

Evaluation of knowledge and practices of *halal* certification among food processing companies in Sabah, Malaysia

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Abstract

Malaysia *Halal* Certification Procedure Manual 2014, Guidelines for *Halal* Assurance Management System of Malaysia *Halal* Certification 2011, Department of Standard (2009; 2013), Food Act 1983, Food Regulations 1985 and Food Hygiene Regulations 2009 are the basic references adopted for *halal* certification used by JAKIM and other authorities. The present work aimed to examine the knowledge and practices in managing the *halal* certification amongst *halal* managers throughout the State of Sabah. A total of 27 questionnaires were completed and returned for the research purpose, covering 45% of the response rate. Non-probability sampling and quantitative approach has been used in the present work for the data collection and analysis. The obtained data were analysed by SPSS to obtain the descriptive and inferential statistics. The mean and standard deviation showed that all the values (knowledge of *halal* concept = 5.85 ± 0.45 ; knowledge of HAS = 136.48 ± 7.72 ; and practices of *halalan tayyiba* = 28.11 ± 1.28) almost yielded the maximum score. Length of employment appeared to be an important factor for the *halal* assurance system (HAS) knowledge level ($p < 0.05$), whereas ethnicity and product cluster appeared to be the influencing factors for *halalan tayyiba* practices level ($p < 0.05$). Therefore, it could be concluded that the effectiveness of implementing the *halal* management can be increased with knowledge and best ethical practices.

Keywords

Halal concept

Halal assurance system

Halalan tayyiba

Malaysia *halal* certification

Halal managers

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Introduction

The economy in Sabah is more focused on the agriculture-based industry which has positioned it as the second highest in Malaysia's *halal* market value of RM6 billion (Rosidah, 2012). This proves that Sabah is ready to play its role as the World *Halal* Hub by 2020, as set out in the Third Industrial Master Plan (IMP3). Along with the growing demand in the *halal* food product market, the involvement of entrepreneurs in the *halal* food industry has also grown. According to Liow (2012), both *halal* and *tayyib* concepts need to be applied together so that the products released are believed to be safe, nutritious and with quality.

SIRIM (Standard and Industrial Research Institute of Malaysia) Sabah urges all competent authorities involved in *halal* certification in Malaysia such as JHEAINS (Jabatan Hal Ehwal Agama Islam Negeri Sabah) and others to coordinate the *halal* certification process. This is because most of the Small and Medium Industries in Sabah are difficult to meet the requirements set out in compliance with the

halal management itself. For example, the problems among the *halal* food industry is the issue of *halal* integrity in food production operations (Soong, 2007), weakness in quality aspects (Arif *et al.*, 2013), inefficient management practices and inefficiencies in management (Mohd Ali and Nor Aini, 2013). Therefore, it is of interest to assess the factors that influence the knowledge and practices of *halal* managers on compliance with *halal* certification through the company's internal management. The *halal* manager refers to the term used by JAKIM (Jabatan Kemajuan Islam Malaysia) as mentioned by the Department of Islamic Development Malaysia (2014) for managing *halal* matters in every company. The multinational and medium industries are required to appoint *halal* executive, while the small industries to appoint a Muslim supervisor and the micro industries to appoint a Muslim worker.

Knowledge on Halal Concept

The Malaysian government has gazetted through the Malaysian *Halal* Standards (MS 1500:2009) in order for the *halal* and *tayyib* aspects are used by the

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halal industries. They need to follow the standards in the production of *halal* products as the Government wants a *halal* product manufacturer in Malaysia to respond to a higher competition for *halal* products worldwide. A study conducted by Muhammad Haziq *et al.* (2015) on 39 *halal* executives among food premises in Malacca stated that existing religious knowledge on the basis of the concept of *halal* becomes the key to the implementation of the internal *halal* system of the organisation. Parallel to the finding by Kasmarini *et al.* (2015) on 60 entrepreneurs with regards to the understanding of the *halal* concept and the importance of *halal* food business information, the level of knowledge of the respondents on *halal* concept was high with the average mean score of 4.52 over 5.00. This shows that the concept of *halal* is intertwined with the practice of Islamic nutrition, and it is compulsory for Muslims to consume quality *halal* food (Chaudry *et al.*, 1997).

Knowledge on Halal Assurance System (HAS)

Muhammad Haziq *et al.* (2015) stated that good knowledge and practice based on these elements can promote the efficiency of the *halal* assurance system including i) *halal* critical points; ii) cleanliness; iii) documentation; and iv) internal *halal* committee. Additionally, every appointed *halal* executive must have specific knowledge to make the implementation of the *halal* guarantee system more efficient, rather than solely using the basic knowledge of Islam. Along with the study done by Noordin *et al.* (2009), the most common problem among food producers was the lack of knowledge on *halal* requirements and procedures, inadequate documentation and filing systems, incomplete certification information, and unclear payment fees. Therefore, the development of a *halal* assurance management system is focused on minimising and preventing incompatibilities in *halal* requirements.

