UNIVERSITI PUTRA MALAYSIA

INTENTION TO ADOPT WEB-BASED HALAL TRACEABILITY SYSTEM AMONG SMALL AND MEDIUM ENTERPRISES OF FOOD SUB-SECTOR IN PENINSULAR MALAYSIA

NUR AMININ MUHAMAD

IPPH 2021 1

INTENTION TO ADOPT WEB-BASED HALAL TRACEABILITY SYSTEM AMONG SMALL AND MEDIUM ENTERPRISES OF FOOD SUB-SECTOR IN PENINSULAR MALAYSIA

By

NUR AMININ MUHAMAD

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the Degree of Master of Science

November 2020

INTENTION TO ADOPT WEB-BASED HALAL TRACEABILITY SYSTEM AMONG SMALL AND MEDIUM ENTERPRISES OF FOOD SUB-SECTOR IN PENINSULAR MALAYSIA

By

NUR AMININ MUHAMAD

November 2020

Chair   : Nitty Hirawaty Kamarulzaman, PhD
Institute : Halal Products Research

Food fraud especially in halal food products caused the biggest concern among Muslim consumers to arise that need consideration by the food manufacturers specifically small and medium enterprises (SMEs). Traceability system could improve the halal transparency along the food supply chain. The Department of Islamic Development Malaysia (JAKIM) had introduced Halal Assurance Management System (HAS) as a guideline for halal traceability system, however, only multinational and medium companies are required to comply with this guideline. Moreover, the adoption of sophisticated systems among SMEs in Malaysia is still low. This could lead to their reluctance to adopt web-based halal traceability system.

The general objective of this study was to identify the intention to adopt web-based halal traceability system among SMEs of food sub-sector in Peninsular Malaysia. Five specific objectives of this study were to determine the level of intention to adopt web-based halal traceability system among SMEs of food sub-sector in Peninsular Malaysia; to determine the association between firmographic profiles of SMEs of food sub-sector in Peninsular Malaysia and their intention to adopt web-based halal traceability system; to identify the relationship between the factors towards perceived usefulness of web-based halal traceability system and perceived ease of use of web-based halal traceability system; to identify the most influential factors that influence the intention to adopt web-based halal traceability system among SMEs of food sub-sector in Peninsular Malaysia; and to suggest possible policy recommendations towards adoption of web-based halal traceability system in Malaysia's halal industry.

An interviewer-administered questionnaire was used for data collection of 260 halal-certified food SMEs that were selected using a systematic random

sampling method. The data were analyzed using descriptive analysis, mean ranking analysis, Chi-square analysis, Pearson correlation analysis, and logistic regression analysis. Most of the respondents were from middle-level management (95 respondents, 36.5%). The majority of food SMEs involved in this study (207 companies, 79.6%) were small business size companies. This study revealed the utilization of information and communication technology (ICT) tools especially the advanced system by the food SMEs was still low. The majority of food SMEs showed a high intention to adopt web-based halal traceability system.

Sales turnover and region have a significant association with intention to adopt web-based halal traceability system among food SMEs. Besides, the environmental aspect and perceived usefulness of web-based halal traceability system showed a strong correlation (r=0.720, p<0.01). Logistic regression analysis revealed that perceived usefulness, perceived ease of use, and sales turnover were the influential factors of intention to adopt web-based halal traceability system among food SMEs.

This study recommends JAKIM to enhance the effectiveness of HAS by guiding the micro and small size SMEs to implement HAS in their business operations. Food SMEs that faced financial constraints are encouraged to seek financial schemes provided by responsible authorities. Besides, network coverage needs improvement throughout the region, especially in rural areas. The number of events for participation of food SMEs need to be intensified to trigger their competitive spirit and innovativeness in improving their business performance. The course and training on halal traceability system are needed for the enhancement of knowledge and skills about the system.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk Ijazah Master Sains

NIAT UNTUK MENERIMA PAKAI SISTEM PENGESANAN HALAL BERDASARKAN WEB DI KALANGAN PERUSAHAAN KECIL DAN SEDERHANA SUB-SEKTOR MAKANAN DALAM SEMENANJUNG MALAYSIA

Oleh

NUR AMININ MUHAMAD

November 2020

Pengerusi   : Nitty Hirawaty Kamarulzaman, PhD
Institut   : Penyelidikan Produk Halal

Penipuan makanan terutamanya dalam produk makanan halal menimbulkan kebimbangan terbesar di kalangan pengguna Muslim yang perlu dipertimbangkan oleh pengeluar makanan khususnya perusahaan kecil dan sederhana (PKS). Sistem pengesanan dapat meningkatkan ketelusan halal di sepanjang rantaian bekalan makanan. Jabatan Kemajuan Islam Malaysia (JAKIM) telah memperkenalkan Sistem Pengurusan Jaminan Halal (HAS) sebagai garis panduan untuk sistem pengesanan halal, namun hanya syarikat multinasional dan sederhana yang diwajibkan untuk mematuhi garis panduan ini. Tambahan pula, penggunaan sistem canggih di kalangan PKS di Malaysia masih rendah. Ini menyebabkan keengganan mereka untuk menggunakan sistem pengesanan halal berdasarkan web.

