship between Muslims' knowledge and attitude is insignificant towards halal cosmetic products. Meanwhile, according to Neni *et al.* (2019), the relationship between awareness, knowledge, and attitude correlates with attitude, moderate, awareness, and knowledge. Furthermore, Aminrad *et al.* (2013) revealed there is a significant and weak relationship between knowledge and awareness and insignificant relationship between attitude and knowledge among students. High level of awareness and adequate knowledge plus favourable attitude from students may have been influenced by the families, teachers, media, private reading and school curriculums (Aminrad *et al.*, 2013).

Attitude towards behaviour is an individual belief whether the person decides to or not to perform a certain behaviour that contributes either positively or negatively to a certain activity. Attitude is related to belief in terms of halal food (Salman & Siddiqui, 2011). According to Ahmad and Omar (2016), religious belief, availability of halal label and exposure to halal concept demonstrate a significant positive effect on consumer attitude towards halal cosmetics. Attitude is found to be valid predictors of intent to purchase halal personal care products in Pakistan (Ansari & Mohammed, 2015). The authors also found that there is a significant and positive relationship between attitude and behavioural intention of purchasing halal cosmetics products. Abd Rahman *et al.* (2014) revealed there is a significant positive relationship between attitude and religiosity and between attitude and intention towards halal cosmetics products. This is supported by Zakaria (2017), who demonstrated that religiosity is the most influential factor towards intention to purchase halal products. On the contrary, Kusumawardhini *et al.* (2016) stated that the effect of religiosity on intention towards Islamic brand is not significant. In another study by Elseidi (2018) revealed that attitude was used as a variable to predict the behaviour of Muslim consumers where high and low Islamic religiosity influenced the intention to purchase halal food products. Ishak *et al.* (2017) indeed showed that attitude is significant and the direct effect of intention towards halal food outlet. However, Marmaya *et al.* (2019) revealed that the attitude of Gen-Y consumers was not significant on the intention to purchase halal food. Earlier, Abd Aziz *et al.* (2017) revealed the factors that influence the public university graduates' career intention in the franchise industry are moderately high and attitude is significantly correlated with intention towards career intention.

Behavioural intention is referred to an individual's probability that he or she will perform the behaviour (Ajzen, 1991). According to Latiff *et al.* (2016), purchasing behavioural intention was influenced by awareness, knowledge, attitude, as well as food labels. Meanwhile, Yunus *et al.* (2014) described that behavioural intention was influenced by halal awareness towards purchasing halal products. Similarly, Aziz and Chok (2013) stated that purchase intention was influenced by awareness towards halal products. It is also revealed that attitude is positively related to behavioural intention to choose halal products (Lada *et al.*, 2009). Furthermore, the behavioral intention to become halal entrepreneurs was influenced by awareness, knowledge, attitude, subjective norm, perceived behavioural control, and perceived relational support (Elias *et al.*, 2016; Ambad *et al.*, 2016; Mohammed *et al.*, 2017).

### 3. Methodology

The conceptual framework (Figure 1) was established based on several studies (Ajzen, 2002; Aminrad *et al.*, 2013; Latiff *et al.*, 2016; Neni *et al.*, 2019) to determine the relationship between awareness, knowledge, and attitude of Muslim university student's behavioural intention towards halal jobs.



**Figure 1.** Conceptual framework. Adapted from Ajzen (2002); Aminrad *et al.* (2013); Latiff *et al.* (2016); Neni *et al.* (2019).

Several null and alternative hypotheses were established and tested in this study as the following:

H<sub>0</sub>: There is no relationship between Muslim university students' awareness and knowledge towards halal jobs.

H<sub>a</sub>: There is a relationship between Muslim university students' awareness and knowledge towards halal jobs.

H<sub>0</sub>: There is no relationship between Muslim university students' knowledge and attitude towards halal jobs.

H<sub>b</sub>: There is a relationship between Muslim university students' knowledge and attitude towards halal jobs.

H<sub>0</sub>: There is no relationship between Muslim university students' awareness and attitude awareness towards halal jobs.

H<sub>c</sub>: There is a relationship between Muslim university students' awareness and attitude towards halal jobs.

A quantitative approach was used in this study to collect data from 1,454 Muslim university students using a self-administered questionnaire. A structured questionnaire was designed to cater the objectives of this study. Purposive sampling was conducted towards a selective, or subjective group of informants (Saabar & Ibrahim, 2014) and used as the sampling method from selected public and private universities located in Klang Valley, Malaysia. The samples were selected based on the researcher's reliance on his/her judgement in choosing the populations that are suitable to provide the right information for the research (Kumar, 2011). The criteria of the respondents in this study were: 1) Muslims 2) university students, and 3) final year bachelor's degree students. Muslim university students were chosen because of the element of religious belief and also to focus on Shariah (Islamic law). The final year bachelor degree students were targeted because they will lead to specific professions immediately upon graduation (Amani *et al.*, 2013).

The questionnaire was constructed in Malay language and consisted of four sections. A total of 10 statements using 3-Point Likert scales (1 = No, 2 = Not Sure, 3 = Yes) related to respondents' awareness towards halal jobs were established (Yusof *et al.*, 2014; Rafida *et al.*, 2013). The use of 3-Point Likert scales for this section is to measure the degree level of respondents' awareness. A score of 1 was given to every "yes" answer whereas score of 0 was

given to “no” and “not sure” answers. The “yes” answer means the respondents are aware towards halal jobs whereas “no” and “not sure” answers mean the respondents are not aware towards halal jobs. This score is used to recode the data for score analysis. Respondents’ awareness was calculated based on a total score of awareness for each question and categorised as high and low levels. The overall score for awareness was from 0 to 10 and the cut-off point was determined at 50% of total range score (Darlington *et al.*, 2019). Respondents with high level of awareness were scored from 6 to 10, while those with low level of awareness were scored 0 to 5. Scales of awareness level were adapted from Yusoff *et al.* (2017).

To determine respondents’ knowledge towards halal jobs, 12 statements using 3-Point Likert scales (1 = No, 2 = Not Sure, 3 = Yes) were established (Akhtari-Zavare *et al.*, 2016; Liu *et al.*, 2016; Sadeeqa *et al.*, 2013). The use of 3-Point Likert scales for this section is to measure the degree level of respondents’ knowledge. A score of 1 was given to every “yes” answer whereas score 0 was given to “no” and “not sure” answers. The “yes” answer means the respondents have knowledge towards halal jobs whereas “no” and “not sure” answers mean the respondents have no knowledge towards halal jobs. The score was used to recode the data for score analysis. Respondents’ knowledge was calculated based on a total score of knowledge for each question and categorised as adequate and inadequate levels (Al-lela *et al.*, 2014; Mohd Azaman *et al.*, 2016; Habte *et al.*, 2018; Al-Qattan *et al.*, 2019). The overall score for knowledge ranged 0 to 12 and the cut-off point was labelled at 50% range of total score (Darlington *et al.*, 2019; Nwankwo *et al.*, 2018; Ismail *et al.*, 2018). Respondents with adequate knowledge were assigned to a score of 7 to 12, while those with inadequate knowledge were assigned to a score of 0 to 6. Scales of knowledge level were adapted from Al-lela *et al.* (2014); Mohd Azaman *et al.* (2016); Habte *et al.*, (2018); Al- Qattan *et al.* (2019).

There were 8 statements using 5-Point Likert scales (1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree) related to respondents’ attitude towards halal jobs were established (Abdullahi *et al.*, 2016). The attitude was calculated based on a mean score for each question and categorised as favourable and unfavourable levels (Mohd Azaman *et al.*, 2016; Alnujaim *et al.*, 2017; Habte *et al.*, 2018). An overall score for attitude ranged between 17 to 85 and the cut of point was determined at 50% of range total score. Respondents who have a favourable level of attitude were scored 52 to 85, while those who have an unfavourable level of attitude were scored 17 to 51. Scales of attitude level were adapted from Ismail *et al.* (2018); Habte *et al.* (2018); Al-Qattan *et al.* (2019). Descriptive analysis was used to analyse the socio-demographic profiles of the university students and their behavioural intention towards halal jobs. The scores of awareness, knowledge, and attitude among Muslim university students were also calculated. Pearson correlation analysis was used to identify the relationship between awareness, knowledge, and attitude towards halal jobs.

## 4. Results and Discussions

### *Socio-Demographic Profiles*

Table 1 shows the socio-demographic profiles of the respondents. The total number of 1,454 respondents were comprised of 69.7% (1,014 respondents) female and 30.3% (440 respondents) male. The respondents with the age range of 20 to 24 years were the majority of respondents who participated in the study, accounted for 94.4% (1,372 respondents), and 5.2% (76 respondents) aged 25 to 29. There were only 0.2% (4 respondents) aged 30 to 34, while 0.1% (2 respondents) with the age of above 35. In regard to ethnicity groups in this study, the respondents are comprised of 95.8% Malays (1,393 respondents), 1.4% Chinese (21 respondents), 0.6% Indians (8 respondents) and 2.2 % other races (32 respondents).

Majority of the respondents (99.4%, 1,445 respondents) were single and only 0.6% (9 respondents) were married. The majority of respondents (56.5%, 821 respondents) possessed working experience, whereas 43.5% (633 respondents) did not. A great number of students participated in the study (83.6%, 1,215 respondents) were funded by sponsorships such as Perbadanan Tabung Pendidikan Tinggi Nasional (PTPTN) Education Financing Scheme, Majlis Amanah Rakyat (MARA) Scholarship, Yayasan Selangor Scholarship, etc. and only 16.4% (239 respondents) were self-funded.

**Table 1.** Socio-demographic profiles of respondents.

| <b>Characteristics</b>      | <b>Frequency (<i>n</i>)</b> | <b>Percentage (%)</b> |
|-----------------------------|-----------------------------|-----------------------|
| <i>Gender</i>               |                             |                       |
| Female                      | 1,014                       | 69.7                  |
| Male                        | 440                         | 30.3                  |
| <i>Age (years)</i>          |                             |                       |
| 20–24                       | 1,372                       | 94.4                  |
| 25–29                       | 76                          | 5.2                   |
| 30–34                       | 4                           | 0.2                   |
| Above 35                    | 2                           | 0.1                   |
| <i>Race</i>                 |                             |                       |
| Malay                       | 1,393                       | 95.8                  |
| Chinese                     | 21                          | 1.4                   |
| Indian                      | 8                           | 0.6                   |
| Others                      | 32                          | 2.2                   |
| <i>Marital Status</i>       |                             |                       |
| Single                      | 1,445                       | 99.4                  |
| Married                     | 9                           | 0.6                   |
| <i>Financial Assistance</i> |                             |                       |
| Self-Funded                 | 239                         | 16.4                  |
| Sponsorship                 | 1,215                       | 83.6                  |
| <i>Working Experience</i>   |                             |                       |
| Yes                         | 821                         | 56.5                  |
| No                          | 633                         | 43.5                  |



| Characteristics                                  | Frequency (n) | Percentage (%) |
|--|---------------|----------------|
| <i>University</i>                                |               |                |
| Universiti Putra Malaysia (UPM)                  | 280           | 19.3           |
| University Malaya (UM)                           | 159           | 10.9           |
| Universiti Kebangsaan Malaysia (UKM)             | 119           | 8.2            |
| International Islamic University Malaysia (IIUM) | 117           | 8              |
| Universiti Teknologi MARA (UiTM)                 | 166           | 11.4           |
| Universiti Pertahanan Nasional Malaysia (UPNM)   | 93            | 6.4            |
| Universiti Kuala Lumpur (UniKL)                  | 168           | 11.6           |
| Universiti Tenaga Nasional (UNITEN)              | 114           | 7.8            |
| Management and Science University (MSU)          | 125           | 8.6            |
| Universiti Selangor (UNISEL)                     | 113           | 7.8            |
| <i>Program</i>                                   |               |                |
| Islamic Studies                                  | 146           | 10.0           |
| Education  | 76            | 5.2            |
| Social Science, Business and Law                 | 501           | 34.4           |
| Science, Mathematic & Computer                   | 439           | 30.2           |
| Engineering, Manufacturing & Construction        | 161           | 11.1           |
| Agriculture & Veterinary                         | 131           | 9.0            |

$n = 1,454$

The Higher Education Institute (HEI) involved in this study consisted of 6 public and 4 private universities in Klang Valley, Malaysia. Table 1 shows that students from Universiti Putra Malaysia (UPM) as the majority of the total respondents, accounted for 19.3% (280 respondents), whereas Universiti Pertahanan Negara Malaysia (UPNM) comprised as the minority, accounted for 6.4% (93 respondents). Participants from Universiti Malaya (UM) were accounted for 10.9% (159 respondents), Universiti Kebangsaan Malaysia (UKM) 8.2% (119 respondents), International Islamic University Malaysia (IIUM) 8% (117 respondents), Universiti Teknologi MARA (UiTM) 11.4% (166 respondents), Universiti Kuala Lumpur (UniKL) 11.6% (168 respondents), Universiti Tenaga Nasional (UNITEN) 7.8% (114 respondents), Management and Science University (MSU) 8.6% (125 respondents) and Universiti Selangor (UNISEL) accounted by 7.8% (113 respondents). The results also showed that the participants educated in the field of social science, business, and law recorded the highest number of respondents with 34.4% (501 respondents), followed by science, mathematics, and computer field with 30.2% (439 respondents), engineering, manufacturing, and construction field 11.1% (161 respondents), Islamic studies 10.0% (146 respondents), agriculture and veterinary 9.0% (131 respondents), while the least number of respondents (5.2%, 76 respondents) were educated in the education field.

### ***Awareness Level***

The level of awareness was calculated based on a total score for each respondent. From the awareness statements, 10 were related to respondents' awareness towards halal jobs. The items were evaluated using 3-point Likert scales ranging from 1 to 3 (1 = No, 2 = Not

Sure, 3 = Yes) (Yusof *et al.*, 2014; Rafida *et al.*, 2013). A score of 1 was given to every “true” answer while score 0 was given to “false” and “not sure” answers. The overall score for awareness ranged from 0 to 10 and the cut-off point was determined at 50% range from the total score (Darlington *et al.*, 2019; Ismail *et al.*, 2018). The awareness level was categorized into two levels namely high awareness and low awareness. The score ranges between 6 to 10 was assigned to respondents with high level of awareness, whereas the score between 0 to 5 was assigned to those who have a low level of awareness. The scales of awareness level were adapted from Yusoff *et al.* (2017). Table 2 summarizes the awareness level towards halal jobs from the respondents. The results showed that 88.2% ( $n = 1,284$ ) of the respondents have high awareness, whereas 11.6% ( $n = 170$ ) have low awareness.

**Table 2.** Awareness Level.

| Awareness Level | Score | Frequency ( <i>n</i> ) | Percentage (%) |
|-----------------|-------|------------------------|----------------|
| High            | 6-10  | 1,284                  | 88.2           |
| Low             | 0-5   | 170                    | 11.6           |
| <b>Total</b>    |       | <b>1,454</b>           | <b>100</b>     |

$n = 1,454$

### Knowledge Level

Respondents’ knowledge level was calculated based on a total score for each respondent and labelled as adequate and inadequate (Al-lela *et al.*, 2014; Mohd Azaman *et al.*, 2016). From the knowledge statements, 12 were related to respondents’ knowledge towards halal jobs. The items were evaluated using Likert scales ranging from 1 to 3 (1 = No, 2 = Not Sure, 3 = Yes) (Akhtari-Zavare *et al.*, 2016; Liu *et al.*, 2016; Sadeeqa *et al.*, 2013). A score of 1 was given to every “true” answer, while score 0 was given to “false” and “not sure” answers. The overall score for knowledge ranged from 0 to 12 and the cut-off point was determined at 50% range of total score (Darlington *et al.*, 2019; Nwankwo *et al.*, 2018; Ismail *et al.*, 2018). Respondents who were labelled as adequate scored 7 to 12, while those who were inadequate scored 0 to 6. Scales of awareness level were adapted from Al-lela *et al.* (2014); Habte *et al.* (2018); Al-Qattan *et al.* (2019). Table 3 summarizes the knowledge level towards halal jobs from the respondents. The results showed that 91.7% (1,333) of the students have adequate knowledge, as opposed to 8.4% (121) with inadequate knowledge. The finding was in line with Nuratifah *et al.* (2019) on the adequate level of knowledge towards halal jobs.

**Table 3.** Knowledge Level.

| Knowledge Level      | Score | Frequency ( <i>n</i> ) | Percentage (%) |
|----------------------|-------|------------------------|----------------|
| Adequate Knowledge   | 7-12  | 1,333                  | 91.7           |
| Inadequate Knowledge | 0-6   | 121                    | 8.4            |
| <b>Total</b>         |       | <b>1,454</b>           | <b>100</b>     |

$n = 1,454$

**Attitude Level**

Respondents’ attitude level was calculated based on a mean score of attitudes for each question and categorised as favourable and unfavourable attitude. From the attitude statements, eight were related to respondents’ attitude towards halal jobs. The items were evaluated using Likert scales ranging from 1 to 5 (1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree) (Abdullahi *et al.*, 2016). The overall score for attitude ranged from 17 to 85 and the cut-off point was determined at the range of 50% from the total score (Darlington *et al.*, 2019; Nwankwo *et al.*, 2018). Respondents who have favourable attitude scored 52 to 85, while those who have unfavourable attitude scored 17 to 51. Table 4 summarizes the attitude level towards halal jobs from respondents. The result shows that 96.4% ( $n = 1,398$ ) of the respondents possessed favourable attitude, as opposed to 3.9% ( $n = 56$ ), who possessed unfavourable attitude.

**Table 4.** Attitude Level.

| Attitude Level        | Score   | Frequency ( $n$ ) | Percentage (%) |
|-----------------------|---------|-------------------|----------------|
| Favourable Attitude   | 52 - 85 | 1,398             | 96.4           |
| Unfavourable Attitude | 17 - 51 | 56                | 3.9            |

$n = 1,454$

**Relationship between Awareness, Knowledge, and Attitude towards Behavioural Intention of Halal Jobs**

Pearson correlation analysis was used to measure the strengths and directions of the linear relationship between two variables. In this study, Pearson Correlation analysis was used to examine the strength of relationships between awareness, knowledge, and attitude towards behavioural intention of halal jobs.

Table 5 summarizes the Pearson correlations analysis. Firstly, the result showed there was a positive relationship at 1% level of significance between awareness and knowledge. The  $H_0$  hypothesis was rejected, indicating there was a significant relationship between Muslim university students’ awareness and knowledge towards halal jobs. The strength of the relationship was moderate between awareness and knowledge with  $r = 0.411$  ( $p < 0.000$ ). Secondly, the result showed there was a positive relationship at 1% level of significance between knowledge and attitude. The  $H_0$  hypothesis was rejected, indicating a significant relationship between university students’ knowledge and attitude towards halal jobs. The strength of relationship was weak between knowledge and attitude with  $r = 0.303$  ( $p < 0.000$ ). Lastly, the highest score showed there was a positive relationship at 1% level of significance between attitude and awareness. The  $H_0$  hypothesis was rejected, indicating a significant relationship between university students’ attitude and awareness towards halal jobs. The strength of relationship was moderate between awareness and attitude with  $r = 0.416$  ( $p < 0.000$ ). The present findings are in accordance with Aminrad *et al.* (2013) where the relationship between knowledge and awareness is significant, but weak. While the relationship between awareness and attitude is significant and have high relationship among

students. Neni *et al.* (2019) revealed the significant but weak relationship between awareness and knowledge and attitude among students.

**Table 5.** Relationships between knowledge, awareness, and attitude of behavioural intention towards halal jobs.

|           |                         | Awareness | Knowledge | Attitude | Decision              |
|-----------|-------------------------|-----------|-----------|----------|-----------------------|
| Awareness | Correlation Coefficient | 1         | 0.411***  | 0.416*** | Reject H <sub>0</sub> |
|           | Sig. (2-tailed)         |           | 0.000     | 0.000    |                       |
|           | <hr/>                   |           |           |          |                       |
| Knowledge | Correlation Coefficient | 0.411***  | 1         | 0.303*** | Reject H <sub>0</sub> |
|           | Sig. (2-tailed)         | 0.000     |           | 0.000    |                       |
|           | <hr/>                   |           |           |          |                       |
| Attitude  | Correlation Coefficient | 0.416***  | 0.303***  | 1        | Reject H <sub>0</sub> |
|           | Sig. (2-tailed)         | 0.000     | 0.000     |          |                       |
|           | <hr/>                   |           |           |          |                       |

Note: n = 1,454

\*\*\* Correlation is significant at 1% level of significance (2-tailed)

\*\*Correlation is significant at 5% level of significance (2-tailed)

\* Correlation is significant at 10% level of significance (2-tailed)

### 5. Limitations and Suggestions for Future Research

This study had a few limitations that have been noted and need to be improved. Firstly, it is important to discuss the demographical background of the samples assessed, in which the gender of respondents were mostly female Muslim university students. This may result to gender biased finding. Hence, the sampling size and targeted group should be further stratified based on the number of total populations of male and female, so that the distribution of gender in all Universities listed will be well represented. Secondly, the study only focused on six public universities and four private universities due to the difference in their semesters' schedule, time constraint, and cost that lead to only four private universities in Klang Valley were chosen. The number of public and private universities to be chosen for this study should be based on fair percentages that will represent the whole Malaysia. Online survey technique may reduce the conflicts of timetable as an issue, as more Universities, both public and private universities can participate in the study. Thirdly, this study only focused on the final year bachelor students, which excluded those students who were undergoing internship training during this data collection. This can be prevented by reaching those who undergoes internship training through email or online survey after obtaining their contact through the respective faculties. Furthermore, the sampling should be conducted at all levels of programme offered from Diploma to Postgraduate level. Fourth limitation of this study is that it only assessed the students' behavioural intention to decide on their career choices. Intention can predict behaviour with a considerable degree of accuracy, this is often dependent on the behaviour being assessed (Fishbein & Ajzen, 2010). Thus, in this study, the actual behaviour is not measured. This can be measured with face to face interview of selected respondents. Finally, another constraint of this is study was to get the accurate number of Muslim university populations in Klang Valley. This can be done by obtaining the secondary data from the Ministry of Higher Education of Malaysia which has categorized the Universities

based on programmes offered. Hence, for the purpose of this study, we shall select those Universities that are Islamically oriented in terms of their courses offered and mode of delivery, teaching and training of students that promote halal concept and approach in all aspects. Comparisons can be further made between Islamically oriented Universities and conventional Universities to determine the impact of teaching and training mode (Islamic/Non-Islamic) practiced by the academic staff throughout the students' academic life. In future research, the actual behaviour should be measured through actual behavior or criteria to be met by fellow halal jobs' applicants, perhaps through the feedback given by fellow halal Industries' and Companies' Human Resources Department. The finding from this approach may resulted to the amendment of existing curriculum and module in the Malaysian Universities to inculcate the knowledge, skills and awareness necessary to become a successful halal job employee.