Practices on Halalan Tayyiba

The use of the term *halalan tayyiba* is mentioned in MS 2393:2013, clause 2.13.2 (Islamic and *halal* principles – Definitions and interpretations on terminology) which means lawful, safe, good quality and wholesome. Omar *et al.* (2013) states that *halalan tayyiba* product means any item that does not lead to damage or does not bring harm as required by the *shariah* law, products which are acceptable and safe to eat. Muslim communities today realise the importance of *halal* concepts to be practiced not only limited to food but also covers handling, packaging, storage and delivery processes (Ab. Karim *et al.*, 2016). It is also supported by Hafaz *et al.* (2014)

noting that in recent years, consumers have not only bought *halal* products but also questioned the *halal* process. Standards in the *halal* process caused users/consumers to make a selection to purchase *halal* products. Therefore, it is important for the processing of *halal* food production to be handled according to the guideline in the standard so that the *halal* status assurance is more reliable and can be maintained.

Materials and methods

Study design, sampling, data collection procedure

The present work adopted a close-ended questionnaire to investigate the knowledge and practices in the food processing of the manufacturing in the state of Sabah, Malaysia. After revising the literature review, the self-administered questionnaire was designed based on the documents related to the Malaysian *Halal* Certification. The questionnaire was examined by the panel of experts in *halal* certificate matters from the Jabatan Hal Ehwal Agama Islam Negeri Sabah (JHEAINS) (the main government agency in charge of *halal* certification in Sabah). A pilot study was conducted on 10 respondents (which are 10% of the total sample population) (Bonett, 2002). Internal consistency for the reliability of the instrument items was measured using Kuder-Richardson 20 (KR-20) for the dichotomy scores and Cronbach alpha for the Likert scale (Tan, 2009). Final modifications of the questionnaires were made based on the results of the pilot study.

The targeted population of the present work was *halal* managers from 71 companies. The sample size calculated according to the formula by Krejcie and Morgan (1970) was 60. The data was collected through observation by the researcher directly or by e-mail. The respondents spent 15 to 30 min per questionnaire. A total of 29.6% completed questionnaires were returned from direct survey and 70.4% received via e-mail.

Instrument development

The final questionnaire was divided into five parts, which were coded as sections A, B, C, D and E. Section A was about the basic company profile. Section B was on respondents' demographic information including gender, age, ethnicity, level of education, position, length of employment, *halal* training, and field of expertise. Section C had six close-ended statements (dichotomous scale) about general knowledge of *halal* concepts and terminology. Section D consisted of five main principles of HAS (30 sub-items with five point Likert scale) to assess the knowledge of the respondents towards HAS.

Section E had six main principles of *halalan tayyiba* (29 sub-items with dichotomous scale) about the practices of respondents in company's operation in terms of *tayyiba* procedures (food safety). This questionnaire was aimed to identify the supervision of *halal* management among the *halal* managers based on the requirements needed which was focused on knowledge and practices.

The statements for each section C, D and E were totalled up to create a total score with a minimum and maximum (Hodge and Austin, 2004). Three levels of composite categories were formed using the 33.3th and 66.7th percentiles as the cut-off point (Barua, 2013; Warmbrod, 2014). As such, the level of knowledge and practices were categorised as "poor" (< P33.3), "moderate" (P33.3-P66.7) or "good" (>P66.7).

Data analysis

Following the data collection, the questionnaires were validated manually, and the data analysis was carried out by SPSS. The descriptive statistics were applied to summarise the data in frequency, percentage, mean and standard deviation. Chi-square Test and Fisher's Exact Test was applied to examine the association between data categories to determine the factors that influenced the level of knowledge and practices. Residual or standardised residual were used to identify which cells were contributing the most to the significance of the chi-square value (Sharpe, 2015). $p < 0.05$ was taken as statistically significant.

Results and discussion

General survey respondents and characterisation of the participating food companies

The results show (Table 1) that the majority of respondents were female (59.3%). Most (40.7%) of the respondents were aged 23 – 29 years old. Besides, 70.4% respondents were Bumiputera, 85.2% had higher education, 63.0% were *Halal* Executive, 51.9% had been employed more than five years, and 33.3% were in the Food Science / Food Technology field of expertise. For company characteristics, 48.1% were from the medium industry, and 22.2% from fats and oils.

Table 1. Demographic profile and company profile ($n = 27$).

Variables		<i>n</i>	%
Gender	Male	11	40.7
	Female	16	59.3
Age	23 – 29	11	40.7
	30 – 39	6	22.2
	40 – 50	10	37.0

Table 1 (Cont.)