Objektif umum kajian ini adalah untuk mengenal pasti niat untuk mengguna pakai sistem pengesanan halal berdasarkan web di kalangan PKS sub-sektor makanan dalam Semenanjung Malaysia. Lima objektif khusus kajian ini adalah untuk menentukan tahap niat untuk mengguna pakai sistem pengesanan halal berdasarkan web di kalangan PKS subsektor makanan dalam Semenanjung Malaysia; untuk menentukan perkaitan di antara profil firma PKS subsektor makanan dalam Semenanjung Malaysia dan niat mereka untuk mengguna pakai sistem pengesanan halal berdasarkan web; untuk mengenal pasti hubungan di antara faktor-faktor terhadap kegunaan yang dapat dirasakan berkenaan sistem pengesanan halal berdasarkan web dan kemudahan penggunaan sistem pengesanan halal berdasarkan web; untuk mengenal pasti faktor yang paling berpengaruh yang mempengaruhi niat untuk mengguna pakai sistem

iii

pengesanan halal berdasarkan web di kalangan PKS subsektor makanan dalam Semenanjung Malaysia; dan untuk mencadangkan kemungkinan cadangan dasar ke arah penggunaan sistem pengesanan halal berdasarkan web dalam industri halal Malaysia.

Soal selidik yang ditadbir oleh penemuduga digunakan untuk pengumpulan data 260 PKS makanan yang disahkan halal yang mana dipilih menggunakan kaedah persampelan rawak sistematik. Data dianalisis menggunakan analisis deskriptif, analisis peringkat min, analisis Khi-kuasa dua, analisis korelasi Pearson dan analisis regresi logistik. Sebilangan besar responden adalah daripada pengurusan pada peringkat pertengahan (95 responden, 36.5%). Sebilangan besar PKS makanan yang terlibat dalam kajian ini (207 syarikat, 79.6%) adalah perusahaan kecil. Kajian ini mendedahkan bahawa penggunaan alat teknologi informasi dan komunikasi (ICT) terutama sistem yang canggih oleh PKS makanan masih rendah. Sebilangan besar PKS makanan mempunyai niat yang tinggi untuk menggunakan sistem pengesanan halal berdasarkan web.

Perolehan jualan dan kawasan mempunyai kaitan yang signifikan dengan niat untuk menerima pakai sistem pengesanan halal berdasarkan web di kalangan PKS makanan. Selain itu, aspek persekitaran dan kegunaan sistem pengesanan halal berdasarkan web menunjukkan korelasi yang kuat (r = 0.720, p <0.01). Analisis regresi logistik menunjukkan bahawa kegunaan yang dirasakan, kemudahan penggunaan yang dirasakan, dan perolehan penjualan adalah faktor yang mempengaruhi niat untuk menerima pakai sistem pengesanan halal berdasarkan web di kalangan PKS makanan.

Kajian ini mencadangkan agar JAKIM meningkatkan keberkesanan HAS dengan membimbing PKS bersaiz mikro dan kecil untuk melaksanakan HAS dalam operasi perniagaan mereka. PKS makanan yang menghadapi masalah kewangan disarankan untuk mencari skim kewangan yang telah disediakan oleh pihak berkuasa yang bertanggungjawab. Selanjutnya, liputan rangkaian perlu dipertingkatkan di seluruh wilayah terutamanya di kawasan luar bandar. Jumlah acara untuk penyertaan PKS makanan perlu dipergiatkan untuk memacu semangat kompetitif dan inovatif mereka dalam meningkatkan prestasi perniagaan mereka. Kursus dan latihan mengenai sistem pengesanan halal diperlukan untuk peningkatan pengetahuan dan kemahiran mengenai sistem tersebut.

iv

ACKNOWLEDGEMENTS

All praise to Allah for giving me an opportunity to continue my studies and had given me the strength to face all the hardships throughout the journey.

I would like to express my gratitude to my supervisor, Associate Professor Dr. Nitty Hirawaty Kamarulzaman who had given guidance and supervise my research from the early stage until the end of the stage. My sincere gratitude also to my committee member, Associate Professor Dr. Nolila Mohd Nawi from the Department of Agribusiness and Bioresource Economics who had shared her knowledge regarding the topics and given various ideas and opinions to improve my research.