## 6. Conclusion

In general, this study indicates Muslim university students' knowledge, awareness, and attitude towards halal jobs among Muslim university students in the Klang Valley, Malaysia. The result revealed that most of the respondents have high level of awareness, adequate knowledge, and favourable attitude towards halal jobs. The Pearson correlation has proven that knowledge, awareness, and attitude have positive and significant relationships. Thus, the correlation value indicates that the more awareness and knowledge among the students on halal jobs, the higher the behavioural intention towards the option for halal jobs. This study has provided a significant impact on awareness, knowledge, and attitude of behavioural intention towards halal jobs among Muslim university students. There is a lack of emphasis especially in academic research and society on the determinants of awareness, knowledge, and attitude of behavioural intention towards halal jobs among Muslim university students. Various initiatives such as halal training and 'Halal Talent Portal' establishment have been carried out to increase participation and awareness towards career in halal industry. Therefore, the higher education institutions (HEI) should create strong opportunities and incentives such as study visits/benchmark to halal-certified factories or companies for future halal talent workers that can simultaneously introduce or expose students to the specific requirements for halal industry occupation. Such initiatives must be acted upon to enhance the effectiveness of the plan implemented by institutions of higher education to produce halal talent workers. The exposure, awareness, and knowledge towards halal jobs and halal industry should be continued and intensified not only focusing on higher education levels but the introduction of halal education should commence early at the school levels.

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### Conflict of Interest

The author declares no potential conflict of interest with respect to the research, authorship, and/or publication of this article.

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*Original Research Article*

## Knowledge and Attitude on Sunnah Food and Islamic Eating Practices among Students Universiti Malaysia Sabah

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**Abstract:** The preservation of future generation and the protection of consumer welfare is a priority in view of the progressive negative behaviours existing in today's societies at large. This study aims to evaluate the level of knowledge and attitude on *sunnah* food and Islamic eating practices, and to determine the relationship between knowledge, attitude and practices among students from Universiti Malaysia Sabah (UMS). The study involved around 414 respondents through convenience sampling by using questionnaires as the research instrumentation. The data was analysed by using SPSS version 25. This study highlighted that family is the main reference for source of information on halal food products followed by the internet and lecturer. Most members of the faculties at UMS has high level of knowledge on the concept of halal and haram in halal food, followed by the Islamic law (*Sharia'*) on halal food and beverages. This is due to courses on halal and haram foods being offered at various faculties in UMS. Although the majority of respondents has high level of knowledge on *sunnah* food, but the practices of respondents consuming the *sunnah* food is low. This happens because the fruits such as dates, pomegranates and figs are quite expensive and not easily accessible in the city of Kota Kinabalu. The study found that the Muslim respondents have positive attitude (i.e. proven by satisfactory level) towards *sunnah* food and eating practices: (1) they always choose *sunnah* and *tayyib* food whenever they want to eat; (2) they eat in congregation (with friends or family) when they want to eat; (3) washing hands before and after eating; (4) saying "*Bismillah*" before eating ; (5) sharing food with friends. However, some of the eating practices are not encouraged by Islam, but because it has become a custom or a part of their daily eating practices. This happens because the Malaysian public is not familiar with eating food from the Arab countries, where it was a way of life for the Prophet SAW. Results also showed that the knowledge on *Sunnah* food was significantly correlated with attitude ( $r = 0.217$ ;  $p < 0.05$ ) and practices ( $r = 0.085$ ;  $p < 0.05$ ) of the UMS students showing positive linear correlations, which confirms that better knowledge can lead to positive attitude and subsequently in good practices.

**Keywords:** *sunnah* food; Islamic eating practices; milk; dates; honey; halal food

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## 1. Introduction

The preservation of future generation and the protection of consumer welfare, as contained in the “*Maqasid Shariah*”, is a priority in view of the progressive negative behaviours existing in today’s societies at large. This qualitative and quantitative research on *sunnah* food and Islamic eating practices focused on sunnah food consumed by the Prophet Muhammad SAW and his eating practices. Some foods mentioned in the al-Quran and Hadith were studied to associate the relationship of knowledge and attitude of halal food and Islamic eating practices of the respondents.

The word *sunnah* which is originated from Arabic term, means traditional customs and practices of the Prophet Muhammad SAW, who constitute a model for all Muslims to follow. Whilst halal food is food, which is allowed or permitted to be consumed by Muslims from *Shariah* principles and is allowed by Allah SWT. *Halal* can be defined as foods which are halal, pure, clean, free from haram materials, whereby *tayyiban* means foods, which are safe, hygienic and nutritious. Islamic eating practices means the *sunnah* way of eating foods, which is being practiced by the Prophet Muhammad SAW.

The current exigencies of various crimes on alcohol, fraud food and dietary supplements, the rising trend on cancers and cardiovascular diseases, diabetes and obesity have prompted this study to evaluate the level of knowledge, attitude and practices of *Sunnah* food and Islamic eating practices. It is believed that *sunnah* food and Islamic eating practices can resolve these problems.

The aims of the study are to evaluate the level of knowledge on *sunnah* food and Islamic eating practices, to evaluate the level of attitude on *sunnah* food and Islamic eating practices and to determine the relationship between knowledge, attitude and practices among students from Universiti Malaysia Sabah.

## 2. Literature Review

The Islamic way of life is a system of divine principles and code of ethics to be practiced in the daily life of every person. Every deed is a form of worship and eating is one of them and it has to be based on the Islamic laws. In perspective, Muslims should eat sufficient bulk of food and select the best grade of food as stated in the al-Quran:

“O children of Adam, take your adornment at every mosque, and eat and drink, but

*be not excessive. Indeed, He likes not those who commit excess.” (al-Quran 7:31)*

*“And similarly, We awakened them that they might question one another. Said a speaker from among them, “How long have you remained [here]?” They uttered, “We have remained a day or part of a day.” They uttered, “Your Lord is most knowing of how long you remained. So send one of you with this silver coin of yours to the city and let him look to which is the best of food and bring you provision from it and let him be cautious. And let no one be aware of you.”(al-Quran 18:19)*

The growing understanding of Muslims throughout the world on their responsibility to eat only halal food (Ambalim & Bakar, 2014) creates positive environment to develop true Muslims with good behaviour. To the Muslims, food should be halal and of good quality and should be authentic. In Islam, every food is deemed halal excluding those that are strictly stated in the al-Quran as prohibited or *haram* (Riaz, 2004). Of special attention is the meat because it forms the greatest strictly regulated food among the food groups. The meat must not only be sourced from halal animals, but also must be slaughtered and processed according to the Islamic laws. Apart from meat, the other foods which are haram, are pork, blood, carrion and liquor.

Allah SWT asked us to select good food and drinks and prohibits us from haram foods which can cause health hazards. According to Abdussalam Thawilah (2010), most scholars are in the same line of opinion that all that are considered halal are halal and all those considered haram are haram by the al-Quran and *as-Sunnah*. Whilst on any matters that has not been mentioned halal or haram is included in the flexibility or on the basis of halal. From *Abu Ad-Darda r.a.*, he reported what the Prophet SAW said: “All that Allah ascertained as halal in the *al Kitab* is Halal. Whilst those that are haram are haram. But for those which He kept quiet, it means flexibility. So, accept this flexibility from Allah SWT for Allah SWT is never forgetful.” (Abdussalam Thawilah, 2010).

### ***Milk***

Milk is one of the favourite foods of Prophet Muhammad SAW, which can be proven and supported by several Islamic resources and scientific research findings from all over the world. Al-Quran clearly encouraged breastfeeding through the following verse: “*Mothers shall breastfeed their children for two whole years, for those who wish to complete the term*” (al-Quran 2:233). In reminding people to tend to their parents with kindness, the al-Quran says: “*His mother carried him, in weakness upon weakness, and his period of weaning is two years*” (al-Quran 31:14). Through the Quranic verses above, they signify that breastmilk from mothers to supersede other milk from cow, sheep and goat. This coincides with the World Health Organization (WHO) theme, which recognizes that breastfeeding the infant for six months is highly recommended, which is then continued until two years old and beyond provides the best possible nutrition that babies need to grow and develop into a healthy adult. Breast milk is proven to contain more than 70% of whey protein compared to cow's milk,

which is biologically crucial for the baby's physiological growth (Camilia *et al.*, 2016). In parallel with the al-Quran, the WHO has placed the policy that mothers should breastfeed their babies from 4-6 months (possibly up to two years) exclusively to prevent infantile diarrhoea. In contrary to the current trend of bottle-feeding using cow's powdered milk, promotion of wet nursing and education on the importance of breast milk should be globally implemented. In addition, breastfeeding benefits mothers in regaining her uterine health, child spacing and prevent breast cancer, besides establishing bonding and psycho-social effect between her and her baby.

It is amazing that the instruction of Allah SWT in the Holy al-Quran is scientifically proven to be accurate and greatly benefit the humankind. Many benefits of milk intake are being discovered today such as in strengthening bones and cancer prevention (Davoodi *et al.*, 2013), and there is now a new study confirming the extra benefits of milk in the stopping of dementia and cognitive decline (Ano & Nakayama, 2018), which the *Quran* had called it “the miserable old age”. Allah the Almighty said: “and among you there is he who is brought back to the miserable old age, so that he knows nothing after having known” (al-Quran 22:5). Prophet Muhammad SAW had uttered “*Allah SWT had not brought down any illness without his remedy*”, therefore, Allah the Almighty, made this milk as a treatment for memory failure particularly for the elderly. Milk is a complete food, rich in protein, calcium, vitamin A and vitamin B (IDFA, 2019). It is pure, desirable and palatable to the drinkers as stated in the following Quranic verse. “*And verily in cattle (too) will ye find an instructive Sign. From what is within their bodies between excretions and blood, We produce, for your drink, milk, pure and agreeable to those who drink it*” (al-Quran 16:66). Meanwhile, a recent study revealed that the consumption of milk daily can protect men from cardiovascular diseases (Rice, 2014).

### **Dates**

The Prophet SAW normally breaks his fast by consuming some dates prior to performing *Maghrib* prayer, and if fresh dates were not accessible, he used to replace them with some dried dates. When they were not accessible, he used to have a few drinks of water, in accordance to some reports (Haylamaz, 2014: Narrated by Ahmad, 12265; Abu Dawood, 2356). In the Malaysian Dietary Guideline 5, it is stated that “Eat plenty of fruits and vegetables everyday”.

Vyawahare, *et al.* (2008) in their regular assessment, conducted the pharmacological researches on dates (*Phoenix dactylifera*), which showed the prospective of dates in the therapy of skin disorders, gastric ulcer, cardiovascular disorder, diarrhoea, and inflammatory ailments, including kidney and liver disorders, viral and microbial infections, cancer, etc. The previous researches also indicated that these dates have important anti-oxidant properties due to the existence of water-soluble mixture with powerful free radical-scavenging impacts, such as phenolic compounds that may be related with reduced occurrence and reduced death rates of deteriorative illnesses in human.

Baliga *et al.* (2011) found that dates are good origins of dietary fibres, carbohydrates, specific important minerals and vitamins. The pits of the date fruits are also an outstanding origin of dietary fibre and comprise of significant quantities of minerals, lipids and protein. Besides dates being dietary, it is also used for medicinal purposes, which are utilized to nurse a variation of sickness in the conventional systems of medicine. Study on its phytochemical properties showed that the fruits contain sterols, carotenoids, procyanidins, anthocyanins, phenolics, and flavonoids; compounds known to contain a number of advantages impacts for human health and benefits. Pre-clinical researches have demonstrated that the dates comprised of free radical scavenging properties, anti-inflammatory, anti-microbial, anti-oxidant, gastroprotective, anti-mutagenic, hepatoprotective, nephroprotective, immune-stimulant activities and anti-cancer.

Tang *et al.* (2013) reported that dates are mainly comprised of 70% carbohydrate (the main sugars being glucose, sucrose and fructose). Date fruit is a beneficial origin of fibre and carries numerous useful minerals and vitamins such as selenium, calcium, fluorine and iron and much more. In 2014, Arshad *et al.* announced that the healing impacts of dates fruits in the stopping of illnesses were via modulation of anti-inflammatory, anti-tumour activity and anti-oxidant. Assirey (2014) measured chemical compositions of ten date palms and they contain all the nutrients the body needs. The dates were high in sugar at 71.2–81.4% dry weight, low in ash which was accounted for 1.68–3.94%; they comprised of little concentrations of protein and lipid at 1.72–4.73% and 0.12–0.72%, respectively. The main mineral was potassium, and the principal sugars were fructose and glucose. They comprised of high concentrations of valine, leucine, aspartic acid, proline, alanine and glycine; little concentrations of serine, isoleucine, threonine, arginine, phenylalanine, tyrosine and lysine; very little concentrations of histidine and methionine. Essa *et al.* (2016) found that dates supply possible defence against the inflammation and oxidative pressure in the brain. The mechanisms of healing may be associated with the antioxidant activities of their phenolic constituents, which clearly demonstrates the nutritional and medicinal values of this fruit. Based on the *in vivo* experimental researches and the active ingredient profiles, it can be summarized that these fruits have promising healing potential against Alzheimer's disease (AD). However, the mechanisms by which dates display their antioxidant activities against the AD are poorly understood and necessitate an extensive investigation utilizing different varieties. Al-Alawi (2017) conducted *in-vitro* and *in-vivo* researches of some pure aqueous and assorted aqueous/organic solvent extracts of the date palm fruits and they discovered that the solvent extracts to own numerous health promoting impacts; including oxidative-stress activity, free radical scavenging capability, prevention of coronary heart disease, hepatoprotective, anti-inflammatory and anti-cancer properties.

## **Honey**

*“And thy Lord taught the Bee to build its cells in hills on trees and in men's habitations; Then to eat of all the produce (of the earth) and find with skill the spacious paths of its Lord: there issues from within their bodies a drink of varying*

*colours wherein is healing for men: verily in this is a Sign for those who give thought”* (al-Quran 16:69). The Prophet SAW said: *“Honey is a healing for the body and the al-Quran is a healing for the soul, hence I proposed to you both cures, the al-Quran and honey.”* (Ahmad *et al.*, 2010).

Vallianou *et al.* (2014) reported that sugars in honey composed of monosaccharides and oligosaccharides. Honey comprised of at least 181 components (Alvarez-Suarez *et al.*, 2013). The most plentiful sugar in honey is fructose, while fructose is sweeter and supply extra energy than artificial sweeteners. Alvarez-Suarez *et al.* (2013) reported that the grade of honey relies on its chemical content and floral sources. Besides sugars, honey also comprises of various vitamins, especially B complex and vitamin C, together with a lot of minerals. Some of the vitamins discovered in honey are pantothenic acid, ascorbic acid, niacin and riboflavin; while minerals include magnesium, copper, manganese, calcium, iron, phosphorus, potassium and zinc are also present. The other components of honey are amino acids, antibiotic-rich inhibin, proteins and phenol antioxidants. It also composed of other bioactive substances such as phenols, flavonoids, nitric oxide (NO), amino acids, carotenoid-derived compounds, metabolites, proteins and organic acids.

Honey is proven to have its anti-bacterial, anti-diabetic, anti-cardiovascular diseases, anti-obesity and wound healing properties on human. In 2008, Simon *et al.* highlighted there were many evidences which confirmed the properties of active ingredients of honey against bacteria and other useful impacts on lesion relieving and motivate other wound supervision experts to utilize CE-certified honey bandages with standardized anti-bacterial procedure. This is in tandem with the findings of Al-Waili (2006), whereby they concluded that a combination of honey, beeswax and olive oil is safe and clinically successful in the therapy of haemorrhoids and anal fissure, which directs the way for further randomized double blind researches. However, D. M. Mandal and S. Mandal. (2011) reported that Manuka and Tualang honey are both effective current anti-microbial agent against anti-biotic resistance and in healing of persistent wound infections, which does not respond to antibiotic treatment. Van den Berg *et al.* (2008) found that buckwheat honey was most successful in lowering reactive oxygen species (ROS) levels and it was chosen for use in wound-relieving products. The main antioxidant properties in buckwheat honey comes from its phenolic constituents, which are available in large quantities. Its phenolic compounds can also apply anti-bacterial activity, whereas its low pH and high free acid composition can help in relieving the wound. Yaqhoobiet *al.* (2008) discovered that consuming natural honey can reduce risk attributes of cardiovascular diseases, in particular among patients with increased threats, and it did not elevate the weight of the body in obese or overweight patients. Bahrami *et al.* (2009) demonstrated, whereby 8-week eating of honey can supply favourable impacts on body weight and blood lipids of diabetic patients. Moghazyet *al.* (2010) study has proven that in developing countries, the trading of clover honey is used clinically and cost-effective bandage for diabetic lesion. It is widespread and in compliance to their ethnic faiths, which forms it as a normal environmentally-based technique for nursing those with diabetic wounds. Kamaratos *et al.* (2012) found that Manuka honey-impregnated bandages (MHID) constitute



a successful treatment for neuropathic diabetic foot sores (NDFU), which leads to a notable shorter time in healing and fast disinfection of ulcers.

Honey is also proven to have anti-oxidants and anti-cancer activities. Khalil and Sulaiman (2010) discovered that antioxidants available in honey derive from various origins including mono-phenolics, vitamin C, polyphenolics and flavonoids. Regular eating of flavonoid is associated with a lowered threat of cardiovascular illnesses. As for the coronary heart illness, the preventive impacts of flavonoids which are mostly anti-oxidant, anti-thrombotic, anti-ischemic, and vasorelaxant and flavonoids lower the threat of coronary heart disease by three major activities: (a) to make better coronary vasodilatation; (b) reduce the capability of platelets in the blood to coagulate; (c) stop LDLs from being oxidized. This investigation has obviously revealed that specific honey polyphenols have a favourable pharmacological function in stopping cardiovascular diseases (Khalil & Sulaiman, 2010). Shadkam *et al.* (2010) reported the finding of their research showed that taking a 2.5 mL dose of honey prior to sleeping has a better easing impact on upper respiratory infections (URIs)-induced cough in comparison to dextromethorphan (DM) and diphenhydramine (DPH) doses. Furthermore, Majid *et al.* (2013) found that taking natural honey notably restricts the raise in blood glucose together with a dominant lowering in the quantities of total cholesterol, LDL and triglycerides, and raise in HDL in young healthy adults in Pakistan. The WHO made a recommendation in 2001 based on accumulating evidence suggests that honey might have a role in treating cough and cold in children. This claim has been supported by Goldman (2014) in his study recommended 2.5 mL honey before bedtime for children older than one year of age with cough. Further study on the health benefit of honey has been conducted by Erejuwa *et al.* (2014), who discovered honey as a natural product that shows prospective results to impede or retard the growth and progress of tumour and cancer. Its anti-tumour, anti-proliferative, anti-cancer, and anti-metastatic impacts are liaised via various mechanisms, which include cell cycle halt, operation of mitochondrial pathway, initiation of mitochondrial external layer permeability, initiation of apoptosis, modulation of oxidative tension, improvement of swelling, modulation of insulin signalling, and retardation of angiogenesis in cancer cells. Honey is particularly and selectively cytotoxic as opposed to tumour or cancer cells, while it is non-cytotoxic to normal cells. It can impede cancerogenesis by modulating or interfering with the molecular operation or episodes of initiation, promotion, and progress phases. It, therefore, can be regarded as a prospective and favourable anti-cancer agent, which demands more study, both in trials and clinical researches. Othman (2012) reviewed that there was a concrete proof that honey is a natural healer as an anti-inflammatory agent, anti-microbial agent, immune booster, “vaccine” to cancer, and advocate to improve persistent ulcers and wounds; which forms as the attribute elements for cancer growth. Finally, Ashaari *et al.* (2013) found that taking honey at a high dosage enhances the general and single indicators of allergic rhinitis (AR), and it could perform as a compatible therapy for AR.

## ***Fruits and Vegetables***

As for fruits and vegetables, the al-Quran stated that:

*“And He it is who causes gardens to grow, [both] trellised and untrellised, and palm trees and crops of different [kinds of] food and olives and pomegranates, similar and dissimilar. Eat of [each of] its fruit when it yields and give its due [zakah] on the day of its harvest. And be not excessive. Indeed, He does not like those who commit excess”* (al-Quran 6:141). *“He causes to grow for you thereby the crops, olives, palm trees, grapevines, and from all the fruits. Indeed in that is a sign for a people who give thought”* (al-Quran 16:11). *“And in the earth, there are tracts side by side and gardens of grapes and corn and palm trees having one root and (others) having distinct roots-- they are watered with one water, and we make some of them excel others in fruit; most surely there are signs in this for a people who understand”* (al-Quran 13:4). *“Amid thornless lot-trees, and banana-trees (with fruits), one above another, and extended shade, and water flowing constantly, and abundant fruit, neither intercepted nor forbidden”* (al-Quran 56:28–33).

The Malaysian Dietary Guideline 5 stated that “Eat plenty of fruits and vegetables everyday”. The key recommendations are namely: (1) Eat a variety of fruits every day; (2) Eat a variety of vegetables every day; (3) Eat at the minimum five portions of vegetables and fruits every day. It has been widely recognized that vegetables and fruits are beneficial for an individual and now substantial scientific data are available to support close associations between vegetable and fruit consumption and good health outcomes. Vegetables and fruits are good sources of dietary fibre, vitamin, minerals and various bioactive substances. Certain nutrients are lost during cooking so eating raw salads is encouraged. When consumed raw, vegetables must always be correctly cleaned. In some cases, cooking elevates nutrient availability, for example, carotenoids from cooked tomatoes are absorbed well than from raw ones. When vegetables are cooked, they should not be overcooked since this will cause nutrient loss. Stir fry vegetables is the best cooking method to minimize the loss of nutrients to the environment. Some fruits and vegetables are particularly plentiful in vitamin A and C. Good origins of beta-carotene, which are predecessors of vitamin A, are dark green leafy vegetables such as sweet vegetable, mustard greens, kale, water spinach, kai-lan, and yellow, orange vegetables and fruits such as tomatoes, bell peppers, sweet potatoes and carrots. Mangoes, papayas and watermelons are also rich origins of vitamin A and C.

There are various scientific proofs that fruits and vegetable intake can reduce hypertension, coronary heart diseases and stroke in the last decade (Liu *et al.* 2000, Moore *et al.*, 1999). Holt *et al.* (2009) research showed that the favourable outcome of fruits and vegetables consumption on markers of inflammation and oxidative stress are already existed in early adolescence, which promotes the United States Dietary Guideline “to consume five or more servings per day” to prevent problems of the heart and blood vessels. WHO (2014) reported that some proofs recommend that eating vegetables and fruits is important in

lowering the threats of non-communicable diseases (NCDs). Bertoia *et al.* (2015) and Schwingshackl *et al.* (2015) highlighted that increased consumption of non-starchy vegetables and fruits is reversely related with alteration in weight. In addition, it prevents long-lasting gain in weight and furnish further food-specific guidance for the stopping of obesity, a principal attribute element for cardiovascular diseases, type 2 diabetes, cancers, and many other health conditions. Selection of food during adolescence might be extremely essential. Jiang *et al.* (2017) highlighted that the raised consumption of vegetables and fruits is related with a reduced threat of cognitive impairment and mental illness. Boeing *et al.* (2012), Borgi *et al.* (2015) and Joshipura *et al.* (2001) suggested that substantial long-lasting consumption and raised intake of whole fruits may lower the attribute of growing hypertension, coronary heart disease (CHD) and stroke. In addition, it can stop gain in body weight and as obesity is the most significant attribute for type-2 diabetes mellitus, a larger consumption of fruits and vegetables are hence, indirectly lowers the prevalence of type-2 diabetes mellitus. Besides that, it can lower the threat of specific eye diseases, dementia and the threat of osteoporosis. Similarly, recent data on asthma, chronic obstructive pulmonary diseases (COPD), and rheumatoid arthritis (RA) showed that a raise in fruit and vegetable intake can prevent these diseases. Joshipura *et al.* (1999) found out that eating vegetables and fruits, in particular citrus fruit and citrus juice, cruciferous and green leafy vegetables can protect one from ischemic stroke risk (Joshipura *et al.*, 1999). In regards to fruits and vegetables role in fighting cancer, Jansen *et al.* (2004) found that commitment to the guideline for vegetables and fruits consumption has relationship with reduced cancer risk. Besides quantity, variety in consumption is also important. Farvid *et al.* (2016) reported that there is an association between higher intake of fruits and reducing threat of breast cancer.