Ethnicity	Malay	5	18.5
	Chinese	3	11.1
	Bumiputera (Indigenous peoples in Sabah)	19	70.4
Level of education	Higher (Diploma or equivalent / Tertiary)	23	85.2
	Lower (Primary / Secondary)	4	14.8
Position	<i>Halal</i> Executive	17	63.0
	Muslim Supervisor	8	29.6
	Muslim worker	2	7.4
Length of employment	< 1 year	3	11.1
	1 – 5 years	10	37.0
	> 5 years	14	51.9
Attended <i>halal</i> training	Yes	27	100.0
Field expertise	Food Science / Food Technology	8	29.6
	Shariah (Islamic studies)	1	3.7
	Marketing	4	14.8
	Hospitality	5	18.5
	Biotechnology	7	25.9
	Others (Engineer and Human Resource)	2	7.4
Company size	Micro	2	7.4
	Small	8	29.6
	Medium	13	48.1
	Multinational	4	14.8
Product cluster	Bakery and Pastry	5	18.5
	Snack and Confectionery	4	14.8
	Fishery and Meats	2	7.4
	Noodles and Grains	5	18.5
	Beverages	2	7.4
	Fats and Oils	6	22.2
	Mix Products	3	11.1

Respondents' knowledge regarding *Halal* concept

The percentage distribution of respondents' knowledge regarding the *halal* concept in term of Islamic law is described in Table 2. For knowledge of *halal* concept section, respondents were required to choose 'Yes' or 'No' answers for six questions. The sum of correct answers was calculated manually and converted to percentage. The score 1-2 was considered as poor knowledge; 3-4 was considered moderate and 5-6 was considered good knowledge.

The level of respondents' knowledge on *halal* concept is shown in Figure 1. It shows that only one respondent (3.7%) achieved moderate knowledge level while 26 (96.3%) of them achieved good level. The 6 close-ended questions required respondents to have knowledge about *halal*, *haram*, *syubhah*, *najs*

Table 2. Percentage distribution of principles on *halal* concept, HAS and *halalan tayyiba*.

No	Variables	Responses (%)	
		Yes	No
Knowledge on <i>Halal</i> Concept			
1	Does <i>halal</i> mean permissible by <i>shari'ah</i> law?	100	0
2	Does haram mean the forbidden?	100	0
3	Do you know that food without the <i>halal</i> logo is considered <i>syubhah</i> ?	92.6	7.4
4	Do you know that animal carcass, blood, pigs and alcohol are haram for Muslims?	100	0
5	Do you know that the term <i>mughallazah</i> , <i>mukhaffafah</i> and <i>mutawassitah</i> are referring to najis?	92.6	7.4
6	Are you aware that JAKIM can revoke <i>Halal</i> Certification Malaysia if there is offense related to <i>tayyiba</i> ?	100	0
No	Variables	Responses (%)	
		Positive Answer	Negative Answer
Knowledge on HAS			
1	Understanding of <i>Halal</i> Assurance System	99.3	0.7
2	Internal <i>Halal</i> Committee	92.1	7.9
3	Documentations	96.9	3.1
4	Internal <i>Halal</i> Control System	97.8	2.2
5	<i>Halal</i> Critical Control Point	100	0
Practices on <i>Halalan Tayyiba</i>			
1	Raw material	95.4	4.6
2	Processing & Manufacturing	100	0
3	Packaging & Labelling	98.5	1.5
4	Storage	98.8	1.2
5	Distribution & Transportation	97.8	2.2
6	Customer	88.9	11.1

and *tayyiba* (Hassan *et al.*, 2015). Most of them were able to answer correctly and seem to implement *halal* standard criteria based on their general knowledge and understanding about *halal*. It was also shown that none of the respondents fell under the category of poor knowledge level. The results also showed that the respondents were aware of the importance to implement *halal* and that they were committed to attend any further training with respect to the regulation and criteria of *Halal* Certification Malaysia.

Respondents' knowledge regarding HAS

The summary of respondents' knowledge regarding HAS is described in Table 2. There were five main variables including the understanding of HAS; internal *halal* committee; documentations; internal *halal* control system; and *halal* critical control point. A 5-point Likert scale was used as measurement statements. The scale ranges from "Strongly Disagree" to "Strongly Agree". For dichotomous classification, the marks 3 and less were categorised as negative response while the marks 4 and 5 were categorised as a positive response (Labib *et al.*, 2013). The score of less than or equal to 130 was considered as "poor knowledge"; 131 – 138 was

considered "moderate", and more than or equal to 139 was considered "good" knowledge on HAS.

The results showed that (Figure 1) there were four (14.8%) respondents under the "poor" level, while 12 (44.4%) of them were under the "average" level, and the remaining 11 (40.7%) were under the "good" knowledge level regarding the implementation of HAS.