I would also like to thank to my beloved parents who had become the backbone throughout the completion of my study. Their encouragement and moral support are the reason for me to reach this level. An appreciation is also dedicated to my loved one as he is the one that always boosts up my confidence level for every single thing that I need to face. Further, I would like to thank my beloved friends who had to fill the role of my family here. I am the most grateful for their assistance and existence throughout this journey.

v

This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Master Science. The members of the Supervisory Committee were as follows:

Nitty Hirawaty Kamarulzaman, PhD
Associate Professor
Faculty of Agriculture
Universiti Putra Malaysia
(Chairman)

Nolila Mohd Nawi, PhD
Associate Professor
Faculty of Agriculture
Universiti Putra Malaysia
(Member)

_____
ZALILAH MOHD SHARIFF, PhD
Professor and Dean
School of Graduate Studies
Universiti Putra Malaysia

Date:

Declaration by graduate student

I hereby confirm that:
- this thesis is my original work;
- quotations, illustrations and citations have been duly referenced;
- this thesis has not been submitted previously or concurrently for any other degree at any other institutions;
- intellectual property from the thesis and copyright of thesis are fully-owned by Universiti Putra Malaysia, as according to the Universiti Putra Malaysia (Research) Rules 2012;
- written permission must be obtained from supervisor and the office of Deputy Vice-Chancellor (Research and Innovation) before thesis is published (in the form of written, printed or in electronic form) including books, journals, modules, proceedings, popular writings, seminar papers, manuscripts, posters, reports, lecture notes, learning modules or any other materials as stated in the Universiti Putra Malaysia (Research) Rules 2012;
- there is no plagiarism or data falsification/fabrication in the thesis, and scholarly integrity is upheld as according to the Universiti Putra Malaysia (Graduate Studies) Rules 2003 (Revision 2012-2013) and the Universiti Putra Malaysia (Research) Rules 2012. The thesis has undergone plagiarism detection software.

Signature: _____ Date: _____

Name and Matric No.: Nur Aminin Binti Muhamad (GS52616)

Declaration by Members of Supervisory Committee

This is to confirm that:
- the research conducted and the writing of this thesis was under our supervision;
- supervision responsibilities as stated in the Universiti Putra Malaysia (Graduate Studies) Rules 2003 (Revision 2012-2013) are adhered to.

Signature: _____
Name of Chairman
of Supervisory
Committee: Assoc. Prof. Dr. Nitty Hirawaty Kamarulzaman

Signature: _____
Name of Member of
Supervisory
Committee: Assoc. Prof. Dr. Nolila Mohd Nawi

TABLE OF CONTENTS

LIST OF TABLES

xiii

LIST OF FIGURES

xiv

LIST OF ABBREVIATIONS

CRM	Customer Relationship Management
DOI	Diffusion of Innovation
DOSM	Department of Statistics Malaysia
DFTZ	Digital Free-Trade Zone
DSM	Department of Standards Malaysia
EDI	Electronic Data Interchange
FinTech	Financial Technology
GDP	Gross Domestic Product
HALFEST	Halal Fiesta Malaysia
HAS	Halal Assurance Management System
HCP	Halal Critical Point
HDC	Halal Development Corporation Berhad
HIMP	Halal Industry Master Plan
ICT	Information and Communication Technology
IHC	Internal Halal Committee
IR	Industrial Revolution
IT	Information Technology
INSEAD	Institut Européen d'Administration des Affaires
IoT	Internet of Things
IS	Information System
JAKIM	Department of Islamic Development Malaysia
MAEPS	Malaysia Agro Exposition Park Serdang
MAHA	Malaysia Agriculture, Horticulture & Agrotourism
MIECC	Malaysia International Exhibition & Convention Centre
MITI	Ministry of International Trade and Industry Malaysia
MNC	Multinational Company
11MP	The Eleventh Malaysia Plan 2016-2020
NFC	Near Field Communication
OECD	Organization for Economic Co-operation and Development
PEOU	Perceived Ease of Use
PU	Perceived Usefulness
RFID	Radio-frequency Identification
SME	Small and Medium Enterprise
SMI	Small and Medium Industry
SPSS	Statistical Package for the Social Sciences
TAM	Theory Acceptance Model
TOE	Technology-Organization-Environment Framework
TPB	Theory of Planned Behavior
TRA	Theory of Reasoned Action
WI-FI	Wireless Fidelity
WIPO	World Intellectual Property Organization

CHAPTER 1

INTRODUCTION

This chapter describes the background and contribution of small and medium enterprises (SMEs) in Malaysia. The implementation of food traceability system along the supply chain is also discussed alongside sustaining Shariah-compliant among halal food manufacturers. The problem statement, research questions, research objectives, significance of the study, scope of the study, operational definition and key terms, and organization of the thesis are also elaborated in this chapter.