### ***Islamic Eating Practices***

Islamic eating practices or manners consuming food in Islam are referred as *sunnah* to ensure the good health of a Muslim is maintained. A Muslim should emulate eating habits or dining etiquette of the Prophet Muhammad SAW as Muslims eat and drink to be healthy so that they can worship Allah SWT. This actually means that Muslims do not eat, if they are full and do not drink if they are not thirsty. Prophet Muhammad SAW said “*We are a people who do not eat until we are hungry. And when we eat, we do not eat to our fill.*” The general practise before eating and drinking is to wash one’s hands. Next is to recite the *bismillah* and kneel before the food. In this account, the Prophet Muhammad SAW uttered “*the devil considers food lawful for him when Allah’s name is not mentioned over it.*” Similarly, it is undesirable to eat with the left hand. Only the right hand should be used for eating and drinking purposes. This is because the left is reserved for unclean duties. It was reported by Ibn ‘Umar RA that the Holy Prophet SAW said: “*None of you must ever eat or drink with his left hand because the devil (shaytan) does so.*” An inclusion to this, the Prophet SAW also advised Muslims to take food when they feel hungry. This is to ensure easy digestion. Similarly, Muslims should not delay eating if food is already being served. Our Prophet SAW uttered: “*It is not right to eat your food quickly, besides, one should eat from what lies nearest*

*to one.*” (Bukhari, 63: 1888). In addition, the Prophet Muhammad SAW recommended that one should stop eating, while there is extra room for the stomach to digest food more easily. The Prophet SAW said: *“If you must eat more, be sure that only one third of your stomach is filled with food, one third is left for water and the remaining one third for air.”* (Nurdeng, 2009). Muslims are discouraged to blow air on food to prevent transmission of bacteria via one’s breath. After finishing his meals, the Prophet SAW always thanks Allah SWT for the food. The eating practices are divided into three sections, which are before, during and after eating.

### *Before eating*

A Muslim should consume only halal food and prepares his food from halal sources and free from any haram contamination. If he is eating outside his home, he should make sure that the food he is eating is halal. In this modern world now, one should look for halal logo on halal certified products and premises. It is an obligation to all Muslims to look for halal food as instructed by Allah SWT in the al-Quran. In this modern world, food is packaged and displayed on shelves in the supermarket. The only way to select which food to be purchased is to look for the halal logo. Likewise, when we want to eat food outside our homes, look for food premises with the halal logo or an evident that it has been halal certified by the competent authority. We must not be misguided by a scanty claim “No Pork, No Alcohol”, which does not prove that its chickens, cattles or lambs are halal slaughtered in accordance to the Islamic regulations and requirements. We must take extra precaution by asking directly the owner of the food premise of the halal status of their food resources. Otherwise, it is better to buy halal sources and then cook and eat at home. The purpose of consuming food is to make oneself stronger and be healthy to worship Allah SWT. The intention of eating is not “live to eat”, but “eat to live”. One, who eats like the Prophet Muhammad SAW is one who eats very little, just enough to survive and worship the Almighty, Allah SWT. The person should wash his hands before eating to clean any dirt or harmful microorganism from his hands. Washing hands is the basic principle for every individual for his or her self-hygiene. Whenever there is a contact between our hands with any dirty surfaces, dangerous microorganisms can be transferred onto our hands. From then on, contaminated hands will transmit diseases to surrounding people when they become into contact with the microbes (Alwis *et al.*, 2012).

Higgs (2015) reported that normal social influence on eating is strong and prevalent. The presence of other people at an eating event or when selections are made about food has a strong effect on behaviour. This may due to humans having a greatly developed capacity to learn from the behaviour of others and find the approval of others rewarding and disapproval aversive. It is recommended that eating norms are followed because they provide information about safe foods and facilitate food sharing. They are a powerful influence on behaviour because following or not following norms is associated with social judgements. Following the norm is more likely when there is uncertainty about what constitutes correct behaviour

and when there is a greater shared identity with the norm referred group. Social norms may influence food selection and consumption by altering self-perceptions and the sensory or hedonic evaluation of foods. The same neural systems that mediate the rewarding effects of food itself are likely to reinforce the eating norms. Larsen *et al.* (2015) highlighted that parents may function as the gatekeepers to his children and support them in attending to internal signals of satiety, while simultaneously controlling healthy dietary behaviour. They may do so by covertly: (1) avoid eating of 'junk-food'; (2) avoiding food for reward or emotional regulation; (3) providing clear and healthy rules about when and what can be eaten; (4) providing larger portions with a variety of healthy foods and vice versa lower portions with less variety of unhealthy foods; (5) stimulating healthy intake by repeated exposure; (6) rewarding the child for trying new and healthy foods; (7) active healthy food modelling e.g., smiling when eating healthy food themselves. Nevertheless, as child's appetitive traits have high genetic origin (Carnell *et al.*, 2008), and it is the environment that drives up obesity rates (Hill *et al.*, 2003; Swinburn *et al.*, 2011), we suggest that the most pertinent food parenting practices underlying the epidemic on obesity are those e.g., rules, monitoring, structure, modelling practices that directly influence the home food environment i.e., food availability and modelling compared to those food parenting practices e.g., restriction, pressure, rewarding, encouragement that act more directly on child appetitive traits.

### *During eating*

A Muslim should start his dining by saying, "In the name of Allah SWT" or "*Bismillah*" (Sahih Muslim: 1305). In case a Muslim forgets to say *Bismillah*, Abu Dawud reported that Prophet Muhammad SAW stated that "*If any of you is about to eat, he should mention the name of Allah. If he forgets to mention the name of Allah SWT at the beginning, he must say, "In the name of Allah over the beginning and the ending."* The person should praise Allah SWT at the end of every meal. Prophet Muhammad SAW said "*If a person eats any food and then says "Praise be to Allah SWT who fed me this and provided for me without any strength or power on my part," all of his previous sins will be forgiven.*" (Al-Tirmidhi).

Next, the person should eat with his right hand using three fingers, taking small portions and chew them well. He should eat the food that is closest to him and do not take any food from the middle of the plate. Prophet Muhammad SAW told Umar bin Salamah: "*O young man, mention the name of Allah SWT, eat with your right hand and eat from what is close to you.*" (Al-Bukhari 63: 1888 and Muslim 1301). Shah *et al.* (2014) reported that eating leisurely notably reduced meal energy consumption in the normal-weight, but not in the overweight or obese category. It reduced rate of consumption and energy density in both categories. Consuming leisurely results in reduced hunger ratings in both categories and raised fullness ratings in the normal-weight group at 60 minutes after the meal started. The same applies to a study by Andrade, *et al.* (2008), who reported that consuming leisurely can assist to maximize satiety and lower energy intake between meals. In 2014, it was reported by Angelopoulos *et al.* that slow paced consuming enhanced fullness and lowered hunger

ratings in obese and overweight participants with Type-2 Diabetes Mellitus (T2DM), minus the development in gut hormone reactions found in normal-weight respondents. Leisure paced consumption may be a beneficial stopping strategy, but might also assist in limiting food consumption in those already facing diabetes and obesity. Al-Tirmidhi reported that Muhammad SAW said *“The blessings descend from the middle of the food. So eat from the edges and do not eat from the middle.”*

A Muslim should chew his food well and should lick his fingers after eating. Al-Bukhari and Muslim reported that Prophet Muhammad SAW said that *“When one of you eats, he should not wipe his fingers until he licks them or has them licked.”* (Muslim 1302). Zhu and Hollis (2014) highlighted that eating leisurely subscribes to a reduced threat of obesity, maybe because it could guide hunger management. Thorough munching is a constructive approach to lower the rate of eating and raising the number of chews prior to swallowing might be a behavioural strategy to lower food consumption and potentially support body-weight control. This study concurs with Li *et al.* (2011), who reported that intercessions targeted at improvising munching practices could become a practical mechanism for tackling obesity. Shah *et al.* (2014) also reported that chewing may also help you feel fuller longer, leading to less eating overall. The study printed in the Journal of the Academy of Nutrition and Dietetics revealed that 70 normal and overweight or obese men and women eat a test meal two times: once eating slowly, and the second, eating quickly. When they ate slowly and chewed their food thoroughly, the respondents reported feeling less hungry one hour after consuming the meal compared to when they ate quickly. If any food is dropped, it should be cleaned and eaten. Prophet Muhammad SAW said that *“If a morsel of food from any of you, he should take it and wipe it clean of any dirt and then eat it. He should not leave it for the Satan (Evil).”* (Muslim 1304).

A Muslim should not blow over very warm food. Alternatively, he should delay until the food chills down. He also should not blow into a glass of water, while drinking from it, alternatively, he should respire three times outside the glass whilst drinking the water.

A Muslim should not overeat. Prophet Muhammad SAW said that *“A human does not fill any container worse than his stomach. It is enough for a human to have some morsels to strengthen his back (keep his back straight). If he must eat more, then it should be one third of his stomach for food, one third for drink and one third for breathing”* (Ahmad Tirmizi: 2380). This is in line with the first Malaysian Dietary Guidelines (MDG) Key Message, which is “Eat a variety of foods within your recommended intake”. Its key recommendations are choosing your daily food intake from a combination of foods based on the Malaysian Food Pyramid and select your daily food consumption according to the portion size suggested. It is very crucial that a person ensures getting proper foods and include the principles of good nutrition such as variety, a balanced intake of nutrients and eating in moderation. Different foods provide different combinations of energy and nutrients. The best way to meet the daily requirements is to eat a variety diet that integrates cereals, fish, poultry,

meat, fruits and vegetables, legumes and dairy products. Food and drinks should be served to the eldest in the gathering and then to those on the right. Prophet Muhammad SAW said that “(Begin with) the eldest. (Begin with) those on the right, and those on the further right” (Al-Bukhari and Muslim).

#### *After eating*

Muslims should stop eating before he becomes full as showed by the Prophet Muhammad SAW. A person should lick his fingers, brush his teeth and rinse his mouth, after eating to maintain oral health. Muslims must praise Allah SWT for all the food he had eaten to show his gratitude.

### **3. Methodology**

The study was conducted at the main campus of Universiti Malaysia Sabah (UMS), Kota Kinabalu. Respondents involved were students from various faculties from the main campus including Faculty of Science and Natural Resources (FSSA), Faculty of Humanities, Arts and Heritage (FKSW), Faculty of Psychology and Education (FPP), Faculty of Food Science and Nutrition (FSMP), Faculty of Engineering (FKJ) and Faculty of Medicine and Health Sciences (FPSK). The method used in the study was convenience sampling. This methodology was selected based on the total number of undergraduate students in the main campus, which is 14,228 people. According to Sekaran and Bougie (2009), this sampling technique is simple to get information and less sources are needed. Based on the table of Determination of size sample from Population by Sekaran and Bougie (2009), 500 students have been identified as respondents. However, only 414 respondents completed the whole questionnaires. In this study, justification from Rascoe’s rule of thumb has been applied. Rascoe (1975) said that the total number of respondents that answered the questionnaire between  $>30$  and  $<500$  is suitable in most studies. The technique used for the study was using a questionnaire. There were five parts in the questionnaire, which consisted of choice selections of “Yes/ No/ Not sure” and category questions. They were: (1) demographic profile of the respondents; respondents’ level of: (2) knowledge, (3) attitude, (4) practices on *sunnah* food; (5) Islamic eating practices on *sunnah* food. There were 500 students, both Muslim and non-Muslims being selected. This selection is based on the age between 19 years to 30 years and they were studying at a University level. Different aspects of demography such as gender, race, knowledge cluster and faculty have also been considered to achieve the objectives of the study. Data analysis in this study was conducted by using Statistical Package for Social Science (SPSS) version 25.0. Results of this study were using quantitative and qualitative applications. The sample data were analysed by using descriptive analysis, percentage and Chi-Squared Test.

#### 4. Results

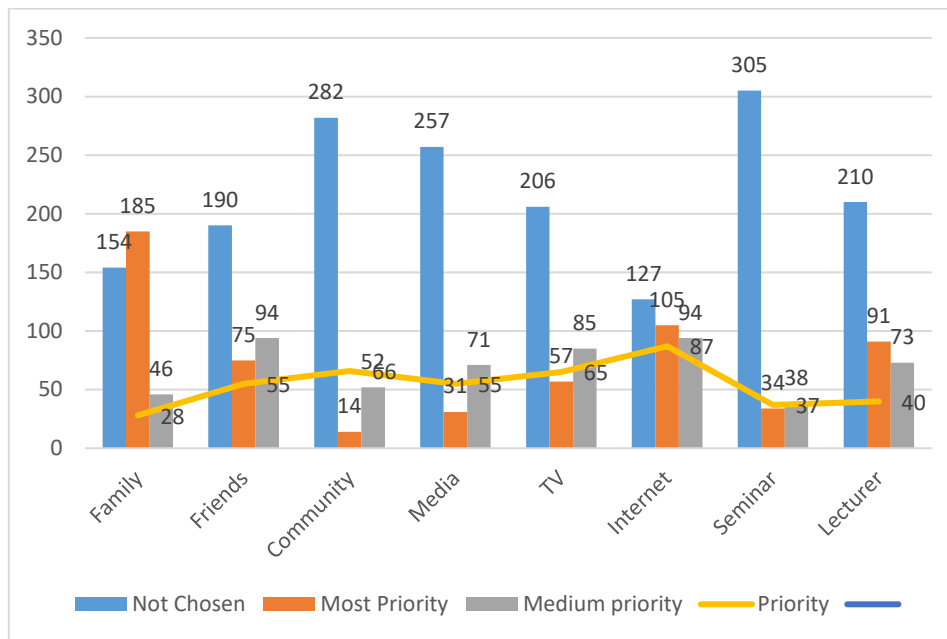
**Table 1:** Demographic profile of the respondents

| Item              | Parameter     | Frequency ( <i>n</i> = 414) | Percentage (100%) |
|-------------------|---------------|-----------------------------|-------------------|
| Gender            | Male          | 99                          | 23.9              |
|                   | Female        | 315                         | 76.1              |
| Age               | 19–21 years   | 177                         | 42.8              |
|                   | 22–24 years   | 225                         | 54.3              |
|                   | 25–30 years   | 12                          | 2.9               |
| Race              | Malay         | 127                         | 30.7              |
|                   | Chinese       | 76                          | 18.4              |
|                   | Indian        | 29                          | 7.0               |
|                   | Others        | 182                         | 43.9              |
| Marital status    | Single        | 405                         | 97.8              |
|                   | Married       | 9                           | 2.2               |
| Faculty           | FKJ           | 44                          | 10.6              |
|                   | FKSW          | 56                          | 13.5              |
|                   | FPP           | 64                          | 15.5              |
|                   | FSMP          | 125                         | 30.2              |
|                   | FSSA          | 48                          | 11.6              |
|                   | FPSK          | 77                          | 18.6              |
| Type of Education | Undergraduate | 411                         | 99.3              |
|                   | Postgraduate  | 3                           | 0.7               |
| Religion          | Islam         | 212                         | 51.2              |
|                   | Christian     | 105                         | 25.4              |
|                   | Buddhist      | 72                          | 17.4              |
|                   | Others        | 25                          | 6.0               |

Note: Abbreviations used to represent each faculty in UMS; Faculty of Science and Natural Resources (FSSA); Faculty of Humanities, Arts and Heritage (FKSW); Faculty of Psychology and Education (FPP); Faculty of Food Science and Nutrition (FSMP); Faculty of Engineering (FKJ); Faculty of Medicine and Health Sciences (FPSK).

From Table 1, it is noted that there were more females, 76.1%, rather than males, 23.9% participated in the study. The dominant age of the respondents, 54.3% was between 22-24 years old, which is the age of active life studying at the university. The race was dominated with others (43.9%) which comprised of ethnic groups making up of students in Universiti Malaysia Sabah, which can be Kadazan, Dusun, Bajau or Murut, followed with Malay (30.7%). Most of the respondents were not married (97.8%). Respondents were mainly from Faculty of Food Science and Nutrition (30.2%), followed by Faculty of Medicine and Health Sciences (18.6%) and Faculty of Psychology and Education (15.5%). Majority of the respondents were undergraduates (99.3%), Muslims (51.2%) and Christianity (25.4%).





**Figure 1:** Sources of information on *Halal* food.

Figure 1 summarizes the sources of information on halal food received by the respondents. Majority 185 of the respondents agreed that the family was the main sources of information on halal food. This finding however is found to be in line with a study by Yusoff and Adzharuddin (2017), whose respondents showed that Muslim families had the highest level of awareness towards halal food. Apparently, the families do not rely information from the Department of Islamic Development Malaysia (JAKIM) alone, but they seek information on halal food products on their own. This finding showed clearly the importance of communication between families in regards to halal food products. This finding also showed the next important source of information on halal food was the internet, as per responded by 105 respondents from USM population. This is true because the respondents selected in this study were mainly university students who use internet as the main medium in searching for information. The study also highlighted that only 34 respondents received information on halal food from the University seminars, followed by 31 respondents from the media and 14 respondents from the community. The low number of respondents reflected that the respondents did not refer to the information obtained from the seminar, community nor the media such as newspapers on information on halal food products. However, 57 respondents exhibited their preference towards obtaining information pertaining to this matter from the television, as visual is the best mode to attract consumers on food in the form of advertisement or news, now accessible via internet. Being university students, they do not have time to ask the society nor refer to the newspapers. But 91 respondents preferred to inquire their fellow lecturers and 75 respondents inquired their friends for such information, as they were always together with their friends in campus.

**Table 2.** Faculty perspective on the knowledge level on Halal food among respondents.

|   | Faculty | Yes | No | Not sure |
|---|---------|-----|----|----------|
| 1. Do you understand about the halal and haram concept?   | FSMP    | 100 | 2  | 16       |
|   | FPSK    | 60  | 3  | 14       |
|   | FSSA    | 42  | 0  | 6        |
|   | FKJ     | 38  | 2  | 4        |
|   | FKSW    | 54  | 0  | 2        |
|   | FPP     | 61  | 1  | 2        |
| 2. I understand about Islamic law on halal food and beverages.                                    | FSMP    | 89  | 11 | 18       |
|   | FPSK    | 53  | 10 | 14       |
|   | FSSA    | 27  | 5  | 16       |
|   | FKJ     | 34  | 3  | 7        |
|   | FKSW    | 50  | 2  | 4        |
|   | FPP     | 58  | 4  | 2        |
| 3. I understand the difference between halal product and halal premise certification.             | FSMP    | 64  | 21 | 33       |
|   | FPSK    | 38  | 18 | 21       |
|   | FSSA    | 22  | 6  | 20       |
|   | FKJ     | 21  | 9  | 14       |
|   | FKSW    | 37  | 6  | 13       |
|   | FPP     | 40  | 4  | 20       |
| 4. halal is something which is allowed by the Shariah and does not impose punishment on the doer. | FSMP    | 75  | 15 | 28       |
|   | FPSK    | 34  | 13 | 30       |
|   | FSSA    | 21  | 3  | 24       |
|   | FKJ     | 23  | 7  | 13       |
|   | FKSW    | 41  | 3  | 12       |

|  | Faculty | Yes | No | Not sure |
|--|---------|-----|----|----------|
|  | FPP     | 49  | 4  | 11       |
| 5. Halal food means food and beverages and their ingredients are allowed in <i>Shariah</i> and fulfils the set conditions. | FSMP    | 110 | 3  | 5        |
|  | FPSK    | 54  | 4  | 19       |
|  | FSSA    | 36  | 1  | 11       |
|  | FKJ     | 36  | 2  | 6        |
|  | FKSW    | 49  | 3  | 4        |
|  | FPP     | 60  | 0  | 4        |
| 6. Food intake from halal sources as well as wholesome is the main factor in choosing food in a Muslim's daily life.       | FSMP    | 100 | 5  | 13       |
|  | FPSK    | 45  | 6  | 26       |
|  | FSSA    | 24  | 0  | 23       |
|  | FKJ     | 27  | 2  | 15       |
|  | FKSW    | 44  | 1  | 11       |
|  | FPP     | 53  | 3  | 8        |

Note: Abbreviations used to represent each faculty in UMS; Faculty of Science and Natural Resources (FSSA); Faculty of Humanities, Arts and Heritage (FKSW); Faculty of Psychology and Education (FPP); Faculty of Food Science and Nutrition (FSMP); Faculty of Engineering (FKJ); Faculty of Medicine and Health Sciences (FPSK).

The total analysis on the level of knowledge among respondents on their diets in Islam were categorised into various faculties. According to Table 2, the results indicated that all members of the faculties at the main campus of University Malaysia Sabah has a high level of knowledge about the concept of halal and haram in halal food, followed by all respondents of the faculties have good knowledge on Islamic law on halal food and beverages. This maybe attributable to courses on halal and haram foods being offered at various faculties in UMS. The study also found that all the faculties can differentiate between product and premise halal certification and understand that halal food means food and beverages and their ingredients are allowed in accordance to *Shariah* and fulfilled the set conditions. All faculties' members were able to define halal food clearly. All faculties' members do agree that food intake from halal sources as well as wholesomeness or *tayyib* are the main factor in choosing food in a Muslim's daily life.

Among the faculties, the Faculty of Food Science and Nutrition represented the highest rank for all items measured by the greatest number of respondents on the knowledge level of halal food and its concept. Second greatest was the Faculty of Psychology and Education, followed by the Faculty of Medical and Health Sciences. Faculty of Science and Natural Resources and Faculty of Engineering ranked among the lowest on their knowledge level of halal food and its concept as per exhibited in Table 2. The reason of the inclination and declination of knowledge depends on the faculty, may be subjected to the intensiveness of courses linked to the halal and haram concept in food being offered semesterly and throughout the academic programme.