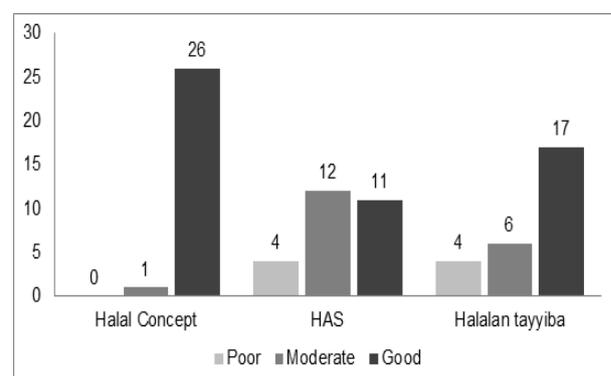


Figure 1. Frequency distribution of knowledge level on *halal* concept, HAS and *halalan tayyiba*.

Based on this result, HAS is a quality assurance system that needs to be implemented by both multinational and medium-sized food industries.

This is to ensure that all the procedures and processes involved are *halal*- and *tayyib*-compliant. However, HAS has also been promoted to the small and micro industries for implementation. It provides a systematic approach to assure the *halal*-ness of the products (Nooh *et al.*, 2007). In the present work, some companies did not have specific internal *halal* management organisation to ensure the implementation of HAS is fully established. This was because all the affairs of *halal* were also performed by the top management and some *halal* executive or supervisor were not managing it efficiently due to the frequent change of positions (Jamaludin *et al.*, 2015). Palmer and van der Vorst (1996) also believed that the majority of SMEs (Small and Medium Enterprises) did not have effective structure and lack of management systems. A study in the United Kingdom found that if companies did not understand the principles and objectives of the systems, they were less motivated to perform in accordance with the procedures because they felt these were not relevant in operation (Hillary, 2000). Meanwhile for some companies (which were in “good” level), the importance of implementing HAS was highly prioritised and had excellent compliance regarding the implementation of JAKIM’s *halal* certification. Similarly, another previous study (Yapp and Fairman, 2006) stated that there was 16% food SMEs which had effective management systems. Therefore, the level of knowledge and understanding of legislation and food control system principles among the food manufacturers directly affected the level of performance that they had in dealing with the company requirements.

Respondents’ practices regarding halalan tayyiba

Halalan tayyiba means aspects related to the processing, preparation, and handling of foods that meet the rules set by the Islamic law (*Syara*). It is the responsibility of the internal *halal* committee to ensure the compliance of *halalan tayyiba* by the employees. This practice is strictly related to the cleanliness and safety in food processing in terms of *halal* concept. The degree of compliance with *halalan tayyiba* was measured based on 29 statements and summarised in six variables which are the main principles of *halalan tayyiba*. Then, the mark of each respondent were totalled up to probable score and analysed. Respondents were required to choose “Yes” or “No” answers for this section.

The relationship between the frequency distribution and the three levels is shown in Figure 1. The score of less than or equal to 26 was considered as “poor” practice; 27-28 was considered “moderate” and equal to 29 was considered “good” practice on

halalan tayyiba. The results showed that there were four (14.8%) respondents were under the “poor” level, while six (22.2%) respondents were under the “average” level, and the remaining 17 (63.9%) were under the “good” level of practices.

The percentage of *halalan tayyiba* practices among the respondents is tabulated in Table 2. The results showed that only processing or manufacturing scored 100% or full compliance with the practices of *halalan tayyiba*. Meanwhile, for other variables such as raw material; packaging and labelling; storage; and distribution and transportation, they were 95.4%, 98.5%, 98.8%, and 97.8%, respectively. For variable customer, 88.9% respondents achieved the correct practice. This was perhaps due to lack of awareness of food manufacturer in promoting *halal*-based products. Gerstenfeld and Roberts (2000) pointed out that some SMEs had poor awareness of the relevance of legislation. In the study by Baharuddin *et al.* (2015), it was found out that *halal* food production was one of the crucial information needed by entrepreneurs to conduct *halal* based-business. This was because many entrepreneurs in Malaysia took advantage of business opportunities in the *halal* food industry to generate income. But at the same time, in addition to qualifying standards, they have to convince the consumers on the *halal* status of the products. Moreover, most consumers in Malaysia are using the *halal* certification as important benchmark when making a decision in purchasing quality food (Nooh *et al.*, 2007).

Based on this finding, most of the respondents complied with the guidelines set by the authorities including hygiene and cleanliness aspects. Moreover, they also realised that the compliance with *halalan tayyiba* constituted the requirements of *Halal* Certification which encompassed cleanliness, safety and purity of the food. The respondents’ practices regarding *halalan tayyiba* were determined based on product compliance with each of the six variables throughout the food processing chain (Arif and Sidek, 2015). This includes the control of raw material; processing or manufacturing; packaging and labelling; storage; distribution and transportation; and customer.