1.1   Overview of Small and Medium Enterprises in Malaysia

Malaysia is categorized as an upper middle-income country, and gradually leading towards a high-income country as Malaysia had shown an impactful achievement by transforming from a principally commodity-driven economy to the one that leads based on service and manufacturing sector (Organisation for Economic Co-operation and Development (OECD), 2018). Small and medium enterprises (SMEs) are one of the major contributors to the Malaysian Gross Domestic Product (GDP) as in 2018, SMEs had exceeded 6.2% of recorded Malaysia's GDP and non-SMEs which is 4.7% and 3.8% respectively. Non-SMEs are referred to as public-listed companies that are included in the mainboard namely Bursa Malaysia and large firms, government-linked companies (GLCs), multinational companies (MNC), state-owned enterprises, and Syarikat Menteri Kewangan Diperbadankan (MKDs) (SME Corporation Malaysia, 2013). Small and medium enterprises (SMEs) had shown a consistent performance in previous years wherein 2017, SMEs recorded 7.1%, exceeding the recorded Malaysia's GDP and non-SMEs which is 5.7% and 4.9% respectively. Meanwhile, in 2016, SMEs had achieved 5.4%, exceeding the recorded Malaysia's GDP and non-SMEs which is 4.4% and 3.9% respectively. The annual percentage of change growth is depicted in Table 1.1.

Table 1.1: Annual Percentage Change Growth

Year	2016	2017	2018
Annual percentage change of Malaysia's GDP (%)	4.4	5.7	4.7
Annual percentage change of non-SMEs (%)	3.9	4.9	3.8
Annual percentage change of SMEs (%)	5.4	7.1	6.2

Source: The Department of Statistics Malaysia (DOSM) (2018)

The Department of Statistics Malaysia (DOSM) (2018) recorded that SMEs have contributed approximately 37.8% towards Malaysia's GDP in 2017 and has increased to 38.3% in 2018. Concurrently, RM521.7 billion was reported as the price of value-added of SMEs at constant 2015 prices in 2018, which rose from RM491.2 billion in 2017. The price of value-added for SMEs showed a constant

increment from 2016 to 2018 alongside the increment of the value-added price for non-SMEs. The value-added at constant prices 2015 for SMEs and non-SMEs are summarized in Table 1.2.

Table 1.2: Value-added at Constant 2015 Prices

Year	2015	2016	2017	2018
Non-SMEs (RM billion)	741.9	770.6	808.7	839.8
SMEs (RM billion)	435.1	458.7	491.2	521.7

Source: DOSM (2018)

The increment was contributed by five (5) sectors in SMEs namely agriculture, mining and quarrying, manufacturing, services, and construction. In 2018, the decrement was reported mainly in all of the sectors except for the services sector as an increment was recorded from 7.2% in 2017 to 8.1% in 2018. SME Corporation Malaysia (2018) reported that the service sector had the largest share of SMEs which is 89.2% with the total number of SMEs recorded 809,126. Table 1.3 summarizes the number of establishments of SMEs by sector and size.

Table 1.3: Number of Establishments by Sector and Size

Sector	Number of SMEs Establishments				Share of SMEs (%)	Large Firms
	Micro	Small	Medium	Total SMEs		
Services	649,186	148,078	11,862	809,126	89.2	9,185
Manufacturing	22,083	23,096	2,519	47,698	5.3	1,403
Construction	17,321	17,008	4,829	39,158	4.3	1,400
Agriculture	4,863	4,143	1,212	10,218	1.1	1,410
Mining and Quarrying	217	458	190	865	0.1	161
Total	693,670	192,783	20,612	907,065	100.0	13,559

Source: SME Corporation Malaysia (2018)

Based on Table 1.3, the manufacturing sector emerged as the second-highest number of establishments that comprise of micro size (22,083 enterprises), small size (23,096 enterprises), and medium size (2,519 enterprises) with the share of 5.3%. Moreover, it was highlighted that the manufacturing sector is composed of a large number of SMEs which was contributed by 98.5% of the total firms (MITI, 2018). This is in line with the number of total SMEs established in the manufacturing sector reported by SME Corporation Malaysia (2018) which is 47,698 compared to 1,403 of large firms' establishments.

There are a few terms used to reflect SMEs which are agro-food SMEs, food SMEs and SMEs. Agro-food SMEs consist of the prefix 'agro-' that means agriculture which is complemented with 'food' refers to all the activities that occur from farm to fork concerning food (Sage, 2018). Furthermore, food SMEs are the sub-sectors that represent both the services sector and manufacturing sector of SMEs namely wholesale and retail trade, food and beverages, and accommodation; and food, beverages, and tobacco products respectively (SME

Corporation Malaysia, 2018). Agriculture and food are somehow connected and closely related to the food industry that needs agricultural products as the raw materials and ingredients in both food manufacturing or services sub-sectors (Gouk, 2012). These show that either agro-food SMEs or food SMEs could be used as a subject to emphasize any issues in the food sector related to SMEs. Meanwhile, SMEs refer to broader perspectives as it encompasses by SMEs that establish their businesses in five sectors namely services, manufacturing, construction, agriculture, and mining and quarrying (SME Corporation Malaysia, 2018). This study focuses more on food, beverages, and tobacco products sub-sector in the manufacturing sector.