**Table 3.** Religious perspective on respondents’ practices on halal food consumption.

|                       |            | Not often | 2–3 times a month | Once a week | 2 times/ more a week |
|-----------------------|------------|-----------|-------------------|-------------|----------------------|
| <b>1. Dates</b>       | Muslim     | 153       | 45                | 8           | 6                    |
|                       | Non-Muslim | 177       | 19                | 1           | 5                    |
| <b>2. Fig</b>         | Muslim     | 180       | 20                | 8           | 4                    |
|                       | Non-Muslim | 174       | 22                | 5           | 1                    |
| <b>3. Pomegranate</b> | Muslim     | 182       | 20                | 6           | 4                    |
|                       | Non-Muslim | 178       | 18                | 4           | 2                    |
| <b>4. Milk</b>        | Muslim     | 34        | 42                | 53          | 83                   |
|                       | Non-Muslim | 38        | 55                | 44          | 65                   |
| <b>5. Honey</b>       | Muslim     | 114       | 65                | 16          | 18                   |
|                       | Non-Muslim | 107       | 55                | 26          | 13                   |
| <b>6. Watermelon</b>  | Muslim     | 68        | 81                | 37          | 26                   |
|                       | Non-Muslim | 74        | 69                | 45          | 14                   |
| <b>7. Pumpkin</b>     | Muslim     | 98        | 86                | 17          | 11                   |
|                       | Non-Muslim | 72        | 36                | 17          | 77                   |

Table 3 reflected that all Muslim and non-Muslim respondents had very low level of eating practices of Islamically recommended (*sunnah*) fruits’ intake frequency as per indicated by not often consumption of dates, figs and pomegranates. This finding has been influenced by the unaffordability of fellow respondents to purchase the fruits at an expensive price and the *sunnah* fruits not easily accessible in the city of Kota Kinabalu. Pumpkin (122 of respondents), watermelon (150 of respondents) and honey (120 of respondents) are quite often consumed like 2–3 times a month and 148 of respondents consume milk is often taken 2 times and more in a week. This is due to the fact that pumpkin, watermelon and honey are easily accessible and affordable in the market and college cafeteria.

**Table 4.** Religious perspective on respondents' practices on the Islamic eating practices.

|   |            | Yes          | No             | Not sure     |
|---|------------|--------------|----------------|--------------|
| 1. When you get stomach ache, do you use honey as one of your treatments. | Muslim     | 19<br>(4.6%) | 170<br>(41%)   | 23<br>(5.6%) |
|   | Non-Muslim | 18<br>(4.3%) | 158<br>(38.2%) | 26<br>(6.3%) |

|  |            | Yes            | No             | Not sure      |
|--|------------|----------------|----------------|---------------|
| 2. Do you wash your hands every time you want to handle food?                    | Muslim     | 207<br>(50%)   | 2<br>(0.5%)    | 3<br>(0.7%)   |
|  | Non-Muslim | 172<br>(41.5%) | 16<br>(3.8%)   | 14<br>(3.4%)  |
| 3. Do you choose food with halal logo when you purchase food at the supermarket? | Muslim     | 206<br>(49.7%) | 2<br>(0.5%)    | 4<br>(0.9%)   |
|  | Non-Muslim | 52<br>(12.6%)  | 98<br>(23.7%)  | 52<br>(12.6%) |
| 4. Do you say "Bismillah" before you eat?  | Muslim     | 208<br>(50.2%) | 1<br>(0.2%)    | 3<br>(0.7%)   |
|  | Non-Muslim | 31<br>(7.5%)   | 148<br>(35.7%) | 23<br>(5.6%)  |
| 5. Sharing food with my friend is my habit.                                      | Muslim     | 168<br>(40.6%) | 22<br>(5.3%)   | 22<br>(5.3%)  |
|  | Non-Muslim | 136<br>(32.8%) | 39<br>(9.4%)   | 27<br>(6.5%)  |
| 6. I always chew my food until it is fine before I swallow it.                   | Muslim     | 131<br>(31.6%) | 37<br>(8.9%)   | 44<br>(10.6%) |
|  | Non-Muslim | 115<br>(27.8%) | 40<br>(9.7%)   | 47<br>(11.4%) |
| 7. Do you buy halal food products since they are widely sold in the market?      | Muslim     | 152<br>(36.7%) | 31<br>(7.5%)   | 29<br>(7%)    |
|  | Non-Muslim | 38<br>(9.2%)   | 112<br>(27%)   | 52<br>(12.6%) |

With regards to the practice of consuming halal food, Table 4 exhibits that 41% (170 respondents) and 38.2% (158 respondents) Muslim and non-Muslim students, respectively, do not use honey as one of the treatments for stomach ache. Both Muslim and non-Muslim students (50%) and (41.5%), wash their hands every time they want to handle food. 49.8% Muslims practice by choosing food with halal logo during food selections at the supermarket, whilst 23.7% non-Muslim students do not practise it. 50.2% Muslims practice by saying “Bismillah” before they eat, whilst 35.7% non-Muslim students do not practise it. This is acceptable as they are not Muslims so they are not obligated to do so.

Both Muslim (40.5%) and non-Muslim students (32.9%) practice by sharing their food with their friends, whilst 31.6% and 27.8% always chew their food until they are fine before swallowing them. Finally, 36.7% Muslim students always buy halal food products since they are widely sold in the market, whilst 27.1% non-Muslim students do not. It is significant that both Muslims and non-Muslims in this study were communal in observing and performing Islamic eating practices such as washing hands before eating, sharing food with friends and families, as well as chewing food until it is fine. However, the non-Muslim

students were less likely on the usage of honey to alleviate illness, choosing food with halal logo as well as saying their prayers before eating.

To the Muslims, nutrition alone is not enough. It has to be halal nutrition as it is their basic rights to have access and to be able to consume food that they choose and are obligated to, as commanded by the Almighty Allah, the Creator. They should emulate the diet of the Prophet Muhammad SAW (halal and *tayyib* food) and the Prophet's Islamic eating practices (hand washing, less eating, moderation, balanced diet and communal/family meals), which have positive effects on their body, brain, mental, personality and health.

Results obtained were statistically analyzed, it proved that knowledge on *sunnah* food was significantly correlated with attitude ( $r = 0.217$ ;  $p < 0.05$ ) and practices ( $r = 0.085$ ;  $p < 0.05$ ) of the UMS students showing positive linear correlations, which confirms that better knowledge can lead to positive attitude and subsequently results in good practices.

## 5. Discussion

It is noted that most respondents have high level of knowledge on *sunnah* food, but do not practice eating them because of their availability and capability of securing them from the Malaysian local market. It takes the government to reduce the costing of the *Sunnah* foods such as olives, pomegranate, figs and dates and to make them available at all times to the population of Eastern Malaysia such as Sabah and Sarawak. Results also showed that knowledge on *sunnah* food was significantly correlated with attitude ( $r = 0.217$ ;  $p < 0.05$ ) and practices ( $r = 0.085$ ;  $p < 0.05$ ) of the UMS students showing positive linear correlations, which confirms that better knowledge can lead to positive attitude and subsequently results in good practices.

The awareness and understanding on halal concept were high among the respondents probably because of the dominance and popularity of the Department of Islamic Development Malaysia (JAKIM) being the authority of halal certification in the country besides the courses on halal and haram in food have been offered in various faculties in UMS.

It is hoped that more people will adhere to practising in consuming *sunnah* food and Islamic eating practices in order to reduce or resolve the criminal rate in consuming alcohol and also the non-communicable diseases.

## 6. Conclusion

This study highlighted that family is the main reference for source of information on halal food products, followed by the internet and lecturer. All faculties at UMS has high level of knowledge on the concept of halal and haram in halal food, followed with Islamic law on halal food and beverages. This maybe influenced by courses on halal and haram foods being offered at various faculties in UMS. This study also showed that although the majority of respondents have high level of knowledge on halal food, but the practices of respondents

consuming the halal food is still minimal. This happens because the fruits such as dates, pomegranates and figs are quite expensive and not easily accessible in the city of Kota Kinabalu. The study also found that the Muslim respondents have positive attitude towards halal food and eating practices, whereby they will always choose halal and *tayyib* food, whenever they want to eat and they dine in congregation. The respondents have satisfactory level on Islamic eating practices such as washing hands before and after eating, saying “Bismillah” before eating and sharing food with friends, but not because it is encouraged by Islam, but because it has become a custom or a part of their daily eating practices. Results also showed that knowledge on *sunnah* food was significantly correlated with attitude ( $r = 0.217$ ;  $p < 0.05$ ) and practices ( $r = 0.085$ ;  $p < 0.05$ ) of the UMS students showing positive linear correlations, which confirms that better knowledge can lead to positive attitude and subsequently results in good practices. The author would like to suggest that future studies can be conducted throughout Sabah as well as Malaysia to better understand the level of knowledge, attitude and practices on Sunnah food and Islamic eating practices.

#### Conflict of Interest

The author would like to declare that she has no conflict of interest associated with this publication. The author received no financial support for the research.

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*Original Research Article*

## Inbound Halal Logistics Practices: A Case of Local Mosques

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**Abstract:** The involvement of multiple supply chain players across the mosque food supply chain has led to halal problems, particularly cross-contamination between halal and haram of raw materials during inbound logistics. The objective of this study is to determine factors that influence inbound halal logistics practices among local mosques. Stratified random sampling was used to select the target local mosques in Peninsular Malaysia. Responses from several mosques' management committees were obtained through self-administrated questionnaires. Descriptive, mean score, factor and logistic regression analyses were performed to analyse the data and to determine the factors that influence inbound halal logistics practices among local mosques. The findings showed that knowledge, dedicated facilities, religious responsibility, management support, financial resources, course and training, and trust were the factors that influenced inbound halal logistics practices among local mosques. This study recommends continuous courses and training on halal logistics should be held by the local mosques and specific guidelines on halal logistics should be made available to ensure inbound halal logistics practices could be performed well by the local mosques.

**Keywords:** food supply chain, halal food, inbound halal logistics, mosques

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## 1. INTRODUCTION

Food safety has become a critical issue in providing safe, clean, and quality food for consumers. Food safety scandals are commonly linked to issues such as food adulteration, substitution, and ingredients fraud, usually to increase manufacturers' profits (Ali *et al.*, 2016; Grimm *et al.*, 2014). The involvement of entire players in the food supply chain is important in providing safe, clean, quality as well as halal food products for consumers. The movement of halal food products along the supply chain requires an in-depth understanding of logistics, utilization of

dedicated facilities, and trust between supply chain partnerships (Abd Kadir *et al.*, 2016). In the Islamic religion, clean, safe, wholesome, and halal food is compulsory for Muslims. The word halal refers to 'permissible' or 'lawful' (Azam, 2016), which is the major concern of Islamic dietary law and obligation for all Muslims (Rezai *et al.*, 2012). All food is halal except a few mentioned in the al-Quran such as pork, blood, carrion, and those animals slaughtered without the name of Allah SWT (Abd. Latif, 2011). According to Demirci *et al.* (2016), halal is referred to as food that is free from swine's flesh, blood, carrion, animals not slaughtered according to Islamic laws and alcoholic drinks. While Lau *et al.* (2016) described that halal (lawful) foods are free from any components that Muslims are prohibited from consuming as mentioned in the Islamic holy book, al-Quran, Hadith and other sources of Islamic law. Halal food must be free from all parts of swine and its derivative as mentioned in the Islamic law and regulations.

Halal food is mentioned specifically by the al-Quran and the Sunnah (Hussaini, 1993; Muhammad Nafik & Ratuasari, 2012). The halal food concept is not only confined to the ingredients in food products, but also includes that anything related to halal food and non-food products must comply with the Islamic rules. This includes the production and distribution processes along the food supply chain activities before the halal products reach consumers for their consumption. According to Ahmad Tarmizi *et al.* (2013), regardless of halal food or non-food products, logistics activities must fulfil the best halal practices as logistics is one of the important parts of the halal supply chain. Considering the importance of halal logistics activities in the local and international markets, Malaysia has established the Malaysia *Halalan Toyibban* Assurance Pipelines (MS2400:2010) as the guidelines for industry players in the logistics sector. The Malaysia *Halalan Toyibban* Assurance Pipelines (MS2400:2010) comprises of MS2400-1:2010 (Part 1) - Halal transportation, MS2400-2:2010 (Part 2) - Halal warehousing, and MS2400-3:2010 (Part 3) - Halal retailing (Department of Standards Malaysia, 2010).

The development of the halal food industry does not involve the point of resources and raw ingredients only, but also including the handling activities. In particular, the Malaysian halal standard guideline for halal food preparation (MS1500:2004) provides comprehensive guidelines covering the sources of halal food and drinks, slaughtering, product processing, handling and distribution, product storage, display and serving, hygiene, sanitation and food safety, as well as, packaging and labelling (HDC, 2012). Not only the guideline provides a reference to serving halal, clean, safe, and wholesome food to consumers, but it also prescribes the packaging, storage, and transportation that should be physically separated from any other non-halal food or any things that are decreed najis (animal or things that are not permissible such as pigs and its derivatives, blood and carrions (Halal Research Council, 2020) by Shariah law to reduce cross-contamination risk with non-halal things (Tieman & Ghazali, 2014). Hence, *halalan toyyiban* processes are indeed necessary along the food supply chain.

As part of the supply chain players, mosques have a huge responsibility to serving food that is safe, clean, quality as well as halal to the community. Mosque in many definitions given is known as a place for Muslims worship (MuslimSpeak, 2009). In modern terminology, a mosque is not only a place for prayers, but also known as community centres. It also could be a place for celebration, *da'wah*, meetings, deliberations, medical care well as a place for education (Newsroom, 2015). Mohamed *et al.* (2014) also described that mosque is not only a place of worship, but also a place to gain knowledge, communal gathering for the Islamic community, holding various religious ceremonies and rituals, and a place where religious studies take place. In the Islamic religion, mosques are viewed as political, economic, and social institutions (Collins, 2011). In Malaysia, mosques are mainly used as facilities for social events such as receptions, talks and religious events. Since many activities are held in the local mosques, there is provision for food during certain events, thus, *halalan toyibban* food will be one of the biggest concerns. Halal problems arise during preparation, handling, processing, or transportation of foods and beverages for events by the mosque management committees and other supply chain players like food suppliers and logistics service providers. This is because some food suppliers and logistics service providers are still lacking in knowledge and understanding of handling logistics activities according to halal logistics standards (Ahmad Tarmizi *et al.*, 2013). It is even more worrisome if the mosque management committees who are responsible for selecting the food suppliers are also lacking in knowledge of halal logistics requirements.

Notably, there is a small number of local mosques that have their catering services, but most of local mosques in Malaysia do not prepare foods and beverages during events or ceremonies at the mosque; rather the mosque will outsource such activities to other food suppliers such as caterers and restaurants. Regularly, the local mosques will choose the food suppliers and logistics service providers to supply and deliver foods and beverages to the mosque during the event or ceremony. The food suppliers then buy the raw materials and prepare the food at their premises and have it delivered to the mosque either by logistics service providers or themselves. As this is the case, the local mosques cannot attest whether the suppliers adhere to the *halalan toyibban* standards for inbound logistics activities such as receiving, storing, and transportation of the raw materials being used.

Generally, some raw materials are mostly imported from foreign countries, the ability to trace the origins of raw materials is limited (Ali & Suleiman, 2017), thus creating some difficulties for the local mosques to guarantee the raw materials are *Halalan toyibban*. The involvement of multiple supply chain players across the food supply chain will lead to various halal problems. It also led to the high possibility that cross-contamination between halal and haram of raw materials, food ingredients, and processed products occurred (Ruslan *et al.*, 2018). Hence, the halal status of raw materials' compliance to the halal standards during inbound halal logistics will be

questionable. Despite the raw materials, mosque management should ensure devices, utensils, and processing aids used in the processing and preparing halal food are easy to clean, complying with inbound halal logistics practices (DSM, 2010). In light of the above discussions, this study aims to determine factors that influence inbound halal logistics practices among local mosques.

## 2. Literature Review

According to Fahimnia and Molaei (2011), logistics are described as a network of organizations, people, activities, information, and resources involved in the physical flow of products from suppliers to customers. Logistics activities are also dealing with getting the right quantity and quality of materials (or services) to the right place at the right time, for the right client, and at the right price (Sadjady, 2011). Further, Jeschonowski *et al.* (2009) described logistics as a part of supply chain management that plans and implements related information between the point of origin and the point of consumption to meet customers' requirements. Since logistics is at the heartbeat of the supply chain, upgrading conventional logistics operations to halal logistics operations will be a huge advantage among logistics practitioners. Logistics activities can be divided into two flows known as inbound and outbound. According to Ingram (2018), inbound logistics is referred to as logistics activities such as transport, storage, and delivery of goods that come into a business, while outbound logistics is referred to as logistics activities that going out from a business.

Halal logistics is a new approach to avoid contamination of perishables, raw materials, and food products during distribution activities (Ahmad Tarmizi *et al.*, 2014). This new logistics innovation involved three main types of activities, namely transportation, warehousing, and retailing as classified according to the Malaysia *Halalan Toyibban* Assurance Pipelines - MS2400:2010 (DSM, 2010). Halal logistics includes the physical activities which provide a set of data for communication and management between continuous links along the food supply chain as aligned with the Shariah concept and from the aspects of policymakers, service providers, and the implication of halal logistics practices (Kamarudin *et al.*, 2012; Tieman, 2011).

According to Halal Industry Development Corporation (HDC) (2012), an institution under the Ministry of International Trade and Industry Malaysia (MITI), halal logistics is referred to as a basic principle of halal in logistics to ensure segregation of halal cargo from non-halal cargo, to avoid cross-contamination and to ensure that the halal logistics system is aligned to the expectation of Muslim consumers. Halal logistics is regarded as a new application of Shariah law to logistics activities in a way that will eventually protect halal integrity along the whole supply chain and follow requirements as stated by the Shariah law (Ahmad Tarmizi *et al.*, 2014; Jaafar *et al.*, 2011; Tieman, 2010).

Malaysia's halal authorized bodies such as the Department of Standards Malaysia (DSM) and the Department of Islamic Development Malaysia (JAKIM) have established guidelines for halal logistics to provide practical guidance for food industry practitioners and food logistics service providers. It is also to serve as a basic requirement for halal food products and food trade or business in Malaysia. *Halalan toyibban* pipeline assurance system had highlighted necessary halal links between producers of products and cargo with consumers to ensure products or cargo are delivered from one custodian to another as per halal requirements. Besides, the importance of halal guidelines is to preserve the halal integrity of the products, goods, and cargo (Abd Latif, 2011). Halal guidelines also could help industry practitioners and other stakeholders reducing the halal risks along the food industry supply chain.

Knowledge is described as a feeling or expression known by a person or a group of peoples (Che Amar *et al.*, 2011). Knowledge is also referred to as expertise and skills gained by a person or a group of people through a theoretical or practical understanding of a subject and it influences intention through attitude (Abd Rahman *et al.*, 2015). Many studies revealed that knowledge has a positive influence on attitudes, but only a few have investigated the effect of knowledge on attitudes towards halal food (Aziz & Chok, 2013). Niu (2010) suggested that knowledge is the key to sustaining competitiveness in the market. In implementing proper halal logistics, industry practitioners need to understand halal logistics objectives, requirements, rules, and regulations (Tieman, 2009). Thus, knowledge of halal logistics concept is important for effective inbound halal logistics.

According to Tieman *et al.* (2012), halal logistics vulnerability can be avoided in the supply chain by having dedicated infrastructure, such as dedicated halal warehouse, and dedicated halal cold storage and transport. As one of the halal logistics objectives is to avoid cross-contamination thus, the mixing of halal and non-halal products in the same cold room is not allowed. The Department of Standards Malaysia (2005) described that dedicated equipment and facilities that are used for non-halal products cannot be used for halal products to uphold halal supply chain integrity.

Previous studies highlighted the possibility of cross-contamination with non-halal products during transportation activities due to some reasons i.e. high cost of logistics operations, different halal certification bodies, and inadequate information and halal logistics experts (Ahmad Tarmizi *et al.*, 2013; Zailani *et al.*, 2015). This can be reduced to a minimum level, if halal food producers have their own transportation and make their delivery to the end consumers (Ab Talib *et al.*, 2015; Ahmad Tarmizi *et al.*, 2013). Besides, the existing dedicated management support to handle the halal food products will reduce the risk of cross-contamination, avoid any human mistake and help to protect the integrity of halal food supply chain (Jaafar *et al.*, 2011).



In the Islamic religion, there are two types of foundation concepts that should be mastered by all Muslims namely *Fardhu Ain* and *Fardhu Kifayah*. *Fardhu Kifayah* explains the maslahah of the religion and worldly matters, which are commandments in *syarak* and it has to be performed by a group of *mukallaf* (an accountable person). This is enough to fulfil the commandment of maqasid by *syarak* and enough to free others from the sin, if it is not performed. While *Fardhu Ain* is specifically for every individual, however, the commandment and obligation are for all *mukallaf* generally (Tarmizi, 2020). Thus, there is a strong interrelated of religious responsibility of halal food supply chain players to perform accountable halal practices (*Fardhu Kifayah*) as Muslim consumers are responsible to follow Islamic dietary (*Fardhu Ain*).

Bonne and Verbeke (2006) described that Muslims must follow a set of dietary laws intended to advance their well-being. As the halal industrial players or responsible parties that provide and serve halal food products to the Muslim community, ensuring all resources of raw materials and inbound activities to follow Islamic rules as one of *Fardhu Ain* or also can be described as main religious responsibility. Based on Adi and Adawiyah (2018), religiosity is one of the relevant values in the business ecosystem. It helps to encourage confidence in the safety of products and promotes both confidences in the halal industry and stability of the halal business. Increasing attention to the importance of religiosity in business and world economic development helps the development of the halal ecosystem. Religion responsibilities appear as a relevant reason to uphold halal logistics and strengthen the entire halal food supply chain.

Good management is to ensure employees received enough support to practice halal in their day-to-day activities. Ahmad Tarmizi *et al.* (2014) explained the management plays a role in accommodating the implementation of halal logistics process through the provision of financial, materials, human resources and shaping the organizational context to make the organization more adaptive to the new halal logistics system. Tan *et al.* (2012) suggested that management roles are important to ensure halal integrity among local halal industry players. Besides the industry players, the management should pay intention to social responsibility and support Islamic institutions such as mosques in upholding and fulfilling halal practice preparation, apart from religious responsibility.

However, according to Stirpe *et al.* (2015), the implementation of new practices will be effective, if they are well accepted by the management. Both management and employees are required to support each other to achieve the objectives of inbound halal logistics (Ahmad Tarmizi *et al.*, 2014). An acceptance is positively associated with intention and behaviour responses (Dix *et al.*, 2016). Hence, full acceptance of new practices among supply chain players towards inbound halal logistics will ensure proper halal practices.

Financial resources make up most of the production factors from a business perspective (Siano *et al.*, 2010). Hence, financial resources are a critical factor in providing enough requirements for dedicated facilities for inbound halal logistics. However, as revealed by Ahmad Tarmizi *et al.* (2014) that financial resources are one barrier to implement proper halal logistics. Zailani *et al.* (2017) further described that lack of financial resources may lead to many halal food SMEs unable to perform total halal logistics activities.

However, mosques as a non-profit organization depend on the external environment for generating financial resources to operate (Mohamed *et al.*, 2014). With a restricted budget and lack of financial resources, local mosque management also might face the same challenges of implementing total inbound halal logistics. Thus, a good financial resource in providing dedicated equipment and facilities is important in ensuring proper inbound halal logistics practices.