Questionnaire score for Halal Concept, HAS and Halalan Tayyiba

There were six items used to evaluate the respondents’ knowledge on *halal* concept in which the mean score was 5.85 ± 0.45 (maximum possible score = 6). A total of 30 items were analysed to access the possible score (136.48 ± 7.72) for knowledge of respondents regarding HAS (maximum probable

score = 150). Meanwhile, the mean score for practices of *halalan tayyiba* was 28.11 ± 1.28 (maximum possible score = 29) as shown in Figure 2. Based on the results, it was found that the respondents demonstrated the achievement of good knowledge and practices because the three mean values almost approached the maximum score for each variable.

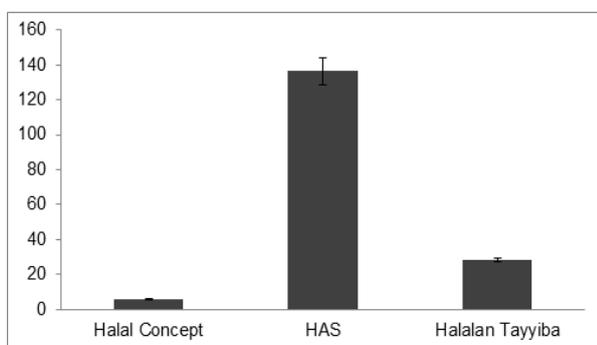


Figure 2. Mean and SD of *halal* concept, HAS and *halalan tayyiba*.

Factors influencing on questionnaire score

To determine the factors influencing knowledge on *halal* concept and HAS, and practices of *halalan tayyiba*, a Chi-square Test and Fisher's Exact Test were applied to assess the association between independent variables (demographic and company characteristic) and dependent variables (level of knowledge on *halal* concept and HAS, and practices on *halalan tayyiba*). In this analysis, the result showed that there was no significant association on *halal* concept. However, length of employment appeared to be an important factor for level of HAS knowledge ($p < 0.05$) while ethnicity and product cluster were the important factors for level of *halalan tayyiba* practices ($p < 0.05$) as shown in Table 3.

The findings also showed that there was a significant association with the length of employment (X^2 was 12.06, $p < 0.05$). The residual value was 1.9 which showed that working experience of over five years and poor level of knowledge were the main contributors to significant differences. The compliance towards HAS can be said as new and is evolving (Nooh *et al.*, 2007). JAKIM has developed the HAS in 2011, and as of now, only compulsory to those multinational companies only. For the other categories, HAS is only "highly encouraged". Considering that the respondents of the study were in between the age of 40 – 50 years old who scored "poor" in knowledge on HAS, their ability to adapt and accept the new system was deemed inefficient as compared to others age range. In contrast, Siow and Norrakiah (2011) had observed that there was a significant relationship between the food handlers'

knowledge level regarding food safety and their working experience. They reported that those who worked less than one year scored higher than those who have been working for more than six years. Besides, Aliff *et al.* (2015) pointed out that the main problem among food industry, especially in the internal management of the company, was that employees were frequently replaced, hence lack of knowledge and skill for *halal* requirements. A good knowledge will positively affect the attitude and working practice (Rahman *et al.*, 2012). However, this contradicts with a study by Mutalib *et al.* (2012) who found out that there was no significant association between knowledge level of food hygiene and sanitation and the respondents' demographic characteristics.

Chi-square Test showed that there was a significant relationship between the level of *halalan tayyiba* practice and ethnicity (χ^2 was 13.40; $p < 0.05$). The standard residual 2.6 (Malays and poor level) was greater than the critical value (± 1.96) showing that this indicator was the main contributor to this significant association. But when the residual values were compared, Bumiputera showed the practice of *halalan tayyiba* in good level. The highest residual value was 3.0. This might be due to the fact that the respondents were predominantly the local indigenous people of Sabah. Similar finding was reported in previous study (Hamid *et al.*, 2014) which revealed that there was a significant relationship between food safety practices among restaurant workers in Sarawak and ethnicity ($F = 2.502$; $p < 0.05$) where the majority of their respondents were Malays. This is supported by a previous study by Lorraine *et al.* (2013) which involved 645 respondents including both who did and did not receive training on food handling in Canada. They found out that the ethnic's background of those food handlers affected the average score of the KAP analysed (knowledge, attitude, practices) at $p < 0.001$. However, the variables in the present work were measured in term of quality assurance and food safety which were necessary to be achieved in *halal* food processing by practices of *halalan tayyiba*. Hence, the present work proved that respondents were competent about the importance of cleanliness, safety and purity in food processing with the highest residual value among the Bumiputera and good level in practices of *halalan tayyiba*.

Besides, the findings of the present work also showed that there was a significant association between the level of *halalan tayyiba* practice with products cluster (χ^2 was 27.95; $p < 0.05$). The standard residual 2.2 (fats and oils; and poor level) was greater than the critical value (± 1.96), showing that this

Table 3. Factors influencing the level of dependent variables.