Table 1.4 shows the decline in the SMEs value-added growth of sub-sectors in the manufacturing sector which is from 6.8% in 2017 to 5.5% in 2018.

Table 1.4: SMEs Value-added Growth of Sub-Sectors in Manufacturing Sector

Sub-sectors in manufacturing sector	2016	2017	2018
Overall manufacturing sector (%)	4.8	6.8	5.5
Petroleum, chemical, rubber, and plastic products (%)	5.4	4.4	5.8
Food, beverages, and tobacco products (%)	**2.9**	**11.0**	**3.6**
Non-metallic mineral products, basic metal, and fabricated metal products (%)	6.2	6.1	6.9
Other manufacturing (%)	4.8	6.3	5.6

Source: SME Corporation Malaysia (2018)

Meanwhile, the food, beverages, and tobacco sub-sector led the increment compared to other sub-sectors where it surged from 2.9% in 2016 to 11.0% in 2017. However, SME Corporation Malaysia (2018) reported that the food, beverages, and tobacco sub-sector had shown a drastic decrement compared to other sub-sectors which is from 11.0% in 2017 to 3.6% in 2018 with the manufacturing of beverages notably contributed to the reduction. Based on the trend shown in Table 1.4, a substantial fluctuation had occurred in the food, beverages, and tobacco sub-sector since 2016. On the other hand, the exports of SMEs manufacturing sector showed excellent performance as the sector is one of the major contributors of total SMEs exports in 2018, with a record of 5.1% (Table 1.5).

Table 1.5: Annual Percentage Change of SMEs Exports by Sectors

Year	2016	2017	2018
Agriculture sector (%)	35.0	-6.3	-2.0
Manufacturing sector (%)	4.6	7.8	5.1
Services sector (%)	8.5	7.1	2.0

Source: DOSM (2018)

The performance of manufacturing sector export was attributed to beverages and tobacco, chemicals, manufactured goods, and miscellaneous manufactured articles with 48.3% of contribution in exports to various countries such as Singapore, China, and the United States of America. Despite the good

3

performance showed by each sector, the contribution of SMEs exports to the total exports in 2018 was the same as the previous year, which was recorded at 17.3%.

1.2   Overview of Halal Industry

The halal industry is imperative in Malaysia since the majority of the population distributed are Muslim consumers. Muslim consumers tend to be more attentive in accessing their dietary intake where the foods must comply according to Shariah law as it is one of the obligations as a Muslim. The total population distributed based on religion in Malaysia is summarized in Table 1.6.

Table 1.6: Total Population by Religion in Malaysia

Religion	Total	Percentage (%)
Islam	15,762,012	60.83
Christianity	2,392,823	9.23
Buddhism	5,459,065	21.07
Hinduism	1,666,365	6.43
Traditional Chinese belief (Confucianism, Taoism)	351,073	1.35
Other religions	96,378	0.37
No religion	183,808	0.71

Source: DOSM (2010)

The religion that is practiced by the majority of the population in Malaysia is Islam with a total population of 15,762,012 (60.83%), followed by Buddhism with a total population of 5,459,065 (21.07%), Christianity with a total population of 2,392,823 (9.23%), Hinduism with total population 1,666,365 (6.43%), Traditional Chinese belief such as Confucianism and Taoism with a total population of 351,073 (1.35%), no religion with total population 183,808 (0.71%), and other religions with a total population of 96,378 (0.37%).

Malaysian food and beverage industry had captivated the attention of entrepreneurs as the industry showed an impressive development over time. Malaysian halal industry provides a great platform for Malaysian producers and manufacturers, particularly SMEs to initiate a business. The Department of Statistics Malaysia (DOSM) (2017) reported that 6,138 companies were established as halal-certified companies in 2015 compared to 3,328 companies in 2010 with an average growth rate of 13%. Moreover, the gross output value of the industry showed an increment of 9.0% annually from 2010 to 2015, concurrent with the annual growth of value-added, which is 12.0%. Based on Table 1.7, the Halal Development Corporation Berhad (HDC) (2016) reported that the companies in the small and medium industry (SMI) are the highest established as halal-certified companies, which is 3,588 (47.9%), followed by companies in the small industry, which is 2,304 (30.7%) and multinational company (MNC) which is 1,607 (21.4%).