Based on the halal standard for halal food handling (MS1500:2009), there is need for training people who are involved in halal food preparation. Besides halal food providers, there is also other knowledge that could be gained through courses and training for a better understanding of halal food handling. Training on halal management will ensure that the levels of knowledge and skill meet the halal and human capital standards among the halal industry players (Hashim & Shariff, 2016). Attending enough halal training is vital in ensuring an adequate supply of competent personnel to meet the long-term requirement of the industry (Pahim *et al.*, 2012).

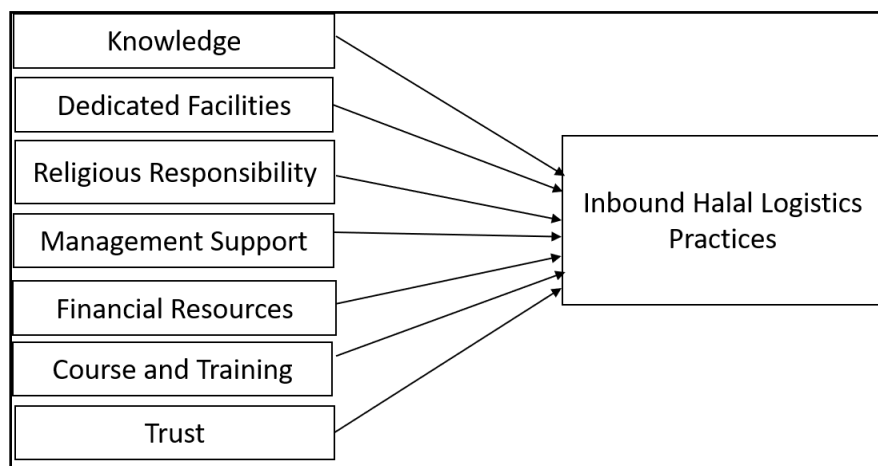
Blalock (2019) suggested relevant course and training are important to gain knowledge and it should be handled by established and qualified instructors. The course and training will improve the trainee's ability to handle the real situation (Bauerle *et al.*, 2016) and improve the quality of the organizations' operational practices (Bächmann *et al.*, 2019). According to Ahmad Tarmizi *et al.* (2014), upper-level management needs to provide comprehensive training to other levels of management to comprehend the risks and understand their roles in performing halal logistics.

Trust is very important in supply chain information (Ellram *et al.*, 1999). A good relationship between supplier and buyer is important in supporting supply chain activities and thus, creating trust (Duffy & Fearn, 2009; Tieman & Ghazali, 2013). Based on Niu *et al.* (2012), trust is an important factor in an industry supply chain. Trust can be a valuable capital to improve cooperation and coordination of economic interaction, enhance organization competitive advantages, and help individuals cope with environmental challenges. Kadir *et al.* (2016) described that trust is a willingness to rely on a trading partner who has a confidence, which can reduce the cost of a transaction, reduce the extensive need for a formal contract, and facilitate an organization's supply chain plan. Despite halal certification and trusted halal logo, trust between

buyer and supplier is needed to ensure halal raw materials are supplied, accordingly (Ali *et al.*, 2017).

### 3. Methodology

This study attempted to determine factors that influence inbound halal logistics practices among local mosques. Hence, as depicted in Figure 1, the conceptual framework of inbound halal logistics practices among local mosques and factors that influence their practices was established to answer the stated research objective. Seven independent variables (factors) were adapted from previous studies (Abd. Rahman *et al.*, 2015; Ab Talib *et al.*, 2015; Kadir *et al.*, 2016; Pahim *et al.*, 2012;) namely; knowledge, dedicated facilities, religious responsibility, management support, financial resources, course and training, and trust. Meanwhile, the dependent variable for this study was the inbound halal logistics practices.



**Figure 1.** Conceptual framework of factors influencing local mosques inbound halal logistics practices. Source: Abd Rahman *et al.* (2015), Ab Talib *et al.* (2015), Pahim *et al.* (2012), and Kadir *et al.* (2016)

This study used a quantitative approach with a total sample of 466 mosques. Stratified random sampling was used to select the local mosques in Peninsular Malaysia, which were represented by the mosque management committees. Data and responses from the mosque management committees were obtained through self-administrated questionnaires using a structured questionnaire. The structured questionnaire consisted of relevant questions mainly questions on inbound halal logistics knowledge as well as questions on factors that influence halal logistics practices among local mosques. Most of the statements to determine respondents' perceptions on halal logistics were established based on 5-point Likert scales: 1-strongly disagree; 2-disagree; 3-neither agree nor disagree; 4-agree; 5-strongly agree. These statements were mainly used in factor analysis, aiming at extracting factors that influence inbound halal logistics practices

among local mosques. Data collected were analysed using several statistical analyses such as descriptive , mean score, factors, and logistic regression analyses. Descriptive analysis was used to analyse local mosque profiles, while mean score analysis was used to measure the inbound halal Halal logistics knowledge based on scoring table adapted from Appiah *et al.* (2011) and Vaiappuri *et al.* (2012). Twelve (12) statements related to the inbound halal logistics knowledge were established with two choices of answer namely; 1-No and 2-Yes. For each correct answer, a score of one (1) was given, while an incorrect answer was given a zero (0) score. Based on the score (Table 1), a cumulative score between 7 to 12 indicates a high knowledge level, while a cumulative score between 0 to 6 indicates a low knowledge level of respondents.

**Table 1.** Knowledge level score.

| Knowledge level | Score |
|-----------------|-------|
| High            | 7–12  |
| Low             | 0–6   |

Source: Adapted from Appiah *et al.* (2011) and Vaiapurri *et al.* (2012)

Based on studies of Hassan *et al.* (2015), Lammertyn *et al.* (2000) and Vaiappuri *et al.* (2012), relevant analyses were used to further analyse the data. Factors analysis was carried out to determine a group of factors towards practicing inbound halal logistics by local mosques. Meanwhile, logistic regression analysis was employed to determine the most influential factors of inbound halal logistics practices among local mosques. Table 2 shows the coding system used for dependent and independent variables in logistic regression analysis.

**Table 2.** Coding system for inbound halal logistics.

| Variables                | Coding                                  |
|--------------------------|---|
| Knowledge level          | 0 = Low knowledge<br>1 = High knowledge |
| Dedicated facilities     | Dichotomous (Factor Score)              |
| Religious responsibility | Dichotomous (Factor Score)              |
| Management support       | Dichotomous (Factor Score)              |
| Financial resources      | Dichotomous (Factor Score)              |
| Course and training      | Dichotomous (Factor Score)              |
| Trust                    | Dichotomous (Factor Score)              |

Note: DV= Inbound halal logistics practices

Equation (1) was established for logistic regression analysis as follows:

$$Y = \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \varepsilon \tag{1}$$

Where;

$Y$  = Inbound halal logistics practices

$\beta_1 \dots \beta_7$  = regression coefficient

$X_1$  = Level of knowledge

$X_2$  = Dedicated facilities

$X_3$  = Religious responsibility

$X_4$  = Management support

$X_5$  = Financial resources

$X_6$  = Course and training

$X_7$  = Trust

$\varepsilon$  = Error

#### 4. Results and Discussions

##### *Mosques Profiles*

A summary of mosques profiles is listed in Table 3. A total of 466 mosques located in Peninsular Malaysia participated in this study with a majority of them was categorized as Masjid Jamek (35.1%, 164). The other mosques types were categorized as Masjid Kampung (34.5%, 161), Masjid Daerah (15.7%, 73), Masjid Negeri (7.3%, 34), Masjid Institut (4.3%, 20), while the remaining were small mosques (3%, 14). The number of qariah is referred to as the Muslim community who actively involved in mosque activities and living nearby mosque areas. The results showed that 50% (233) of local mosques have between 400 to 1,000 qariah, while 44.8% (209) of local mosques have less than 400 qariah. The remaining 5.2% (24) of local mosques have more than 1,000 qariah. The majority 54.7% (255) of local mosques revealed that about 6-10 events were held in a year, while 198 (42.5%) and 13 (2.8%) local mosques had more than 10 and less than 5 events in a year, respectively. The majority of the local mosques (65.6%, 306) took the responsibility to prepare the meal on their own, while only 160 (34.3%) of the local mosques outsourced it to catering services.

**Table 3.** Mosques Profiles.

| <b>Profile</b>          | <b>Frequency (n)</b> | <b>Percentage (%)</b> |
|-------------------------|----------------------|-----------------------|
| <b>Type of mosque</b>   |                      |                       |
| Masjid Negeri           | 34                   | 7.3                   |
| Masjid Institut         | 20                   | 4.3                   |
| Masjid Daerah           | 73                   | 15.7                  |
| Masjid Jamek            | 161                  | 34.5                  |
| Masjid Kampung          | 164                  | 25.2                  |
| Others (small mosques)  | 14                   | 3.0                   |
| <b>Number of qariah</b> |                      |                       |
| ≤ 400                   | 209                  | 44.8                  |
| 401–1,000               | 233                  | 50.0                  |

|                                    |            |            |
|------------------------------------|------------|------------|
| >1,000                             | 24         | 5.2        |
| <b>Number of events per year</b>   |            |            |
| ≤5                                 | 13         | 2.8        |
| 6–10                               | 255        | 54.7       |
| >10                                | 198        | 42.5       |
| <b>Food preparation for events</b> |            |            |
| Outsource (catering services)      | 160        | 34.3       |
| Prepared by the mosques            | 306        | 65.6       |
| <b>Total</b>                       | <b>466</b> | <b>100</b> |

**Knowledge Level on Inbound Halal Logistics Practices**

A total of 12 statements were established concerning knowledge on inbound halal logistics practices among local mosques. Table 4 shows the responses of the respondents on each statement based on ‘Yes’ or ‘No’ answers. Most of the statements were adapted from studies of Tieman (2009) and Abd. Latif (2011).

**Table 4.** Statements of knowledge on inbound halal logistics practices.

| No | Statement   | Yes  |     | No   |     |
|----|---|------|-----|------|-----|
|    |   | %    | n   | %    | n   |
| 1  | Knowledge of halal logistics is important in creating halal compliance.   | 94.4 | 440 | 5.6  | 26  |
| 2  | MS-2400-1:2010 is the Malaysia Standard for halal logistics.  | 1.7  | 8   | 98.3 | 458 |
| 3  | Inbound logistics are important to ensure the food product is guaranteed halal.   | 86.5 | 403 | 13.5 | 63  |
| 4  | Halal integrity must be preserved during logistics activities along the food supply chain.  | 80.9 | 377 | 19.1 | 89  |
| 5  | Inbound halal logistics is a process of procurement, movement, storage, and handling the raw materials, product ingredients, and finished products. | 76.6 | 357 | 23.4 | 109 |
| 6  | The objective of halal logistics is to ensure halal integrity along the food supply chain.  | 74.7 | 348 | 25.3 | 118 |
| 7  | Dedicated workers are required during handling inbound halal logistics.   | 59.2 | 275 | 40.8 | 191 |
| 8  | Halal logistics is to ensure that no cross-contamination during transporting halal foods or products.   | 93.1 | 433 | 6.9  | 33  |
| 9  | Halal logistics involves activities such as transportation, warehousing, and retailing.   | 13.5 | 63  | 85   | 403 |
| 10 | Segregation of halal and non-halal items is required for inbound halal logistics.   | 85.8 | 400 | 14.2 | 66  |
| 11 | Containers that are used for inbound logistics of non-halal products need to have ritual cleansing before it is used for halal products.            | 97.9 | 456 | 2.1  | 10  |
| 12 | Halal logistics is to avoid any cross-contamination in food handling during logistics activities to ensure the food is safe to eat.                 | 91.8 | 427 | 8.2  | 39  |

Note: n = 466

Two scores were assigned to the respondents based on if they choose ‘No’ and ‘Yes’. For each correct answer, a score of one (1) was given, while an incorrect answer was given a zero (0) score. Mean score analysis was used to measure knowledge level with two scales of indicator

namely; high level (7-12) and low level (0-6) adapted from Appiah *et al.* (2011) and Vaiapurri *et al.* (2012) (Refer to Table 1). The respondents who scored between 7-12 were considered to have high knowledge in inbound halal logistics practices, while the respondents who scored between 0-6 showed low knowledge in inbound halal logistics practices.

Based on Table 5, the results revealed that 81.9% (382) of local mosques have high knowledge of inbound halal logistics practices, while the remaining 18.1% (84) local mosques have low knowledge of inbound halal logistics practices. Hashim and Shariff (2016) described that adequate knowledge of halal related matters would provide a clear understanding to perform halal practices. Ahmad Tarmizi *et al.* (2020) further indicated that knowledge is crucial when adopting or implementing halal logistics as new practices in an organization.

**Table 5.** Knowledge level on inbound halal logistics practices.

| Level (score) | Frequency (n) | Percentage (%) |
|---------------|---------------|----------------|
| High (7-12)   | 382           | 81.9           |
| Low (0-6)     | 84            | 18.1           |
| <b>Total</b>  | <b>466</b>    | <b>100</b>     |

***Factors that Influence Inbound Halal Logistics Practices***

Factor analysis was conducted to extract factors from inbound halal logistics practices among local mosques. The result of Kaiser-Meyer-Olkin (KMO) in Table 6 showed 0.782 which was above 0.6 and based on Kaiser (1974), this shows that the variances among the variables are estimable. The Bartlett’s test of sphericity showed significant at 1% level of significance, showing that the factor analysis with variables was appropriate (Raykov & Marcoulides, 2012).

**Table 6.** KMO and Bartlett’s Test.

|   |         |
|---|---------|
| Keiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) | 0.782   |
| Bartlett’s Test of Sphericity                         |         |
| Approx. Chi-Square                                    | 8.974E3 |
| df  | 465     |
| Sig   | 0.000   |

Cronbach’s alpha for the reliability test showed  $\alpha = 0.822$ , indicating all the 25 statements are valid and reliable. The results in Table 7 showed that the cumulative percentage of variance for the six (6) factors was 52.550%. The six (6) factors extracted were labelled as ‘dedicated facilities’, ‘religious responsibility’, ‘management support’, ‘financial resources’, ‘course and training’, and ‘trust’. The first factor that influenced the local mosques towards inbound Halal logistics practices was labelled as ‘dedicated facilities’ with an eigenvalue of 5.476 and Cronbach’s  $\alpha$  of 0.891. This factor comprised of five sub-variables, which explained a total variance of 18.254%. The second factor was labelled as ‘religious responsibility’ with an

eigenvalue of 2.463 and Cronbach's  $\alpha$  of 0.696. This factor comprised five sub-variables, which explained a total variance of 8.809%. The third factor comprised of four sub-variables was labelled as 'management support' with an eigenvalue of 2.205 and Cronbach's  $\alpha$  of 0.721, which explained a total variance of 7.349%. The fourth and fifth factor was labelled as 'financial resources' and 'course and training', comprised of four sub-variables, respectively. The fourth factor explained a total variance of 6.850% with an eigenvalue of 2.055 and Cronbach's  $\alpha$  of 0.722, while the fifth factor explained a total variance of 6.168% with an eigenvalue of 1.850 and Cronbach's  $\alpha$  of 0.717. The last factor was labelled as 'trust', comprised three sub-variables with an eigenvalue of 1.536 and Cronbach's  $\alpha$  of 0.716, and explained a total variance of 5.119%.

Logistic regression analysis was used to determine the factors that influence inbound halal logistics practices among local mosques. Table 8 summarizes seven variables tested using logistic regression analysis. All variables were significant at 1% and 5% levels of significance, respectively. The -2 Log-Likelihood produced a value of 368.603 for the final model iteration and is considered desirable. The value of Cox and Snell  $R$  square was 0.386, whereas the value of the Nagelkerke  $R$  square value was 0.527. The Wald values of logistic regression analysis showed how important each of the significant factors affects the inbound halal logistics practices among the local mosques. The bigger the Wald value, the higher the effect of that variable in determining inbound halal logistics practices among the local mosques. The direction of the relationship for factors that increase and decrease the likelihood of the answer 'Yes' could be interpreted from the positive sign of values and estimated coefficient values. The exponential (B) values were used in the equation to calculate the probability of a case falling into a specific category (Pallant, 2005). Based on the results, knowledge level was the variable that showed the most effect with a Wald value of 10.270, while trust appeared as the variable that showed the least effect with a Wald value of 4.587.

All significant variables had estimated coefficient values that showed the existence of a positive relationship. The results revealed the estimated coefficient for the knowledge level showed a positive relationship. This indicated that the mosque management committees, who have high knowledge of inbound halal logistics were 2.643 times likely to practice proper inbound halal logistics as compared to the mosque management committees with low knowledge of inbound halal logistics. As addressed by Abd Rahman *et al.* (2015) that knowledge influences the skills and intention attitude of a person, hence high knowledge of inbound halal logistics among the mosque management committees leads to proper inbound halal logistics practices.



**Table 7.** Factors extracted from local mosques inbound halal logistics practices.

| Statement  | Factor loading | Eigenvalue | % of variance | Cumulative % of variance | Cronbach's alpha |
|--|----------------|------------|---------------|--------------------------|------------------|
| <b>Factor 1: Dedicated Facilities</b>  |                |            |               |                          |                  |
| 1. Proper equipment for handling, storage, and transportation of halal products can prevent the occurrence of cross-contamination. | 0.921          | 5.476      | 18.254        | 18.254                   | 0.891            |
| 2. The mosque needs to have adequate equipment to enhance inbound halal logistics.   | 0.883          |            |               |                          |                  |
| 3. Transportation is an important asset that can minimize the contamination of food.   | 0.794          |            |               |                          |                  |
| 4. The importance of ritual cleansing is to ensure all equipment is kept clean and dedicated.                                      | 0.764          |            |               |                          |                  |
| 5. Containers use in preparing food at the mosque must undergo a proper ritual cleansing.  | 0.725          |            |               |                          |                  |
| <b>Factor 2: Religious Responsibility</b>  |                |            |               |                          |                  |
| 1. The mosque always chooses suppliers who adhere to halal standards.  | 0.784          | 2.463      | 8.809         | 27.064                   | 0.696            |
| 2. The mosque should be provided with procedures as guidelines for selecting halal suppliers.                                      | 0.744          |            |               |                          |                  |
| 3. The mosque is responsible for ensuring that the raw materials delivered are halal.  | 0.713          |            |               |                          |                  |
| 4. It is the responsibility of the mosque to serve food that <i>halalan toyyiban</i> to the mosque congregation.                   | 0.676          |            |               |                          |                  |
| 5. Food products supplied by the Muslims are guaranteed halal.   | 0.614          |            |               |                          |                  |
| <b>Factor 3: Management Support</b>  |                |            |               |                          |                  |
| 1. The mosque management committees should give full support to the established procedure of selecting halal products.             | 0.852          | 2.205      | 7.349         | 34.412                   | 0.721            |
| 2. Collectively support of the mosque management committees will encourage proper practices of inbound halal logistics.            | 0.827          |            |               |                          |                  |
| 3. Inbound halal logistics should be monitored by the mosque management committees to ensure its effectiveness.                    | 0.749          |            |               |                          |                  |

|  |       |       |       |        |       |
|--|-------|-------|-------|--------|-------|
| 4. The mosque management committees should have the same goals to successfully practice halal logistics.   | 0.636 |       |       |        |       |
| <b>Factor 4: Financial Resources</b>   |       |       |       |        |       |
| 1. The mosque is willing to invest more in ensuring that the products received are <i>halalan toyyiban</i> .                                     | 0.817 | 2.055 | 6.850 | 41.263 | 0.722 |
| 2. Enough financial resources will help the mosque to ensure products or materials received have followed halal logistics standards.             | 0.669 |       |       |        |       |
| 3. The mosque will ensure raw materials purchased is <i>halalan toyyiban</i> although expensive if the mosque provides a lot of provisions.      | 0.584 |       |       |        |       |
| 4. The mosque can adopt a more secure supplier selection guideline if it has enough financial resources.   | 0.544 |       |       |        |       |
| <b>Factor 5: Course and Training</b>   |       |       |       |        |       |
| 1. Course and training related to halal logistics would help in the implementation of halal logistics among the mosque management committees.    | 0.910 | 1.850 | 6.168 | 47.430 | 0.717 |
| 2. The mosque management committees should provide courses on halal logistics.   | 0.831 |       |       |        |       |
| 3. The frequency of courses on halal logistics will strengthen the knowledge of halal logistics.   | 0.773 |       |       |        |       |
| 4. Course and training are very important to improve knowledge of halal logistics practices.   | 0.771 |       |       |        |       |
| <b>Factor 6: Trust</b>   |       |       |       |        |       |
| 1. The mosque management committees should trust that raw materials and food ingredients supplied by the suppliers are <i>halalan toyyiban</i> . | 0.849 | 1.536 | 5.119 | 52.550 | 0.716 |
| 2. Raw or semi-processed materials that are sold by non-Muslims with halal logos are halal-trusted goods.  | 0.764 |       |       |        |       |
| 3. The local mosque management should build a good relationship with local suppliers to procure halal raw materials.                             | 0.660 |       |       |        |       |

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The estimated coefficient for religious responsibility and course and training showed positive relationships, indicating the mosque management committees, who had a high religious responsibility showed 0.613 times likely to practice proper inbound halal logistics as compared to the mosques' management committees, who had a low religious responsibility. The local mosque management committees should comply with the Muslim dietary law to show obligation and responsibility towards the Islamic religion (Bonne & Verbeke, 2007). While the mosque management committees, who have attended halal courses and training showed 0.641 times likely to engage in proper inbound halal logistics, as compared to the mosque management committees who have not attended halal courses and training. As mentioned by Pahim *et al.* (2012), attending enough halal training is important to supply adequate knowledge and skills of competent local mosques to meet the inbound halal logistics practice requirements.

The result also revealed that the estimated coefficient for dedicated facilities, financial resources, management support, and trust showed a positive relationship. This showed that the local mosques which used dedicated facilities are 0.674 times likely to practice proper inbound halal logistics, as compared to the local mosques that did not have dedicated facilities. The existing dedicated facilities to handle halal food preparation, will reduce the risk of cross-contamination, reduce human mistakes, and help to protect the integrity of the halal food supply chain (Jaafar *et al.*, 2011). The local mosques that have good financial resources showed 1.483 times more likely to practice proper inbound halal logistics, as compared to the local mosques with inadequate financial resources. As argued by Zailani *et al.* (2017), lack of financial resources could lead to the inbound halal logistics not being performed well by an organization. The result also showed that the local mosques that have good management support showed 0.721 times more likely to practice proper inbound halal logistics, as compared to the local mosques that did not have good management support. This result was similar to Stirpe *et al.* (2015) that proper inbound logistics practices will be effective, if they have good support from the management. Finally, the local mosques that have high trust in their suppliers showed 1.349 times more likely to practice proper inbound halal logistics than those local mosques that had low trust in their suppliers. Trust builds a good relationship between supplier and buyer, which is important in supporting supply chain activities (Tiemann & Ghazali, 2013). Hence, trust helps the local mosques to secure resources of halal raw materials for a longer period. Table 8 summarizes the overall results of the logistic regression analysis of this study.