		Level of HAS Knowledge				
Variables		Poor	Moderate	Good	Total (%)	
Length of employment ^a	< 1 year				3 (11.1)	
	Residual	-0.4	1.7	-1.2		
	Std. Residual	-0.7	1.4	-1.1		
	1 -5 years				10 (37.0)	
	Residual	-1.5	1.6	-0.1		
	Std. Residual	-1.2	0.7	0		
	> 5 years				14 (51.9)	
	Residual	1.9 ^b	-3.2	1.3		
	Std. Residual	1.3	-1.3	0.5		
Total (%)	4	12	11	27 (100)		
		Level of <i>Halalan Tayyiba</i> Practices				
Variables		Poor	Moderate	Good	Total (%)	
Ethnicity ^a	Malay				5 (18.5)	
	Residual	2.3	-0.1	-2.1		
	Std. Residual	2.6 ^c	-0.1	-1.2		
	Chinese				3 (11.1)	
	Residual	0.6	0.3	-0.9		
	Std. Residual	0.8	0.4	-0.6		
	Bumiputera				19 (70.4)	
	Residual	-2.8	-0.2	3.0 ^b		
	Std. Residual	-1.7	-0.1	0.9		
	Total (%)	4	6	17	27 (100)	
	Product Cluster ^a	Bakery & Pastry				5(18.5)
		Residual	-0.7	-0.1	0.9	
		Std. Residual	-0.9	-0.1	0.5	
		Snack & Confectionery				4(14.8)
		Residual	-0.6	-0.9	1.5	
Std. Residual		-0.8	-0.9	0.9		
Fishery & Meats					2(7.4)	
Residual		-0.3	-0.4	0.7		
Std. Residual		-0.5	-0.7	0.7		
Noodles & Grains					5(18.5)	
Residual		-0.7	0.6	0.9		
Std. Residual		-0.9	0.8	0.5		
Beverages					2(7.4)	
Residual		0.7	0.6	-1.3		
Std. Residual		1.3	0.8	-1.1		
Fats & Oils					6(22.2)	
Residual		2.1	1.7	-3.8		
Std. Residual		2.2 ^c	1.4	-1.9		
Mix Products					3(11.1)	
Residual		-0.4	-0.7	1.1		
Std. Residual		-0.7	-0.8	0.8		
Total (%)		4	6	17	27 (100)	

^aChi-square statistically significant at $p < 0.05$

^bThe larger the residual, the greater the contribution of the cell to the magnitude of the chi-square obtained value (Agresti, 2007 and Delucchi, 1993)

^cThe indicator more meaningful when the residual value converted to a z-score (standard residual) and greater than the critical value ($\geq \pm 1.96$) (Agresti, 2007 and Meuwissen *et al.*, 2007)

indicator was the main contributor to this significance among the variables. This showed that fats and oils had poor *halalan tayyiba* practices as compared to the other products. The concept of *halalan tayyiba* directly involves all levels of processing. The present work showed that the well-being of the product sector was more committed to preserving aspects of food security and quality.

In addition, JHEAINS has mandated that all food industries in Sabah should be subjected to inspection and audits with respect to the requirement of the Guidelines on Food Safety is Responsibility of The Industry (MeSTI) Certification Scheme before *halal* monitoring can be done. MeSTI is directly under the jurisdiction of the Ministry of Health (MOH). MOH (2016) defined MeSTI as a minimum Food Safety Assurance Programme to control processing operations in food manufacturing premises. In relation thereto, it is an impetus for *halal* food manufacturer in Sabah to implement *halalan tayyiba* and compliance with other food quality control requirements based on *halal* certification references

Conclusion

In summary, the findings obtained in the present work showed that the knowledge and practices of most respondents were at a good level. *Halal* managers who were involved in the present work demonstrated strong commitment to *halal* certification requirements as indicated by the high scores achieved. Chi-square test revealed that the length of employment was the most important factor for knowledge of *halal* assurance system, whereas ethnicity and product cluster appeared to be the most important factor for *halalan tayyiba* practices. Values of residual or standard residual confirmed the factors that contributed to the significance of chi-square. More than five years of working experience showed a poor level on knowledge of *halal* assurance system. In contrast to ethnicity, residual value has proven that the level of *halalan tayyiba* practices among *Bumiputera* was in a good level. On the other hand, differences of product cluster showed that *halalan tayyiba* practices for fats and oils were poor. Overall, the present work demonstrated that the demographics and characteristics of the companies affected the performance of internal *halal* management. The balance of mastering *syariah* (Islamic education) and technical (science) plays an important role in establishing the authority of the *halal* managers for the production of better quality and purity of the products.