4

Table 1.7: Total Halal Certified Company and the Application of Halal

	Products (%)	Premises (%)	Companies (%)	Total (%)
Multinational Company (MNC)	840 (20.4)	368 (41.8)	399 (15.9)	1,607 (21.4)
Small and Medium Industry (SMI)	2,155 (52.4)	324 (36.8)	1,109 (44.3)	3,588 (47.9)
Small Industry	1,120 (27.2)	188 (21.4)	996 (39.8)	2,304 (30.7)
Total	4,115	880	2,504	7,499

Source: HDC (2016)

Table 1.7 also shows that halal was applied based on the product, premises, and companies. Majority of SMI companies that applied halal for their product composed of 2,155 (52.4%), followed by 1,120 small industry companies (27.2%) and 840 MNC (20.4%). Most of the companies that applied halal for premises were MNC which accounted for 368 (41.8%), whereas 324 companies (36.8%) were from SMI and 188 companies (21.4%) were from small industry. Meanwhile, the application of halal for companies was dominated by 1,109 SMI companies (44.3%), while the others were 996 small industry companies (39.8%) and 399 MNC (15.9%).

The halal industry has demonstrated its capability to create job opportunities as evidenced by the increase in the employment rate. It was recorded that 345,644 workers were employed in 2015 which rose from 198,696 employed workers in 2010. Halal food production entails the Shariah-compliant food that emphasizes the hygiene and safety aspects of the products that are produced by producers and manufacturers (Shafii & Khadijah, 2011). The involvement of SMEs in the industry would satisfy the demand for halal products for the country as Muslim consumers in Malaysia could access the products, especially food without being skeptical.

There are two organizations responsible for any inquiries on the management and resolution of issues in halal affairs. The first organization is the Department of Islamic Development Malaysia (JAKIM), which is the federal government agency in Malaysia that administers Islamic affairs in the country. The Department of Islamic Development Malaysia (JAKIM) has three main roles, namely drafting and standardizing the Islamic Law, coordinate the Islamic administration, and coordinate and develop Islamic education (JAKIM, 2016). The second organization is Halal Development Corporation Berhad (HDC), which also a Malaysian federal government agency that was mandated as the custodian of Malaysia's halal economy as well as a trusted partner in the halal business.

The role of HDC focuses mainly on assisting industry players to increase Malaysia's halal exports and direct investment for halal industrial parks. Other responsibilities of HDC include providing advisory services regarding opportunities across the halal market and value chain, construct strategies and

5

initiatives that are in line with the country's development of socio-economic agenda, facilitate the growth and participation of halal industry participants, promote Halal Malaysia brand worldwide, coordinate and report the performance index regarding the initiatives implemented, enhance the value of talents development initiatives, assist in the fully halal and Shariah-compliant value chain development, facilitate the international relations and cooperation, and assist in the management of halal industry-related initiatives and issues (HDC, 2020).

1.3   Halal Food Issues

Religion obligation influenced Muslim consumers to be vigilant in appraising their dietary consumption with respecting the *halalness* of the products as the issue is very sensitive. The food fraud especially in halal food products caused an immense concern among Muslim consumers where the occurrence would be a threat for food manufacturers and producers. Food fraud refers to food misrepresentation, alteration, addition, or intentional substitution; or misleading or false statements regarding the product for profit gain (Spink & Moyer, 2011). In 2018, local newspapers such as Utusan Online, Berita Harian Online, and Kosmo Online had reported that a few companies were busted because of the fake halal logo and doubtful halal logo were used for their food products (Nuar, 2018; Othman, 2018; Yahya, 2018). Zailani et al. (2010) claimed that scepticism among Muslim consumers in some way was triggered due to the halal logo issues which led to some queries on the halal compliance and halal integrity among the halal industry players, as well as the halal transparency on the Malaysian market regarding its efficacy.

Traceability promotes transparency and ensures that certain products or materials could be traced along the supply chain (Abdul Majid et al., 2015). The presence of a traceability system could minimize the risk of product recall (Kal-Kausar et al., 2013). International newspaper in Singapore namely Singapore The Straits Times had reported that some of the companies in Malaysia were forced to recall their products due to contamination of bacteria and excessive level of the chemical in the foods (Shiying, 2020; Thimothy, 2019). These incidences occurred when the *toyyiban* element in halal was excluded. Thus, to minimize the issues from persistent reoccurrence, an effective traceability system in Malaysia, especially in the halal food industry is extremely crucial (Mohamed et al., 2016; Poniman et al., 2015; Shafii & Khadijah, 2011; & Zailani et al., 2010). Halal transparency along the food supply chain could be enhanced by establishing a proper halal traceability system, particularly a web-based system which could eventually spur on consumers' trust towards halal food products.

Halal supply chain management entails a persistent *halalness* of the food products along the companies' supply chain. However, there is a lack of awareness and understanding of the halal concept among the employees (Ernest & Lau, 2012). Jamaludin et al. (2015) claimed that a variation of halal

6

training programme has developed confusion among the workforce. Hashim and Mohd Shariff (2016) on the other hand, argued that halal training programs are imperative for halal management and Shariah knowledge in developing new skills of human capital in the company. The halal food issues discussed in the earlier paragraphs are summarized in Table 1.8.