**Table 8.** Logistic Regression Analysis.

| Variables                | Estimated coefficient ( $\beta$ ) | Standard error           | Wald   | Significance | Exponential (B) |
|--------------------------|-----------------------------------|--------------------------|--------|--------------|-----------------|
| Knowledge level          | 0.972                             | 0.303                    | 10.270 | 0.001*       | 2.643           |
| Religious responsibility | 0.489                             | 0.157                    | 9.685  | 0.002*       | 0.613           |
| Course and training      | 0.445                             | 0.157                    | 8.073  | 0.004*       | 0.641           |
| Dedicated facilities     | 0.394                             | 0.149                    | 6.960  | 0.008*       | 0.674           |
| Financial resources      | 0.394                             | 0.134                    | 8.657  | 0.003*       | 1.483           |
| Management support       | 0.328                             | 0.150                    | 4.801  | 0.028**      | 0.721           |
| Trust                    | 0.299                             | 0.140                    | 4.587  | 0.032**      | 1.349           |
| Constant                 | 18.085                            | 2.983                    | 36.744 | 0.000        | 0.000           |
| -2 Log-Likelihood        | 368.603                           | Nagelkerke R             |        |              | 0.527           |
| Cox and Snell R square   | 0.386                             | Hosmer and Lemeshow Test |        |              | 0.000           |

Note: DV: Inbound halal logistics practices  
 \*significant at 1% level of significance  
 \*\*significant at 5% level of significance

Based on the results, the final logistic regression model is shown in Equation 2 as follows: -

$$\text{Inbound halal logistics practices} = 18.085 + 0.972 (\text{Knowledge level}) + 0.489 (\text{Religious responsibility}) + 0.445 (\text{Course and training}) + 0.394 (\text{Dedicated facilities}) + 0.394 (\text{Financial resources}) + 0.328 (\text{Management support}) + 0.299 (\text{Trust}) + \epsilon$$

### 5. Conclusion

The results revealed that most local mosques have high knowledge of inbound halal logistics, indicating proper practices of inbound halal logistics among the local mosques. The local mosques need to consider all the factors that have influenced proper inbound halal logistics practices such as knowledge, dedicated facilities, religious responsibility, management support, financial resources, course and training, and trust. This study provides valuable information to enhance inbound halal logistics practices in handling halal food among the local mosques in Malaysia. It is recommended that the local mosques to organize continuous halal course and training among mosque management committees to strengthen their knowledge of halal logistics. It is also recommended that the local mosques should have specific guidelines on inbound halal logistics practices to ensure effective implementation of halal logistics. The importance of the guidelines is to avoid human mistakes, reduce the possibility of cross-contamination with non-halal products, and safeguard the halal integrity of the food. Hence, the responsibility to protect halal integrity along the halal food supply chain is not only played by the producers and industry practitioners, but all Muslims must also take active roles in ensuring all food supply chain players practice halal logistics for the food to be served as *halalan toyyiban* food.

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### Conflict of Interest

The author declares no potential conflict of interest with respect to the research, authorship, and/or publication of this article.

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# Detection of Edible Bird's Nest Using Fourier Transform Infrared Spectroscopy (FTIR) Combined with Principle Component Analysis (PCA)

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**Abstract:** Edible bird's nest (EBN) is rich in nutrients and health benefits; making it one of the Chinese delicacies over the centuries. However, due to the overpriced and limited supply of EBN, it is being adulterated with other cheaper versions. Therefore, the aim of this study is to establish a method of detecting adulterants in EBN using Fourier transform infrared spectroscopy (FTIR) as the spectrum fingerprinting analysis together with principal component analysis (PCA). Spiked samples have been developed for *Tremella* fungus and porcine gelatine at the concentrations of 1%, 5%, 10%, 20% and 30% (w/w). The FTIR method combined with PCA analysis was able to detect the adulteration of porcine gelatine and *Tremella* fungus in the sample of adulterated EBNs at low concentration of 1% (w/w). The simple approach employing FTIR combined with PCA may provide a useful tool for EBN detection.

**Keywords:** Edible bird's nest (EBN), authentication, adulteration, Fourier transform infrared spectroscopy (FTIR), principal component analysis (PCA)

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## 1. Introduction

Edible bird's nest (EBN) is a delicacy and known to provide essential health benefits including enhancing beauty of a person. It has been used as a traditional medicine for the past centuries. EBN are mainly from the species of *Collocalia* and *Aerodramus* which can be found in South East Asian countries such as Indonesia, Malaysia, Philippines, Thailand, Vietnam and small part of southern China (Marcone, 2005). The three most common cave nests are *A. fuciphagus*, *A. maximus* and *C. esculent* (Looi & Omar, 2016). The swiftlet birds

specifically the male partners produce saliva to build the nest during the breeding season. The feather (also seaweed and mosses) and vegetation were bonded together and cemented using their saliva secreted from their salivary gland. When exposed to air, the sticky secretion hardens forming the bird's nest (Kang *et al.*, 1991). The nest is built in a half-bowl shape from the strands of the solidified saliva thus, enhancing the capabilities of withstanding the bird's eggs and hatchlings (Sidq Ramji *et al.*, 2013).

Known as one of the health-promoting foods in China, which contributes to delicious and scrumptious taste, the composition of EBN has been studied making it among the world's expensive foods. Norhayati *et al.* (2010), stated that the main nutrients in EBN by *A. fuciphagus* including crude protein, sialic acid and high level of minerals such as calcium, sodium, magnesium, potassium phosphorus, iron, zinc and copper. The potential health effects of EBN have been studied over the years to have biological effects other than anti-ageing properties. One of the earliest discoveries is an epidermal growth factor (EGF)-like activity, which helps in proliferation, differentiation and target cell's survival (Herbst, 2004; Kong *et al.*, 1987).

The price of the EBN skyrocketed because of the high demand especially from China. According to The Star newspaper in 2017, the processed EBN has soared until RM 10,000/kg from RM 7,000/kg depending on the grade, type and origin. As for the unprocessed bird's nest, the price has increased from RM 1,300/kg to RM 2,700/kg (Wong, 2017). This explained the authentication issues that stirred up among the consumers. In an article by Wong (2013), the authentication of EBN can be of the fake ones, with adulterants and contaminated with bird droppings or any harmful materials to consumers. The common adulterants in EBN can be classified into Type-I and Type-II. Type-I are solid polysaccharides and polypeptides, whereas Type-II are water-soluble saccharides, polypeptides and salts (Shim *et al.*, 2016).

Various studies have been conducted in detecting adulterants in EBN using different methods with different percentage limit detections. These include polymerase chain reaction (PCR) (Guo *et al.*, 2014; Quek *et al.*, 2018), enzyme-linked immunosorbent assays (ELISAs) (Nur Azira *et al.*, 2016), infrared (IR) spectroscopy (Guo *et al.*, 2014; Shi *et al.*, 2017) and gas chromatography/liquid chromatography-mass spectrometry (GC/LC-MS) (Yang *et al.*, 2014). Fourier transform infrared spectroscopy (FTIR) is one of the applications of mid-IR spectroscopy, which can obtain spectra from solid, liquid or gas samples (Paul & Genesca, 2013). The IR beam was directed onto an optically dense crystal with high refractive index at certain angle. With minimum sample preparations needed, it is known as one of the fastest sampling, higher reproducibility and can minimize user to user spectral variations (Sousa *et al.*, 2018). However, FTIR produces a complex spectrum, which contains various variables. Therefore, a chemometric methods of principle component analysis (PCA) could allow the characteristics of the sample relationships and classified as a group of same characteristics (Granato *et al.*, 2018). Many studies done have reported the excellent combination of FTIR

and PCA in food analysis due to feasibility of the results. For instance, detection of lard in “rambak” crackers and determination of thermal effect on oxidation of extra virgin olive oil was successfully determined by PCA (Erwanto *et al.*, 2016; Selaimia *et al.*, 2017). Thus, the integration approach has become a powerful tool and reliable for the meaningful results. This study aims to use FTIR combined with PCA in the detection of adulteration in EBN.

## 2. Materials and Methods

### Materials

Two types of EBN house nest (*Collocalia sp.*) and cave nest (*Aerodramus sp.*) were purchased from Malaysia and Indonesia respectively. *Tremella* fungus (TRE) (dried) was purchased from the local supermarket in Genting Highlands, Pahang, Malaysia. Porcine skin gelatine (P) (G2500-100G, #058K0109) and bovine skin gelatine (B) (G9391-100G, #126K0051) were purchased from Sigma-Aldrich (St. Louis, USA). Monosodium glutamate (MSG) powder was purchased from the local supermarket in Selangor, Malaysia. Five different EBN samples are tabulated in Table 1.

**Table 1.** Samples of EBN

| No. | Sample name     | Origin    | Species               | Type       | Abbreviation |
|-----|-----------------|-----------|-----------------------|------------|--------------|
| 1   | Cave nest       | Indonesia | <i>Aerodramus sp.</i> | Cave nest  | CN           |
| 2   | Blood cave nest | Indonesia | <i>Aerodramus sp.</i> | Cave nest  | BC           |
| 3   | Orange nest     | Malaysia  | <i>Collocalia sp.</i> | House nest | ON           |
| 4   | White nest 1    | Malaysia  | <i>Collocalia sp.</i> | House nest | HOUSE        |
| 5   | White nest 2    | Malaysia  | <i>Collocalia sp.</i> | House nest | WW           |

### Spiked Sample Preparation

The spiked samples were prepared following the procedure described by Jamalludin and Tukiran (2018), with a slight modification. The EBN samples were grinded using pestle and mortar. TRE was blended using Panasonic MX-SM1031 (240V~50Hz) until it turned into fine powders, while the P powder was directly taken from the bottle. The spiked samples of TRE and P were prepared in five concentrations which were 1%, 5%, 10%, 20% and 30% (w/w). After that, ON, BC, TRE and P were sieved into finer powders using a 1 mm sieve to make a constant particle size. The ON powders were weighed using a precision analytical balance. The ON samples were transferred into Eppendorf tube and were mixed using Advanced IR Vortex Mixer (Velp Scientifica, Italy) with the speed of 20x100 rpm for 1 minute. The ON samples were kept in an airtight bag for further analysis. These steps were also applied for BC, TRE and P.

### FTIR

The FTIR was performed according to Jamalludin and Tukiran (2018). The infrared spectra were analysed in the range between 4000–650  $\text{cm}^{-1}$  with Thermo Scientific Nicolet iS50 FT-IR (ThermoFisher Scientific, Waltham, USA). The OMNIC™ Spectra Software (Version 9.2.106) was used to perform FTIR analysis, which gives clear visual data including spectral identification tools, interpretation algorithms and scientific documentation. The

sample background was run before placing samples into the crystals. Accurately weighed amounts of sample powder were placed on the crystal diamond and making sure the crystal was all covered. All spectra were recorded in absorbance with the resolution of 4  $\text{cm}^{-1}$  at an average of 32 scans. Each sample was analyzed individually in duplicate. The sample was removed using a dry tissue and the surface of FTIR spectrometer was cleaned with methanol before running the sample background.

### ***Statistical Analysis***

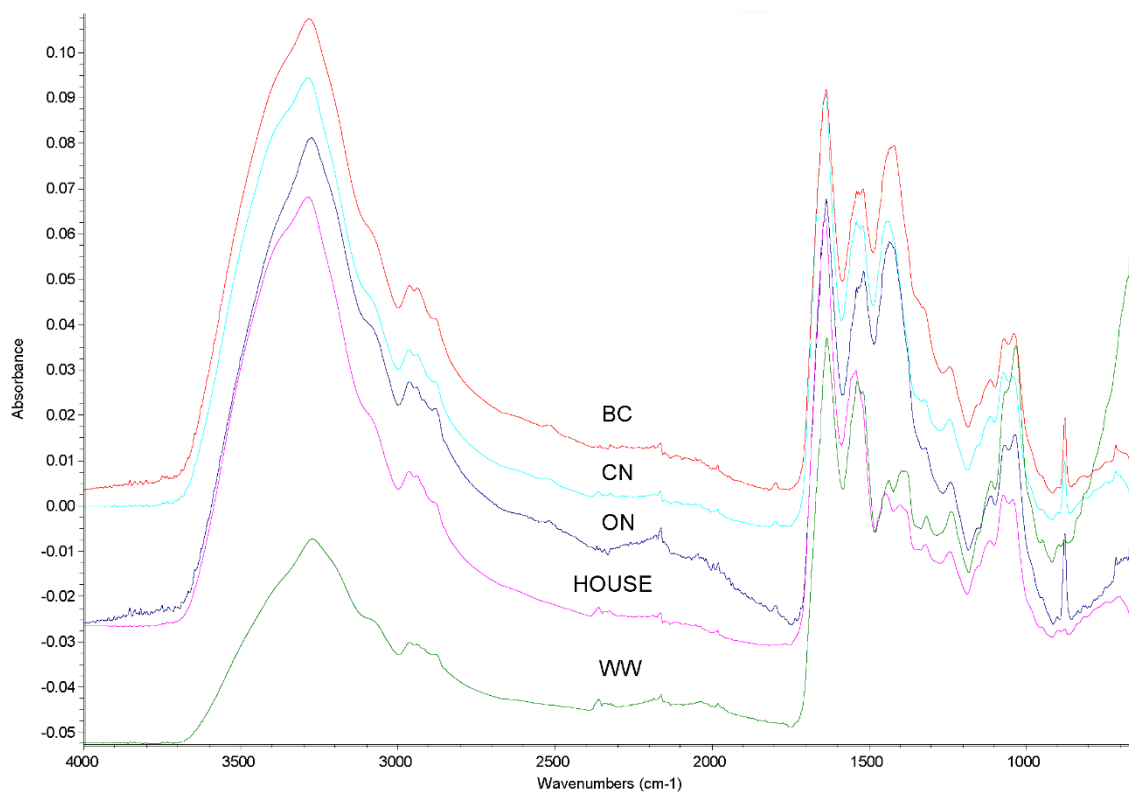
The quantitative data were analyzed using Unscrambler® v9.7 CAMO Software AS and the classification of data were performed using PCA. Score plot and loading plot were the outcomes produce by PCA that shows the variability of FTIR data. Fifteen sample variables of wavenumber ( $\text{cm}^{-1}$ ) of 1633  $\text{cm}^{-1}$ , 1602  $\text{cm}^{-1}$ , 1518  $\text{cm}^{-1}$ , 1516  $\text{cm}^{-1}$ , 1444  $\text{cm}^{-1}$ , 1442  $\text{cm}^{-1}$ , 1434  $\text{cm}^{-1}$ , 1415  $\text{cm}^{-1}$ , 1336  $\text{cm}^{-1}$ , 1247  $\text{cm}^{-1}$ , 1248  $\text{cm}^{-1}$ , 1241  $\text{cm}^{-1}$ , 1029  $\text{cm}^{-1}$ , 875  $\text{cm}^{-1}$ , and 704  $\text{cm}^{-1}$  were chosen for the PCA, since these wavenumbers ( $\text{cm}^{-1}$ ) have either similarities or differences in spectrum between each sample.

## **3. Results**

### ***FTIR Spectra***

#### ***Pure EBN***

Five types of EBN spectral were compared as shown in Figure 1. The region between 3600-3100  $\text{cm}^{-1}$  can be compensated for the water (O-H stretching) like those reported by Hamzah *et al.* (2013). This indicated that water molecules were present in EBN although the samples were in powdered form. Between the region of 2100 and 2160  $\text{cm}^{-1}$ , only ON and HOUSE samples produced a significant peak at that region. Region 876-875  $\text{cm}^{-1}$  was significant for all CN and almost disappeared in HOUSE (Guo *et al.*, 2017). Different wavenumber produced from the absorbance peaks might be contributed from asymmetric stretching vibrations of  $\text{CH}_2$  (2934  $\text{cm}^{-1}$ ),  $\text{CH}_2$  stretching lipids (2855  $\text{cm}^{-1}$ ), C=O triglycerides (1745  $\text{cm}^{-1}$ ), stretching vibration of C=O bond of amide I (1654  $\text{cm}^{-1}$ ) and N-H bending vibration for amide II band (1545  $\text{cm}^{-1}$ ), bending vibration  $\text{CH}_2$  in polysaccharides (1430  $\text{cm}^{-1}$ ), symmetric stretching vibration of COO- groups of fatty acids and amino acids (1400–1300  $\text{cm}^{-1}$ ), phosphate vibration of nucleic acids (1235  $\text{cm}^{-1}$ ), C-O stretching vibration coupled with C-O bending of the C-OH groups of carbohydrates (1045  $\text{cm}^{-1}$ ), CH out-of-plane bending vibrations (1000–700  $\text{cm}^{-1}$ ) (Guo *et al.*, 2017; Hamzah *et al.*, 2013; Movasaghi *et al.*, 2008). All samples exhibit almost similar spectrum in the fingerprint region  $>1500$   $\text{cm}^{-1}$  thus showed the presence of similar compounds.



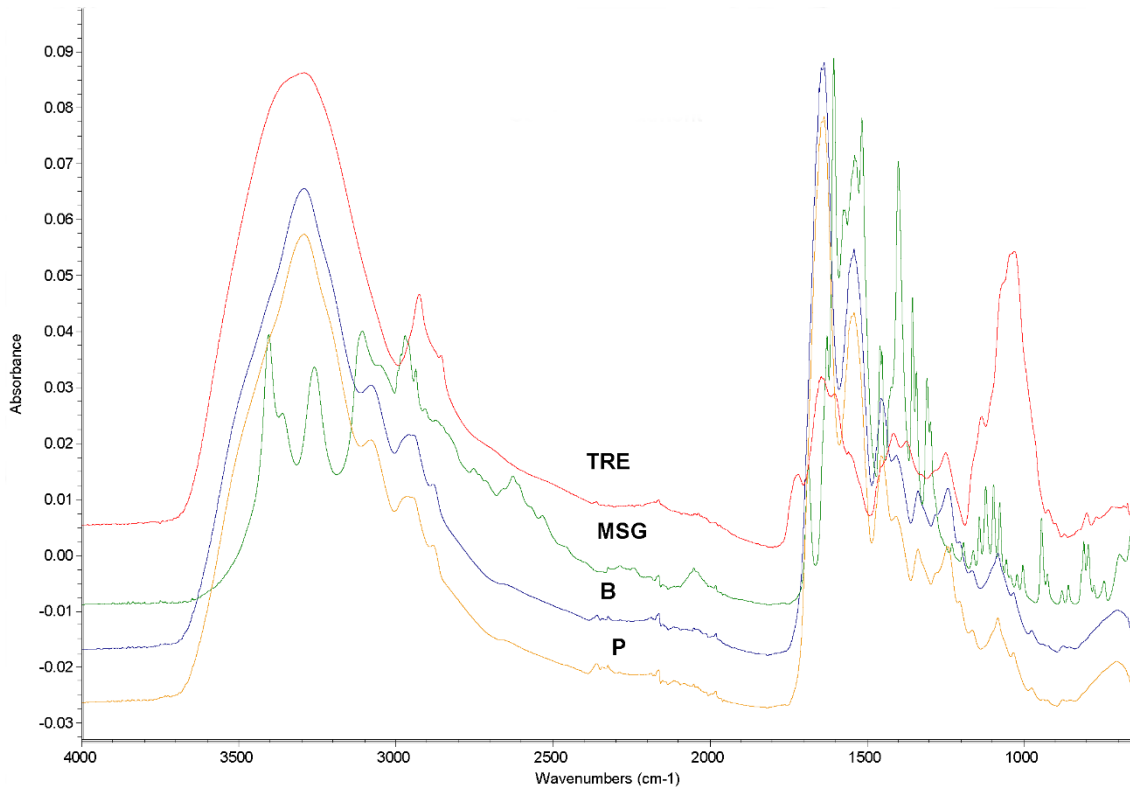
**Figure 1.** Overlapped spectrum of cave nest (*Aerodramus* sp.) and house nest (*Collocalia* sp.). BC: blood cave nest, CN: cave nest; ON: orange nest; HOUSE: white nest 1; and WW: white nest 2

Based on Figure 1, the peaks between  $1635\text{--}1634\text{ cm}^{-1}$  were accounted for amide I and  $1539\text{--}1515\text{ cm}^{-1}$  were accounted for amide II. The peaks  $1445\text{--}1434\text{ cm}^{-1}$  and  $1417\text{--}1393\text{ cm}^{-1}$  might indicate the presence of carboxylic (COOH) and aldehydes (CH=O), respectively. The peak at  $1070\text{--}1030\text{ cm}^{-1}$  were the resulting vibrations of polysaccharides (C-O bonds), which has proven the presence of carbohydrates in EBN as reported by Hamzah *et al.* (2013) and Set (2012). As shown, there were no obvious spectral features that can be recorded, except for the varieties of different spectrum in the region between  $1800\text{--}700\text{ cm}^{-1}$ . The results for amide I and amide II were similar from the reported value  $1600\text{--}1700\text{ cm}^{-1}$  and  $1560\text{--}1335\text{ cm}^{-1}$  (Hamzah *et al.*, 2013; Shi *et al.*, 2017).

### Adulterants

Four adulterants namely, TRE, MSG, P and B were compared. Figure 2 exhibits that TRE was significant at  $1415\text{ cm}^{-1}$  (COOH bend or stretch), while MSG produced the highest number of spectra, which was easily being distinguished at  $2050\text{ cm}^{-1}$  (C=C stretch),  $857\text{ cm}^{-1}$  and  $655\text{ cm}^{-1}$  among other adulterants. The exhibited spectrum was similar with the reported spectrum in National Institute of Standards and Technology (NIST) Chemistry WebBook (2018). P and B can be distinguished at  $1634\text{--}1633\text{ cm}^{-1}$  (C=O stretch),  $1337\text{--}1336\text{ cm}^{-1}$  (C-N bond) and  $1081\text{ cm}^{-1}$  (C-O bond), which were not shown in other adulterants. Hence, it can be concluded that, P and B showed similar spectrum with different absorbance values. Hashim *et al.* (2010) and Eryilmaz *et al.* (2017) also mentioned that P and B can be found

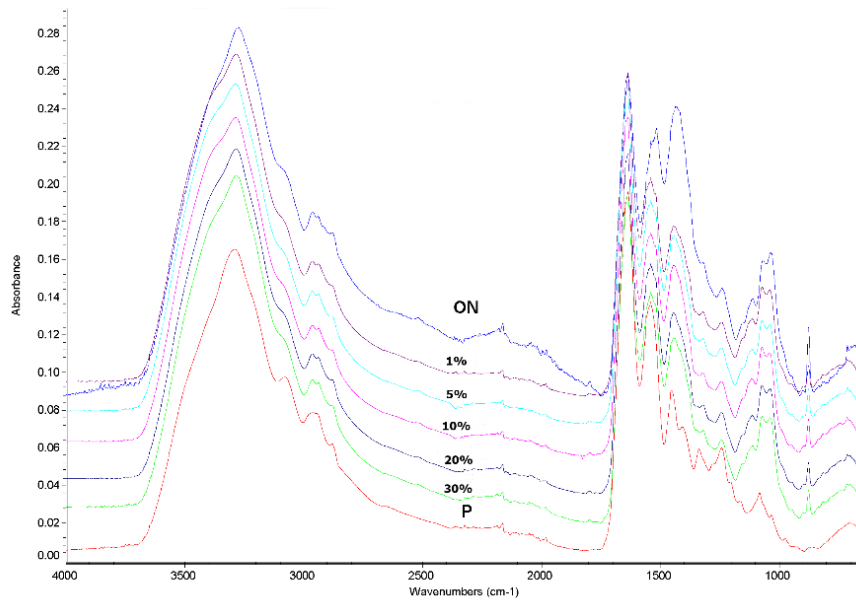
similar in region  $1656\text{--}1644\text{ cm}^{-1}$  (amide I),  $1560\text{--}1335\text{ cm}^{-1}$  (amide II) and  $1240\text{--}670\text{ cm}^{-1}$  (amide III).