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References

- Ab. Karim, N. F., Samicho, Z. and Muhammad Nurul Azmi, A. F. 2016. *Halalan Toyyan* elements in *Halalan-Toyyiban* Risk Management Plan (HTRMP) of chilled food products during warehousing activities: a review. *Journal of Applied Environmental and Biological Sciences* 6(11): 103-110.
- Agresti, A. 2007. Introduction to categorical data analysis. New York: John Wiley and Sons.
- Arif, S. and Sidek, S. 2015. Application of *halalan tayyiban* in the standard reference for determining Malaysian *halal* food. *Asian Social Science* 11(17): 1911-2025.
- Arif, S., Sidek, S., Ismail, N. and Ahmat, N. N. 2013. Kebolehlaksanaan Sistem Jaminan *Halal* Di Kalangan Pengusaha Restoran Di Malaysia: Isu Dan Cabaran. *iECONS 2013: Proceedings of Sustainable Development Through The Islamic Economics System*. Kuala Lumpur.
- Baharuddin, K., Kassim, N. A., Nordin, S. K. and Buyong, S. Z. 2015. Understanding the *halal* concept and the importance of information on *halal* food business needed by potential Malaysian entrepreneurs. *International Journal of Academic Research in Business and Social Sciences* 2(5): 2222-6990.
- Barua, A. 2013. Methods for decision-making in survey questionnaires based on likert scale. *Journal of Asian Scientific Research* 3(1): 35-38.
- Bidin, J. 2016. Future directions of *halal* in Malaysia: opportunities for trade and investment. Malaysia: *Halal* Industry Development Corporation.
- Black, T. R. 1999. Doing quantitative research in the social sciences. London: SAGE Publication.
- Bonett, D. G. 2002. Sample size requirements for testing and estimating coefficient alpha. *Journal of Education Behaviour* 27: 335-340.
- Buang, A. H. and Mahmud, Z. 2012. Issues and challenges of *halal* certification bodies in Malaysia. *Shariah Journal* 20: 271-288.
- Chaudry, M. M., Hussaini, M. M., Jackson, M. A. and Riaz, M. N. 1997. *Halal* Industrial Production Standards. USA: J&M Food Products Company.
- Delucchi, K. L. 1993. On the use and misuse of chisquare. In Keren, G. and Lewis, C. (Eds), *A Handbook for Data Analysis In The Behavioral Sciences*, p. 295-320. Hillsdale: Lawrence Erlbaum.
- Department of Islamic Development Malaysia. 2014. Manual Procedure for Malaysia *Halal* Certification, 3rd revision. Malaysia: Department of Islamic Development Malaysia.