Table 1.8: Summary of Halal Food Issues

Issue	Description	Source
Food traceability system	• Some Malaysian companies are forced to recall their products in Singapore due to contamination of bacteria and excessive level of the chemical in the foods	Shiying (2020); Thimothy (2019)
Violation of halal logo	• Fake halal logo and doubtful halal logo are used for food products	Nuar (2018); Othman (2018); Yahya (2018)
Halal supply chain management	• Lack of awareness and understanding about halal concept among employees • Variation of a halal training programme developed confusion among the workforce and impede the perseverance of food products' *halalness* along the companies' supply chain	Ernest & Lau (2012); Jamaluddin et al. (2015)

Source: Compiled by the author (2020)

1.4   Malaysian Guideline on Halal Traceability System

The Department of Islamic Development Malaysia (JAKIM) (2011) had developed a guideline namely Halal Assurance Management System (HAS) as an approach to nurturing halal-certified companies in adopting a system during the enhancement of their efficiency in controlling the authenticity and purity of halal. The system that conforms to the halal requirements stated by the competent authorities enables the availability of traceability across the supply chain. This guideline also could assist non-halal certified companies to acquire a halal certificate from the rightful authority. The supply chain process that abides regulation stated by the halal authority as comprised in HAS would be an internal mechanism for a company that could assist in monitoring and controlling halal products supply chain as well as enhancing and preventing the negligence of Shariah-compliant procedure in manufacturing halal products.

According to JAKIM (2011), HAS needs to be complemented with any applicable halal standards or guidelines stated by competent authorities such as the Department of Standards Malaysia (DSM), as described in Table 1.9.

7

Table 1.9: Halal Standards in Malaysia

Halal Standard	Description
MS 1500: 2009 Halal Food - Production, Preparation, Handling and Storage - General Guidelines	- Specifies the practical guidance regarding the preparation and handling of halal food product, including nutrient supplements for food industry and a basic requirement for halal food product and food trade or business in Malaysia.
MS 2400 - 1: 2010 Malaysia Standard - Halal-Toyyiban Assurance Pipeline - Part 1: Management System Requirements for Transportation of Goods and/or Cargo Chain Services	- Emphasizes on the requirements of management system for assurance of the halal integrity of products, goods and/or cargo that were handled through various modes of transportation.
MS 2400 - 2: 2010 Malaysia Standard - Halal-Toyyiban Assurance Pipeline - Part 2: Management System Requirements for Warehousing and Related Activities	- Enforces the requirements of management system for assurance of the halal integrity of products, goods and/or cargo at the warehouse.
MS 2400 - 3: 2020 Malaysia Standard - Halal-Toyyiban Assurance Pipeline - Part 3: Management System Requirements for Retailing; and Manual Procedure of Malaysia Halal Certification	- Emphasizes the requirements of management system for assurance of halal integrity of products, goods and/or cargo at the retail stage.

Source: DSM (2018); DSM (2009)

There are several terms developed to simplify the explanation of a certain concept in the HAS guideline. Table 1.10 summarizes the terms and their descriptions that are frequently used throughout the guideline.

Table 1.10: Term and Description of Halal Assurance Management System

Term	Description
Internal Halal Committee (IHC)	A committee formed by the company responsible for developing, monitoring, and controlling the halal assurance system.
Internal Halal Committee Meeting	A meeting that discusses the development, implementation, maintenance, and overview of halal assurance management system undertaken by members of the internal halal committee.
Documentation	The record of activity regarding halal assurance management system.
Control Measure	The crucial act or/and activity needed in controlling or/and eliminating halal threats.
Corrective Action	The act that needs to be taken resulting from the loss of control at IHC monitoring.
Non-compliance	The negligence or/and nonfulfillment of any halal standards or guidelines.
Contamination	A common term that explains the contaminated state caused by either a contaminant or precursor which eventually influences the halal status.

Traceability	The capacity of history, location, or application verification for the documented and recorded item. Traceability elements encompass product, process, and customer traceability.
Halal Critical Point (HCP)	Critical points throughout the halal supply chain that could eliminate the likelihood of halal non-compliance once identified, monitored, and controlled.
Verification	The procedures or methods used in monitoring to identify whether the halal assurance system complies or requires revision and revalidation.

Source: JAKIM (2011)

Halal assurance management system (HAS) emphasizes the reduction and elimination of non-compliance of the halal requirements. The crucial part which is Halal Critical Point (HCP) would be identified across the supply chain alongside persistent monitoring, controlling, and verification. An efficient HAS encompasses effectual procedures of a product recall, availability of traceability system through proper documentation, and orderly filing system for procedures, halal application, documents, and records that enable audit process by rightful authorities. Crucial principles that shall be emphasized by IHC at the time of HAS implementation include the determination of HCP; development and verification of flow chart; implementation of control measures; development of corrective actions; documentation system and management of records; and process verification (JAKIM, 2011). Further explanation of these critical principles can be referred to in Appendix A.