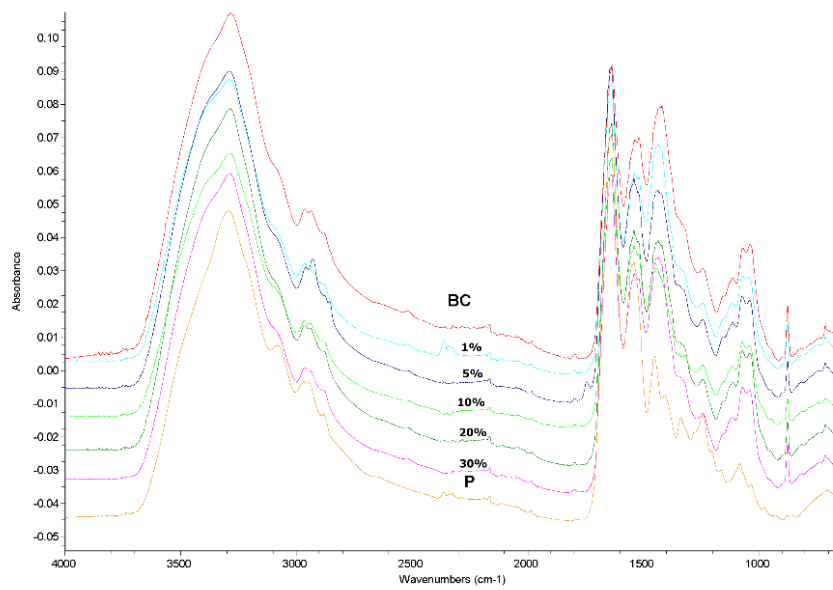
**Figure 2.** The overlapped spectrum of different types of adulterants. TRE: *Tremella* fungus; MSG: monosodium glutamate; B: bovine gelatine; and P: porcine gelatine.

### *Adulterated spiked samples*

Figure 3 (a) and (b) represent the P adulterant that can be denoted at  $1539\text{ cm}^{-1}$ ,  $1453\text{--}1444\text{ cm}^{-1}$  and  $1081\text{--}1070\text{ cm}^{-1}$  for all P percentages in ON and BC. Meanwhile, the adulteration of TRE in ON and BC exhibited similar spectrum with the samples of the pure BC and ON illustrated by Figure 4 (a) and (b). Thus, further analysis using PCA is required to identify the adulteration of P and TRE in ON and BC.



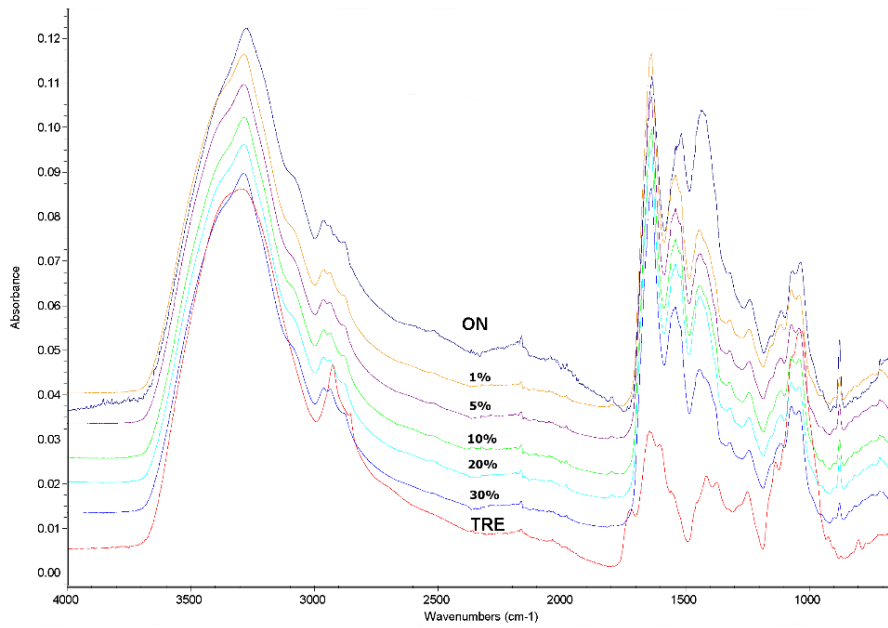
(a)



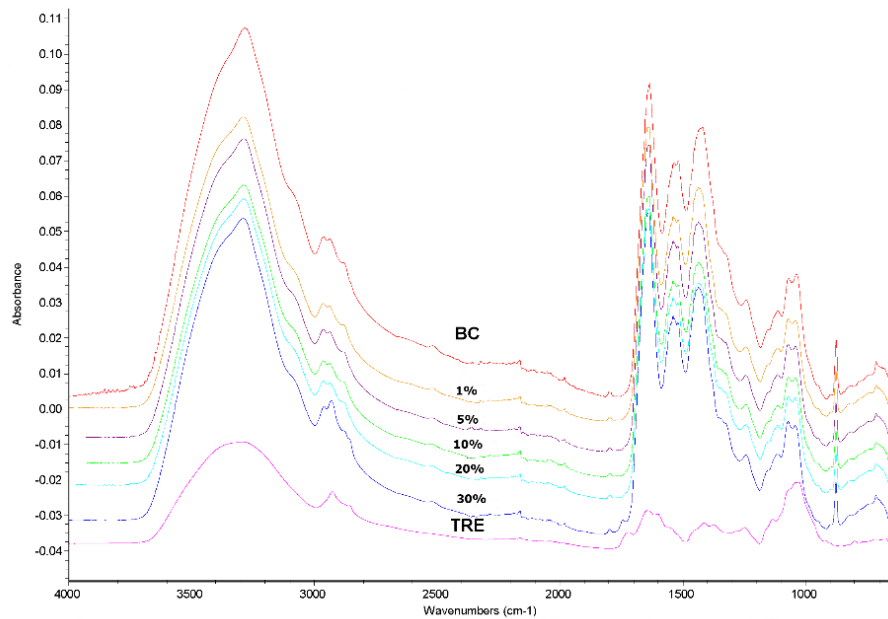
(b)

**Figure 3.** The overlapped spectrums of edible bird's nest (EBN) adulterated with different percentage of porcine gelatine (P). (a) Orange nest (ON); and (b) blood cave nest (BC).





(a)



(b)

**Figure 4.** The overlapped spectrums of edible bird’s nest (EBN) adulterated with different percentage of *Tremella fungus* (TRE). (a) Orange nest (ON); and (b) blood cave nest (BC).

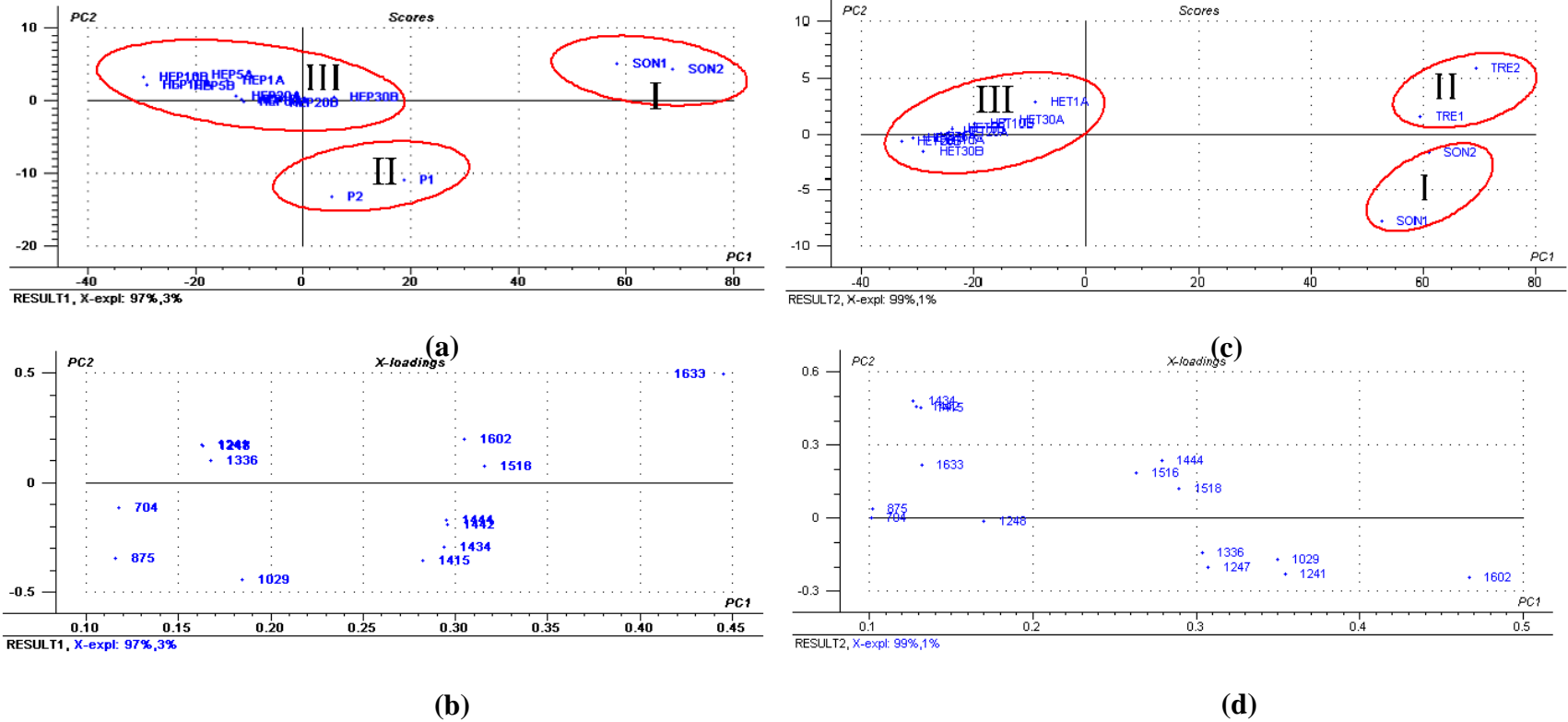
***Principle Component Analysis (PCA)***

The PCA is one of the chemometric analysis, which utilizes low dimensional space (principle components) of the new latent variables from a larger dimensional data. The first

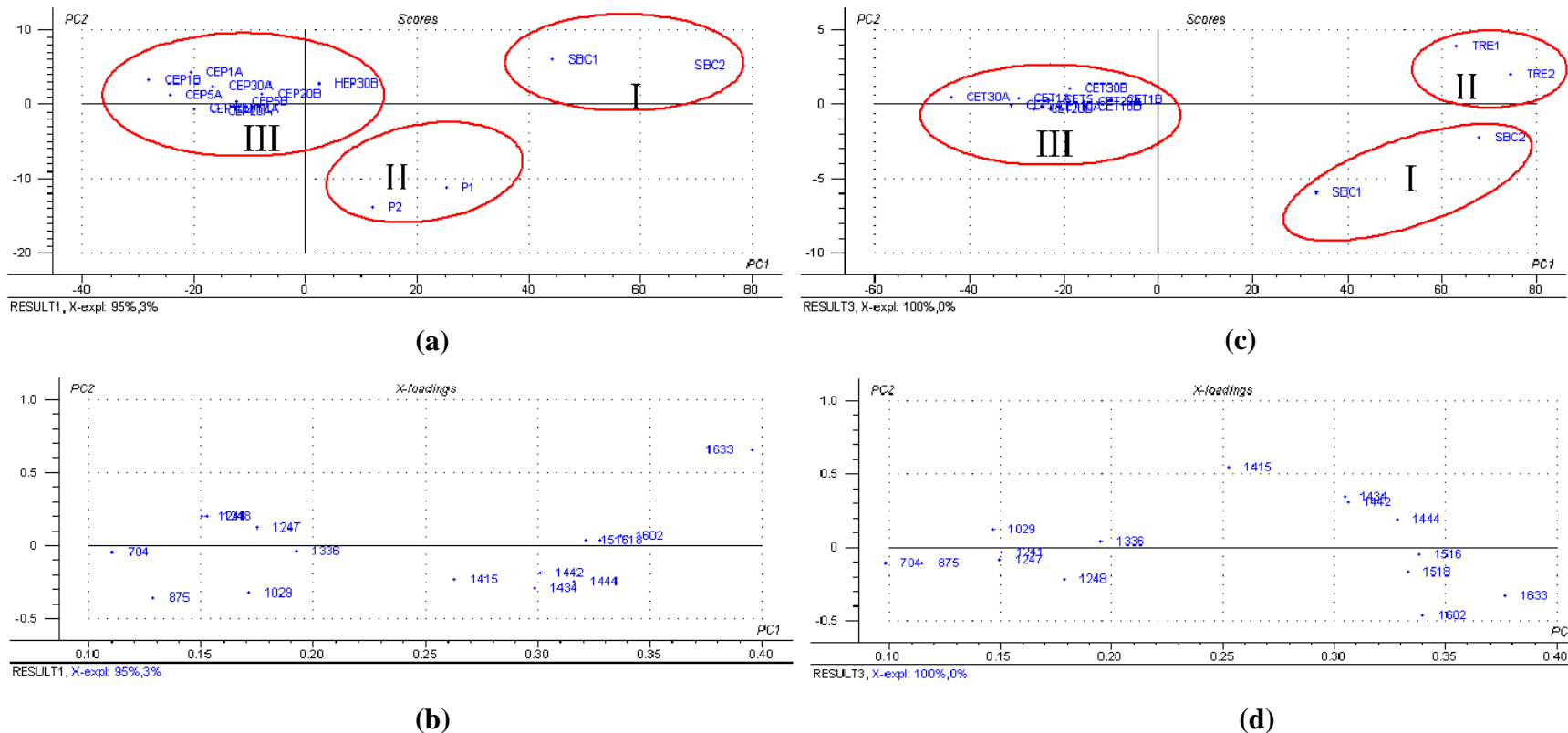
principle components (PC1) represented the highest variance in a data set and the second highest data set was grouped in the second principle components (PC2). The number of variables can be reduced by this method, which gives the graphical representation of the data. The results were presented in terms of loading plots, which showed the contribution of the variables to a given PC and the score plots, which showed the projections of the objects and the similarities can be measured among them (Massart *et al.*, 1997; Norhayati *et al.*, 2010). Fifteen variables were chosen to represent significance for each sample. Those wavenumber variables of  $1633\text{ cm}^{-1}$ ,  $1602\text{ cm}^{-1}$ ,  $1518\text{ cm}^{-1}$ ,  $1516\text{ cm}^{-1}$ ,  $1444\text{ cm}^{-1}$ ,  $1442\text{ cm}^{-1}$ ,  $1434\text{ cm}^{-1}$ ,  $1415\text{ cm}^{-1}$ ,  $1336\text{ cm}^{-1}$ ,  $1247\text{ cm}^{-1}$ ,  $1248\text{ cm}^{-1}$ ,  $1241\text{ cm}^{-1}$ ,  $1029\text{ cm}^{-1}$ ,  $875\text{ cm}^{-1}$ , and  $704\text{ cm}^{-1}$  had shown either significant similarities or differences between each sample.

In Figure 5 and Figure 6, the PCA could differentiate between the samples when ON and BC adulterated with P and TRE. The samples were classified into three groups in the PCA, where the group I represents the pure samples of ON or BC, group II represents either P or TRE and group III represents the adulterated samples with 1%, 5%, 10%, 20% and 30% of P or TRE. Figure 5 (a) and (c) of ON samples adulterated with P and TRE show that 97% and 99% of the variation were accounted for PC1 and 3% and 1% of the variation were accounted for PC2, respectively. Meanwhile, based on the Figure 6 (a) and (c), the results of BC samples adulterated with P and TRE show that PC1 accounted for about 95% and 100% of the variation and PC2 accounted for about 3% and 0% of the variation, respectively. Both score plots of P and TRE samples were located at the positive side of X-axis, however, P was located below X-axis, while TRE was located above X-axis. Hence, the PCA in both ON and BC samples was able to detect the grouping, similarities and differences of the input data even at low adulterants concentration at 1%.

In addition, the variables that were located farther from the origin of PCA loading plots have strong contributions for the PCA model (Marina *et al.*, 2010). Figure 5 (b), 6 (b) and 8 (d) showed that the wavenumbers of  $1602\text{ cm}^{-1}$  and  $1633\text{ cm}^{-1}$  have high contributions, indicating the separation of the samples between the adulterants and EBN samples. However, the loading plot of ON adulterated with TRE in Figure 5 (d) showed that  $1633\text{ cm}^{-1}$  weakly contributed to the model, however,  $1602\text{ cm}^{-1}$  contributes a strong influence on the variation of the samples. This might suggest that both adulteration in ON and BC with P and TRE can be differentiated through the variables that have strong contribution for the PCA model.



**Figure 5.** PCA grouping of orange nest (ON) adulterated with porcine gelatine (P) and *Tremella* fungus (TRE). (a and b) Score plots and loading plots for PCA grouping of orange nest (ON) adulterated with porcine gelatine (P) (c and d) Score plots and loading plots for PCA grouping of orange nest (ON) adulterated with *Tremella* fungus (TRE). Group I: orange nest; group II: porcine gelatine or *Tremella* fungus; group III: adulterated orange nest with porcine gelatine or *Tremella* fungus percentage.



**Figure 6.** PCA grouping of blood cave nest (BC) adulterated with porcine gelatine (P) and *Tremella* fungus (TRE). (a and b) Score plots and loading plots for PCA grouping of blood cave nest (BC) adulterated with porcine gelatine (P) (c and d) Score plots and loading plots for PCA grouping of blood cave nest (BC) adulterated with *Tremella* fungus (TRE). Group I: blood cave nest; group II: porcine gelatine or *Tremella* fungus; group III: adulterated blood cave nest with porcine gelatine or *Tremella* fungus percentage

#### 4. Conclusion

Fourier transform infrared spectroscopy (FTIR) is a reliable, fast and easy to use fingerprinting technique that can be applied for food authentication. The Principal Component Analysis (PCA) analysis can further concluded and differentiated EBN, adulterants and different concentration of adulterations for porcine (P) and *Tremella* fungus (TRE) in the edible bird's nest (EBN). This study showed that the presence of P and TRE adulterants in orange nest (ON) and blood cave nest (BC) can be detected as low as 1% (w/w) concentration through the significant distinction of the grouping in the PCA. The wavenumbers of  $1602\text{ cm}^{-1}$  and  $1633\text{ cm}^{-1}$  show high contribution to the separation between the adulterants and EBN samples. To conclude, FTIR with the combination of PCA is a reliable tool in authenticating EBN.

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**Conflicts of Interest:** The authors declare no conflict of interest.

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*Review Article*

## Halal antimicrobials in food: A review on prospects and challenges of antimicrobials from animal sources

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**Abstract:** Food antimicrobial agents (FAA) provide the first food defence system against pathogens for processed food products. In addition, they function as an antioxidant in preventing colour and taste changes for food safety and quality. Muslim consumers are concerned about the source of FAA which may contain non-permissible ingredients according to Islam including pig and unslaughtered permissible animal sources. They also raise concerns about the increasing risk of toxicity when the FAA is consumed and the possibility of the FAA rendering organoleptic effect on the food. The application of the FAA protects the food from microbial contamination and indirectly combats emerging devastating diseases. Hence, halal FAA (HFAA) can be introduced so that Muslim consumers can accept FAA usage. Generally, HFAA is categorised according to ingredient sources such as animal, plant, bacteria, or synthetic origins. There are doubts on the halal status of animal-origin FAA as the source might be originating from pig, unslaughtered animal, human, or origins which are filthy. The animal-origin FAA shows strong antimicrobial properties against Gram-positive and negative pathogens, as well as toxicity and organoleptic issues. Thus, the FAA should be used within the allowable range. HFAA has become one of the most studied FAAs due to these issues. Many HFAAs are produced from animals without the full verification of halal status. This review presents an overview of the origins and challenges of HFAA production. Furthermore, this study also highlights how FAA could be verified as halal which is the theme of future research in HFAA development.

**Keywords:** Halal; food antimicrobial agents; Generally recognised as safe (GRAS)

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## 1. Introduction

Islam has outlined the guide to life for Muslims, including the need to find halal and *Toyyib* food. Halal food is defined as permissible and lawful for consumption according to the al-Quran and al-Sunnah (Aziz, Musa & Rahman, 2016). In this context, the food should be free from dirt or contamination of *haram* (prohibited) resources such as pork and unslaughtered animals. *Toyyib* in food refers to hygienic and nutritious food including the quality of taste, smell, and colour (Hashim & Shariff, 2016). Consumable foods such as dairy products, seafood, raw meat, and semi-processed meat have a short shelf life that can be easily contaminated with bacteria-causing diseases; thus, there is the importance of exploiting the concept of *toyyiban*.

Food operators should follow good hygiene practice (GHP) and good manufacturing practice (GMP) to avoid food spoilage. These practices focus on safety and hygiene requirements in food handling (Błaszczuk, 2019). The implementation of these practices and halal assurance system (HAS) in the food supply chain can enhance the quality and safety of food products (Department of Standards Malaysia, 2019). However, the practices do not minimise the incidence of food spoilage and inhibit the growth of foodborne pathogens. Therefore, food preservation is used to inhibit bacterial growth while maintaining food nutrients and preventing food damage from unpleasant odour and colour changes. Boiling, cooling, freezing, pasteurisation, hydration, pickling, and traditional preservation are among the popular preservation processes. Some of the modern preservation techniques include nuclear radiation and modified packaging methods such as vacuum packaging. Besides that, antimicrobial agents function as control measure tools in food manufacturing.

Food antimicrobial agents (FAA) are commonly used in the product formulation stage or during the food production process as food additives reduce or eliminate food spoilage and pathogens. Muslim consumers are concerned about the source of FAA that may contain non-permissible ingredients according to Islam besides increasing the risk of toxicity when being consumed. FAA might negatively render the organoleptic effect on the food. Generally, food including FAA is classified as halal according to ingredient sources like animal, plant, bacteria, or synthetic origins. Antimicrobials of animal-origins are the biggest challenge for the halal concept of HFAA because there are doubts on animal-origin FAA that might originate from pig, unslaughtered animals, human, or origins which are filthy. Some examples of FAA are AP originating from bovine (Palmieri *et al.*, 2018) and lactoperoxidase from pigs for human consumption (Pisoschi *et al.*, 2018). However, for their business applications, a number of manufacturers have falsely claimed the FAA origin and this issue has then caused concern to certain consumer groups such as vegetarians (Musalib *et al.*, 2015), Jews (Romi Mukherjee, 2014) and Muslims (Department of Standards Malaysia, 2019). The false claim has impaired HFAA integrity where HFAA origin is not correctly reported (Soon *et al.*, 2017) and can lead to the consumer exposing themselves to diseases such as bovine spongiform encephalopathy

or mad cow disease due to bovine-originated food (Azilawati *et al.*, 2015). As a result, HFAA from animals is scrutinised for the Malaysian halal certification.