- Department of Standard. 2009. MS1500:2009. *Halal* food-production, preparation, handling and storage-general guidelines, 2nd revision. Malaysia: Department of Standard.
- Department of Standard. 2013. MS2393:2013. Islamic and *halal* principles – Definitions and interpretation on terminology. Malaysia: Department of Standards.
- Euromonitor International. 2009. *Halal* Processed-food Market in Malaysia. Retrieved from website: <http://www.euromonitor.com/>
- Gerstenfeld, A. and Roberts, H. 2000. Size matters: barriers and prospects for environmental management in small and medium sized enterprises. Sheffield: Greenleaf.
- Hafaz, N. A., Zainuddin, Y. and Thurasamy, R. 2014. Modelling of *halal* warehouse adoption using Partial Least Squares (PLS). *International Journal of Contemporary Business Management* 1(1): 71-86.
- Hassan, M. H., Arif, S. and Sidek, S. 2015. Knowledge and practice for implementation internal *halal* assurance system among *halal* executives. *Asian Social Science* 11(17): 57-66.
- Hayati@Habibah, A. L. and Ali, K. A. M. 2008. Aspects of quality, safety and health among PKS industry: a literature review. *Jurnal Teknologi* 59: 65-79.
- Hillary, R. 2000. Small and medium sized enterprises and the environment. Sheffield: Greenleaf.
- Hodge, V. J. and Austin, J. 2004. A survey of outlier detection methodologies. *Artificial Intelligence Review* 22(2): 85-126.
- Jamaludin, M. A., Kamarudin, N. K. H. and Ramli, M. A. 2015. *Halal* executive's perception towards *halal* training programmed based on training needs analysis. *The International Journal of Humanities and Social Studies* 3(1): 2321-9203.
- Kasmarini Baharuddin, Norliya Ahmad Kassim, Siti Khairiyah Nordin and Siti Zahrah Buyong. 2015. Understanding the *halal* concept and the importance of information on *halal* food business needed by potential Malaysian entrepreneurs. *International Journal of Academic Research in Business and Social Sciences* 5(2): 170-180.
- Kettani, H. 2010. World muslim population: 1950-2020. *International Journal of Environment Science and Development* 2(1): 127-170.
- Krejcie, R. V. and Morgan, D. 1970. Determining sample size for research activities. *Educational and Psychological Measurement* 30: 607-610.
- Labib, S., Mohammad M. O. and Al-Dalalah, M. R. 2013. Food hygiene knowledge, attitudes and practices of the food handlers in the military hospitals. *Food Nutrition Science* 4: 245-251.
- Liow, R. 2012. *Marketing halal: Creating new economy, new wealth*. Kuala Lumpur: MPH Publishing.
- Lorraine, M., Vallaster, L., Wilcott, L., Henderson, S. and Kosatsky, T. 2013. Evaluation of food safety knowledge, attitudes and self-reported hand washing practices in food safety trained and untrained food handlers in British Columbia, Canada. *Food Control* 30(1): 150-156.
- Majid, M. A. A., Abidin, I. H. Z., Majid, H. A. M. A and Chik, C. T. 2015. Issues of *halal* food implementation in Malaysia. *Journal of Applied Environmental* 5: 50-56.
- Meuwissen, M. P. M., Van Der Lans, I. A., Huirne, R. B. M. 2007. Consumer preferences for pork supply chain attributes. *Wageningen Journal of Life Sciences* 54(3): 293-312.
- MOH. 2016. Guidelines on MeSTI Certification Scheme. Malaysia: Ministry of Health. Retrieved from website: <http://fsq.moh.gov.my/v5/ms/garis-panduan-makanan-selamat-tanggungjawab-industri-mesti-3/>
- Mohd Noor, M. A. and Idris, N. A. 2013. Faktor-faktor yang mempengaruhi ketidakcekanan pelbagai industri pemprosesan makanan *halal* Malaysia. *Proceedings PERKEM UKM*: 438-444.
- Mutalib, N. A. A., Rashid, M. F. A., Mustafa, S., Nordin, S. A., Hamat, R. A. and Osman, M. 2012. Knowledge, attitude and practices regarding food hygiene and sanitation of food handlers in Kuala Pilah, Malaysia. *Food Control* 27: 289-293.
- Nooh, M. N., Nawai, N., Dali, N. R. S. M. and Mohammad, H. 2007. *Halal* branding: an exploratory research among consumers in Malaysia. 3rd UNITEN International Business Management Conference, p. 16-18. Malacca, Malaysia.
- Noordin, N., Md Noor, N. L., Hashim, M. and Samicho, Z. 2009. Value chain of *halal* certification system: a case of the Malaysia *halal* industry. In European and Mediterranean Conference on Information System. Kuala Lumpur, Malaysia.
- Omar, E. N., Jaafar, H. S. and Osman, M. R., 2013. *Halalan toyyiban* supply chain of the food industry. *Journal of Emerging Economics and Islamic Research* 1(3): 1-12.
- Palmer, J. and van der Vorst, R. 1996. Are standard systems right for SMEs?. *Eco and Auditing* 3(2): 91-96.
- Population Distribution and Basic Demographic Characteristic. 2010. Department of Statistics Malaysia.
- Rahman, M. M., Arif, M. A. Bakar, K and Tambi, Z. 2012. Food safety knowledge, attitude and hygiene practices among the street food vendors in Northern Kucing city, Sarawak. *Borneo Science* 31: 2231-9085.
- Rosidah Musa. 2012. Domestic and International Market Potential of Malaysia's *Halal* Food Products. Selangor: Universiti Teknologi Mara.
- Rosnani, A. H., Son, R., Mohhidin, O., Toh, P. S. and Chai, L. C. 2014. Assessment of knowledge, attitude and practices concerning food safety among restaurant workers in Putrajaya, Malaysia. *Food Science and Quality Management* 32: 20-27.
- Sharpe, D. 2015. Your chi-square test is statistically significant: now what? *Practical Assessment, Research and Evaluation* 20(8): 1-10.
- Siow, O. N. and Norrakiah, A. S. 2011. Assesment of knowledge, attitudes and practices (KAP) among food handlers at residential colleges and canteen regarding food safety. *Sains Malaysiana* 40(4): 403-410.

- Soong, S. F. V. 2007. Managing *halal* quality in food service industry. Singapore: University of Nevada, Las Vegas.
- State of the Global Islamic Economy Report 2015/16. 2015. New York City: Thomson Reuters and Dinar Standard.
- Tan, S. 2009. Misuses of KR-20 and Cronbach's Alpha reliability coefficients. *Education and Science* 34(152): 102-112.
- The Pew Forum on Religion and Public Life. 2011. The future of the global muslim population projections for 2010-2013. Washington: Pew Research Center.
- Vogt, W. P. 2007. Quantitative research methods for professionals. United State: Pearson Education Inc.
- Warmbrod, J. R. 2014. Reporting and interpreting scores derives from likert-type scales. *Journal of Agricultural Education* 55(5): 30-47.
- Yapp, C. and Fairman, R. 2006. Factors affecting food safety compliance within small and medium-sized enterprises: implications for regulatory and enforcement strategies. *Food Control* 27: 289-293.