This review highlights the importance of incorporating halal and *toyyiban* concepts when developing halal food antimicrobials from animal sources. The paper presents the challenges of the current HFAA application regarding its halal status and prospects of HFAA. Finally, the paper discusses various aspects that should be considered before introducing halal and *toyyiban* food antimicrobials in processing food products.

## 2. Discussion

### *Food Antimicrobial Agents*

In general, FAA is the additives used in food processing to prevent biological deterioration which is classified as preservatives. The U.S. Food and Drug Administration (FDA) defines two categories of FAA: (1) antimicrobial agents that have direct contact on food, and (2) antimicrobial agents used in water that have contact with food or used as food-contact substances. This definition is used to define antimicrobials which are used in food processing for commercial purposes (U.S. Food and Drug Administration, 1999). Following the definition of FAA by the FDA, Malaysia's Food Regulation 1985 (P.U.(A) 437/85) with the latest amendment (P.U. (A) 200/2017) defines FAA in regulation 20A as follows: any substance that (1) preserves food by hindering or reducing microorganisms and spoilage growth including mould, fungi, and rope inhibitors or (2) sterilises polymeric food-contact surfaces (P.U.(A) 437/85 Food Regulations 1985, 2017).

The selection of FAA is based on its natural and synthetic origins besides considering whether it is safe for consumption. Natural FAA such as antimicrobial peptides (APs) of animal origins have received interest due to the following: (1) their innate immunity mechanism in animals (Palmieri *et al.*, 2018); and (2) its function to replace toxic chemical-synthesis FAA is cancerous to human (Pisoschi *et al.*, 2018). Natural FAA has been associated with relieving and avoiding cancer, ageing, and cardiovascular diseases (Von Borowski *et al.*, 2018). Various studies determined the toxicity level of animal antimicrobials by examining their LC<sub>50</sub> (Fink *et al.*, 2020) and FAA of animal origins such as lactoferrin and chitosan that were approved and generally recognised as safe (GRAS) by the FDA due to their potent metabolites in inhibiting pathogenic bacteria (Rees *et al.*, 2017). Besides its natural origin and safety for consumption, FAA should fulfil these characteristics: broad antimicrobial capability spectrum, kill rather than inhibit food pathogens, potent at low concentration, thermally labile and stable at pH changes (Pisoschi *et al.*, 2018).

### *Halal Food Antimicrobial Agents*

Halal is an Arabic word that indicates a state of permissibility for objects, actions and consumption following the Shariah law (Department of Standards Malaysia, 2019) provided that they are safe and not toxic. Surah al-Baqara verse 168 in the al-Quran states, "O mankind,

eat from whatever is on earth that is lawful and good” (al-Quran 2:168). In another verse, al-Baqara verse 173, Allah SWT states: “He has forbidden to you dead animals, blood, the flesh of swine that have been dedicated to other than Allah SWT” (al-Quran 2:173). These verses express the virtuous commandment by referring to the terms of halal and *toyyib* in food consumption. From these verses, pigs and dogs are prohibited as there is evidence of reducing the quality life of human after consuming pork or having some physical contact with dogs. For instance, pork has a 7.6 ratio of omega-6/omega-3 fatty acids (Ojha *et al.*, 2017) which can increase the risk of cardiovascular, autoimmune, cancer, and inflammatory diseases (Leung *et al.*, 2019). Dogs are linked to diseases from parasites and pathogens such as Campylobacteriosis (Skarp, Hänninen & Rautelin, 2016). Thus, for an FAA to be acknowledged as HFAA, it should not contain ingredients from these sources and derivatives.

The Malaysian Standard MS 1500:2019 halal food, which is the general guidelines from the Department of Standards Malaysia (DSM), states that halal foods should not contain *najs* which refers to pigs, dogs and their descendants besides free from poison, intoxication and hazardous materials including contamination from foodborne pathogens during preparation, processing, handling, packaging, storage and distribution. DSM mentioned that halal foods should originate from slaughtered animals according to the Shariah law (Department of Standards Malaysia, 2019). Thus, the FAA should conform to the Malaysian Standard MS 1500:2019 as the status of the FAA may hinder this confirmatory. For instance, APs from lactoperoxidase from pigs (Pisoschi *et al.*, 2018) and caprylic acid from human breast milk do not conform to MS 1500:2019.

### ***Animal Source of Antimicrobial Agents***

Natural antimicrobials can be found in animals, plants, and bacteria. Some examples of animal origins are lysozyme in milk and chitosan in seafood (Pisoschi *et al.*, 2018). Natural antimicrobials derived from plants such as saponins, eugenol, carvacrol, linalool, citral, terpene, flavonoids, and thymol are obtained from various parts of plants such as tea, basil leaves, onions, ginger, cloves, parsley seeds and fruits. The Gram-positive bacterium also produces cationic and APs that can penetrate small-sized membranes which have antimicrobial effects on various foodborne pathogenic microorganisms. For example, the *Lactobacillus* species is isolated from fermented food to produce one of the active AP groups known as bacteriocin.

FAA from the animal source originates from the defence systems of animals. For example, lactoferrin and lysozyme can be found in eggs and milk from mammals, which are among the food antimicrobials that originate from animals (Shi *et al.*, 2018). Lactoferrin can be extracted from human milk (Novoselova & Prosekov, 2016) and found in white blood cells, saliva, and tears (Franco, *et al.*, 2018). Other APs can be derived from animal sources such as chitosan, pleurosidine, and spheniscin which have antimicrobial properties (Pisoschi *et al.*, 2018).

### *Lactoferrin*

Lactoferrin is a glycoprotein-iron compound that has a strong affinity to iron. This chelating compound renders iron deficiency to bacteria, fungi and parasite cells (Zhang *et al.*, 2017). Lysozyme is an enzyme that breaks the peptidoglycan bonds of bacterial cell walls. Gram-positive bacteria have these bonds, and they are susceptible to lysozyme inhibitory (Franco *et al.*, 2018). To obtain lactoferrin, skim milk is diluted with dilution buffer and incubated overnight with stationary, packed into a column. The lactoferrin is eluted with elution buffer using cation exchange chromatography. The reverse micellar extraction is another method to obtain lactoferrin from milk (Pawar *et al.*, 2019).

### *Chitosan*

Chitosan is a deacetylated chitin that is produced from crustacean shells such as shrimp, crab and crayfishes. The chemical name of chitosan is 2-amino-2-deoxy-b-D-glucan that renders the potent inhibitory effect in medical and agricultural industries due to its cationic structure (Khare, Biswas & Sahoo, 2014). Different chitosan sources have different molecular weight, deacetylation grade, and emulsion abilities from the chitosan of a crab shell. The chitosan's molecular weight, length, deacetylation levels, and the replacement position of glucosamine chitosan units, pH chitosan solution, and target organisms can affect its inhibitory efficacy (Salama *et al.*, 2020).

### *Pleurocidin*

Pleurocidin from the skin of winter flounder fish (*Pleuronectes americanus*) is a polypeptide of 25 amino acids. The mucosal tissues and myeloid cell of the fish skin produce high content of pleurocidin (Gyawali & Ibrahim, 2014) that act as a defence system by inhibiting the growth of pathogenic microorganisms that infect fish and a physical barrier against climatic change. Pleurocidin can be used as halal food antimicrobial due to its stability and tolerance against heat and salt besides its noncytotoxicity to human cells and potency against food pathogens such as *L. monocytogenes*, *P. expansum*, *V. parahemolyticus*, *S. cerevisiae*, and *E. coli* O157:H7. The ability of dissolved pleurocidin in saliva with a salivary enzyme can inhibit biofilm generation of cariogenic bacteria such as *S. mutans*. The incorporation of pleurocidin in food can ensure food safety and prevent dental caries (Sun *et al.*, 2017). However, its efficacy is inhibited in a rich-bivalent-ion environment, such as magnesium and calcium solutions.

### *Free fatty acids*

Fatty acids are carbon chain that consists of a carboxyl group (–COOH) and a methyl group (–CH<sub>3</sub>) at both ends. The hydrophilicity of the carboxyl group and the hydrophobicity of the methyl group contribute to the amphipathic characteristics of the fatty acids. Fatty acids can be found in mammals' milk such as cows, camels, goats, buffaloes, sheep (Claeys *et al.*, 2014), horse, yak, reindeer and donkey (Martini *et al.*, 2014) which are dairy-species mammals

that produce milk (Alichanidis *et al.*, 2016). The milk from these animals is halal and permitted for consumption (Department of Standards Malaysia, 2019).

Lipids from animals such as free fatty acids (FFA) have microbial inhibitory effects against a broad spectrum of pathogenic bacteria and fungi. Medium- and long-chain free fatty acids can deactivate *L. monocytogenes* (Sternkopf Lillebæk *et al.*, 2017). Humans cannot synthesise EPA and DHA which have to be obtained from animal, plant, and bacterial sources as alternatives (Leung *et al.*, 2019). FFA incorporates chitosan as an edible food coating to preserve food for better antimicrobial activity and decreasing the roughness of coating (Limited, 2012). Besides that, food manufacturers are interested in this incorporation to develop other food coatings using polysaccharide-based ingredients such as cellulose, starch, and dextrin (Zivanovic *et al.*, 2014).

Fatty acids are generally classified as the following: (a) carbon chain: short fatty acid chain (SCFA) with < 6 carbons, medium fatty acids chain (MCFA) with 6 < carbon < 12 (Souza *et al.*, 2014), and long-chain fatty acids (LCFA) with > 16 carbons; and (b) the existence or absence of double bond: unsaturated fatty acids if it contains one or more C=C double bonds or saturated fatty acids if it contains only C-C bonds.

These antimicrobial activities of fatty acids are due to the presence of the carboxyl group (-OH). On the other hand, methylated fatty acids normally appear in the form of fatty acid methyl esters (FAMES) which have fewer effective activities. In addition, SCFA such as butanoic acid (C4:0) and MCFA such as caproic (C6:0), caprylic (C8:0), and lauric acids (C12:0) exhibit stronger inhibitory activity than LCFA including palmitic (C16:0) and stearic acids (C18:0) (Souza *et al.*, 2014). Davidson *et al.* (2015) mention that the carboxyl group reduces the acidification of the intercellular cell and interferes with the protein membranes of pathogenic bacteria due to the small amount of carbon in SCFA. Hence, SCFA and MCFA have been widely used as antimicrobials in food such as infant formula, pharmaceutical and medical applications (Rodriguez-Moya & Gonzalez, 2015).

Bond type is another factor that contributes to the antibacterial activities of fatty acids. At the same carbon chain length, unsaturated fatty acids with a double bond of carbon chain have a stronger inhibitory effect than saturated fatty acids. The unsaturated SCFA and MCFA are more sensitive to Gram-positive than Gram-negative bacteria. Among the monounsaturated fatty acids, the 14 and 16 carbon chains have a higher potency than other fatty acids in the same group. The double bond of unsaturated fatty acids, which is attributed to the cis formation, had shown stronger antibacterial activity than trans formation because the latter had a similar structure of saturated fatty acids.

### ***Challenges of Halal Food Antimicrobials***

The APs from the animal origin of antimicrobials is another issue for the halal concept. Although they have active inhibiting property, the source of APs is extracted from the

gastrointestinal secretory fluids of rats and pigs which contradict the halal requirement for food antimicrobials (Department of Standards Malaysia, 2009). Due to the limited information and lack of awareness, consumers accept these APs as food preservatives without knowing the origin of these antimicrobials.

It is not permissible for Muslims regardless of the methods used to isolate and purify antimicrobials from humans (Department of Standards Malaysia, 2019). For instance, caprylic acid from human breast milk and acid purification of human lactoferrin from bovine milk by the transgenic bovine species contain human's lactoferrin transgene (Novoselova & Prosekov, 2016). Lactoferrin that uses human recombinant (HR) or genetically-modified (GMO) techniques are not permissible. The reason for the prohibition of human sources is stated in the al-Quran and al-Sunnah in which humans are the caliph in this world that should be respected and they have dignity. Al-Israa' 17:70, al-Quran states: "Verily We have honoured the children of Adam. We carry them on land and sea, and have made provision of good things for them, and have preferred them above many of those whom We created with a marked preferment." Al-An'am 6:145, al-Quran mentions: "Say (O Muhammad): I find not in that which is revealed unto me aught prohibited to an eater that he eats thereof, except it be carrion, or blood poured forth, or swine flesh for that verily is foul or the abomination which was immolated to the name of other than Allah SWT. But who is compelled (thereto), neither craving nor transgressing, (for him) lo! Your Lord is Forgiving, Merciful." The Arabic structure of the word 'whereof you eat' directly describes that humans can only consume the meat of livestock and not humans, either internal or external parts.

Generally, the halal status of ingredients produced by HR and GMO is based on two opinions: a) the Shafie school of thought that considers it as not permissible due to the prohibition of consuming ingredients from human source (Department of Standards Malaysia, 2019); and (b) it is permissible since the nature of the antimicrobials source (milk) has changed into different properties and characteristics of substance (lactoferrin). The nature of change in the latter opinion is called *al-istihalah* (Yunos *et al.*, 2014). *Istihalah* is defined as the transformation or conversion from one substance to another substance. From the Shafie school of thought, it is only applicable after completing the transformation (*Istihalah al-Kamilah*).

However, the Department of Islamic Development Malaysia (JAKIM) opts for the former opinion as there is another permissible method that extracts bovine lactoferrin by microfiltration and adsorption through a strong cation exchanger (Burling, 2018).

### ***Generally Recognised as Safe (GRAS) and Content Limit of Food Antibacterial Agents***

The concept of halal is not only confined to permitted food, but also its nutritious value and safety for consumption. This concept has led to the broader halal purpose in which halal and *toyyiban* involve two elements; halal means are justified by Shariah while *toyyiban* means safe, healthy, nutritious, and good quality (Sowhini *et al.*, 2020). *Toyyiban* aspect applies to safe and food that is non-contaminated with microorganisms. It considers the degree of toxicity

of antibacterial preservatives that are mixed into the food. The increase in resistance of a pathogenic microorganism to antibiotics and the use of natural preservatives in food and storage companies have led to the use of natural preservatives such as the FAA. However, the safety of natural preservatives such as the FAA has resulted in accredited bodies such as the European Union Commission (EUC) and the United States Food and Drug Administration (FDA) to produce safeguard lists. The EUC has listed FAA in Everything Added to Food in the US (EAFUS) list, where the FDA recognises these ingredients as safe for use FAA (GRAS). For instance, antimicrobials from milk such as lactoferrin are accepted as FAA in the USA and its maximum allowable limit depends on the type of food system. For yoghurt and powdered milk, the maximum allowable limit is 1 mg/g and 4 mg/g, respectively. The EU has set the maximum allowable limit for additional food systems such as candies (7.5 mg/g), cheese (20 mg/g), non-alcoholic drinks (1.20 mg/g), cake and pastries (10 mg/g) (Franco *et al.*, 2018).

Chitosan has also been recognised as GRAS as mentioned by the FDA through GRAS notification no. GRN 000443 for shrimp-derived chitosan and GRN 000397 for chitosan from *Aspergillus niger*. Negligible information is available on the maximum allowable chitosan in food. The FDA has also provided the maximum level of chitosan in drinking water which is 10 mg/L. Although the FFA received GRAS status, the FDA has declared trans-fatty acids as harmful for consumption (U.S. Food and Drug Administration, 2018). The EUC and FDA have not reported the maximum use level of individual FFA in food except for erucic acid or unsaturated omega-9 fatty acid. However, the German Federal Institute for Risk Assessment (BfR) has proposed the maximum use level of 20 g/kg, 4 g/kg, and 30 g/kg of erucic acid in vegetable oils and fats, infant and follow-on formula, and mustard, respectively (German Federal Institute for Risk Assessment [BfR], 2018). The EUC proposed the values for the maximum-level recommendation (Knutsen *et al.*, 2016).

### **Toxicity**

The application of the FAA dose should be based on the maximum use level and toxicity value to comply with the manufacturing of halal and toyyiban food products and reduce the adverse effects on consumers (Sowhini *et al.*, 2020). Repeat-dose toxicity, genotoxicity, and carcinogenicity information have become the threshold for food application (Feigenbaum & Worth, 2019). Carcinogen is a substance that induces (malignant) tumours, increases the incidence of malignancy, and shortens the time of tumour occurrence after its inhalation, ingestion, dermal application, or injection (Corvi, Spielmann & Hartung, 2019). Genotoxicity is the toxicity effect from the interaction of the carcinogen that renders DNA damage. Repeat-dose toxicity addresses the type of effect and its degree by the carcinogen via repetitive assays (Doe & Botham, 2019).

The European Food Safety Authority (EFSA) revealed that lactoferrin which was injected into a rat at 2,000 mg/kg body weight per day had no adverse effect (European Food Safety Authority, 2012). Besides that, 0.4% of chitosan may render significant toxicity to human cells (Ma *et al.*, 2018). Information regarding the toxicity of pleurocidin is limited; however,

pleurocidin renders the toxicity value of 128 µg/mL towards HL60 human leukaemia cells and acute toxicity (after 1 hour) towards zebrafish embryos at 25 µg/mL concentration. In terms of safety, caprylic acid is approved and recognised as a GRAS compound by the FDA. Although the concentrations of FFA may be high in food, they exhibited low toxicity. Souza *et al.* (2014) revealed that the majority of fatty acids have more than 80% cell viability at their MIC concentrations. There was also a generic report on the toxicity of saturated and unsaturated FFA to human melanoma cell lines. Besides that, a study on the toxicity of individual FFA provided the details. Linoleic, arachidonic, palmitoleic, and palmitic acids at 200 µM concentration exerted toxicity to human melanoma cells.

### ***Organoleptic Issues***

Organoleptic issues revealed that the quality of food taste should be maintained although the FAA can suppress bacterial growth. The high content of unsaturated FFA makes it prone to oxidation and cause rancidity in the food system. Unsaturated FFA with more double bonds is also susceptible to oxidation. For instance, C18:3 oxidises twice as fast as C18:2 (Caballero, Finglas & Toldra, 2016). Food that is mixed with herbs and spices should not disturb the taste. A mixture of oregano oils on meat and fish does not change the taste because the taste of meat mixed with 0.8% v/w oregano oil after cooking and left to be cooled at 5°C is acceptable. The flavour, smell, and colour of minced meat can be improved when adding 1% of the oregano oil after cooking.

Seafood products can be preserved with oregano oil and thyme besides meat products. For example, cod fillet produces a different but pleasant taste when it is mixed with 0.05% (v/w) oregano oil, while thyme mixed with Asian fishes of 0.05% (v/v) could preserve the fish up to 33 days at 0–2°C. Adding thyme oil by 0.9% in cooked shrimp did not show any effect on taste and appearance. However, the accepted taste and appearance of the shrimp can be reduced if 1.8% of thyme oil is used as a coating.

Most essential oil components are approved as FAA and flavours. For example, carvacrol can produce spicy-like scents, citral-like lemons, and geraniol-like roses. The exposure of 1 mM carvacrol or cinnamic acid to kiwi fruit and milk melon can delay the defects without causing organoleptic changes. However, essential oils are seldom used in food as the FAA is very limited due to the consideration of taste, despite the fact that the majority of essential oils are classified as GRAS.



**Table 1:** Food antimicrobial agents

| Animal source of antimicrobial agent | Possible source   | 1) Halal and 2) toyyiban status  | Maximum use level in the food system  | Toxicity value  |  |  | Organoleptic limit   |
|--------------------------------------|---|--|---|---|--|--|--|
|                                      |   |  |   | Carcinogenicity   | Genotoxicity   | Repeat-dose toxicity   |  |
| Lactoferrin                          | 1) Eggs from mammals<br>2) Milk, white blood cells, saliva, and tears from mammals, including human | 1) Not halal if the sources are from human and non-halal animals<br>2) Approved as GRAS  | 1) Yoghurt (1 mg/g) (FDA)<br>2) Powdered milk (4 mg/g) (FDA)<br>3) Infant formulae (1 mg/g) (FDA)<br>4) Milk dessert (2 mg/g) (FDA)<br>5) Chewing gum (30 mg/g) (FDA) | No report   | >2000mg/kg/day on rats (Yamauchi <i>et al.</i> , 2000) | > 1800mg/kg/day on rats (Cerven, DeGeorge & Bethell, 2008)   | No report  |
| Chitosan                             | Crustaceans such as shrimp, crab, and crayfishes  | 1) Halal<br>2) Approved as GRAS  | Drinking water (10 mg/L) (FDA)  | 16 g/kg on rats (Health & Services, 1997)   | No report  | 2,545 mg/kg/day on rats (National Institutes of Health & US Department of Health and Human Services, 2017) | Chitosan is tasteless, and the report of organoleptic limit is absent        |
| Pleurocidin                          | The skin of winter flounder fish ( <i>Pleuronectes americanus</i> )                                 | 1) Halal<br>2) No report of GRAS status  | No report   | No report   | No report  | No report  | No report  |
| Free fatty acid                      | Milk of mammals, including human  | 1) Halal if the sources are from halal animals Not permissible if the source is from human<br>2) Fatty acids are approved as GRAS except for trans-fatty acids | 1) Erucic acid in:<br>a) Vegetable oils and fats (0.002 mg/kg) (BfR)<br>b) Infant and follow-on formula (0.004 mg/kg) (BfR)<br>c) Mustard (0.03 g/kg) (BfR)           | 200 µM of linoleic, arachidonic, palmitoleic, and palmitic acids (human melanoma cells) | No report  | No report  | Unsaturated FFA causes rancidity; however, no organoleptic limit is reported |

### 3. Conclusion

The concept of halal and toyyiban should be viewed holistically in nutrition, including the addition of FAA into food products during the manufacturing process. More detailed studies are needed to find appropriate preservation techniques to improve safety and quality without causing nutrient loss in food. In this context, natural FAA has received considerable attention for the benefit of food quality and safety besides reducing the adverse effects on human health. Furthermore, natural FAA promotes acceptable criteria for food quality retention. Various experiments involving essential oils, enzymes, bacteriocin, chitosan, and organic acids on different types of foods have proven that they are suitable for antimicrobial inhibitors. They are also valid and accepted as synthetic FAA. However, more detailed studies are needed to find new sources of FAA, including FAA from animal sources. The concept of toyyiban should be included in the nutritional aspect. Hence, it is crucial to study the FAA levels of toxicity and limitations to avoid health issues since the food should be not only halal but also safe.

#### Conflict of Interest

We declare that we have no conflict of interest.

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