The Department of Islamic Development Malaysia (JAKIM) (2015) stated in the manual of halal certification procedure Malaysia (third revision) for the category of food products/ beverages/ food supplements that only multinational company (MNC) and medium size company are required to implement HAS, whereas small and micro size company are not required to implement HAS. The establishment of SMEs in the manufacturing sector according to size showed that small companies are leading (23,096 companies, 48.42%); followed by micro (22,083 companies, 46.30%); and medium (2,519 companies, 5.28%) (SME Corporation Malaysia, 2018). Meanwhile, HDC (2016) highlighted that halal-certified companies by category were led by small medium industry (SMI) (1,109 companies, 44.3%); followed by small industry (996 companies, 39.8%); and MNC (399 companies, 15.9%). These statistics show that among the three sizes of SMEs, small and micro sizes represented most of the SMEs. The problem arises whenever these statistics were aligned with HAS implementation requirement. In other words, only a small representative of SMEs, specifically medium size company is exposed and familiar to HAS, a comprehensive system that could enhance business efficiency in controlling the authenticity and purity of halal.

9

1.5   Adoption of Technology by Small and Medium Enterprises

According to the Ministry of International Trade and Industry Malaysia (MITI) (2018), Malaysia is literally in a convincing position and has become one of the competitive nations in terms of technology utilization. Malaysia was ranked 37th globally out of 127 countries and placed 8th among Asian in Global Innovation Index 2017 which was co-published by Cornell University, Institut Européen d'Administration des Affaires (INSEAD), and World Intellectual Property Organization (WIPO). Besides, World Economic Forum and Kearney (2018) stated in the Readiness for the Future of Production Report 2018 that Malaysia is a well-established nation as the country could reap benefits from the execution of Industry 4.0. These outstanding achievements in some way contributed by the manufacturing industry in Malaysia. The forecast of the industry was expected to be flexible over time and in line with the target for annual Gross Domestic Product (GDP) growth rate of 5.1% as mentioned in the Eleventh Malaysia Plan, 2016-2020 (11MP) (MITI, 2018).

Realizing that SMEs is one of the imperative sectors that contribute to the Malaysian economics enhancement, the government undertakes an approach to provide the platform for SMEs to make their presence as globally recognized as well as encouraging SMEs to be globally competitive by adopting recent technological advances as they have a bright potential to export their products (MITI, 2018). The recent technological approaches that were exposed to SMEs include e-Commerce Strategic Roadmap and the Digital Free-Trade Zone (DFTZ). Besides, Organisation for Economic Co-operation and Development (OECD) (2018) also reported that the technology and innovation promotion of Malaysia was scored 4.77 from the scale range 1 to 6 which placed Malaysia as the third country that possessed an advanced level of policy development and implementation for SMEs after Singapore (6.00) and Thailand (5.01) among ASEAN countries.

Concurrent with the government's desire to ensure the global recognition of Malaysian SMEs, the same approach had been put into consideration regarding the enhancement of transparency in the halal Malaysian market. The Halal Development Corporation Berhad (HDC) (2020) had set halal traceability services as one of the key enablers to support the implementation of the Halal Industry Master Plan 2030 (HIMP 2030). Halal traceability services focus on the encouragement of halal innovation through the advancement of technology such as Blockchain, Industrial Revolution (IR) 4.0, Big Data, Internet of Things (IoT), and Financial Technology (FinTech) to ensure the halal products, go through a verified supply chain entirely. The utilization of these advanced technologies could provide huge potential to further improve the halal industry in Malaysia. The benefits that could be reaped by the Malaysian halal industry from the advancement of these technologies include the improvement of transparency, traceability, and authenticity of halal products, processes, and services across the supply chain, better management of contamination and hazard, faster and optimized mass production, rapid changing of consumer behavior could be

adapted quickly, and the integration of supply chain could be improved for faster delivery of raw materials and products.

According to Gunnar and Fremme (2007), adopted traceability system conducted using a web-based system is more efficient and effective compared to a paper-based system. However, the majority of companies that adopt traceability system commonly used manual traceability tools and methods which is inefficient compared to semi-automated and automated approaches (Neumuller & Grunbacher, 2006). This accords with the revelation made by SME Corporation Malaysia (2018) that the adoption of advanced systems by most of the SMEs in Malaysia in which their level of complexity is the same as the traceability system are still low namely intranet, extranet, e-commerce marketplace, and Customer Relationship Management (CRM) systems regardless the fact that smartphones, computers, and the Internet have been used widely for their business operations (Figure 1.1).
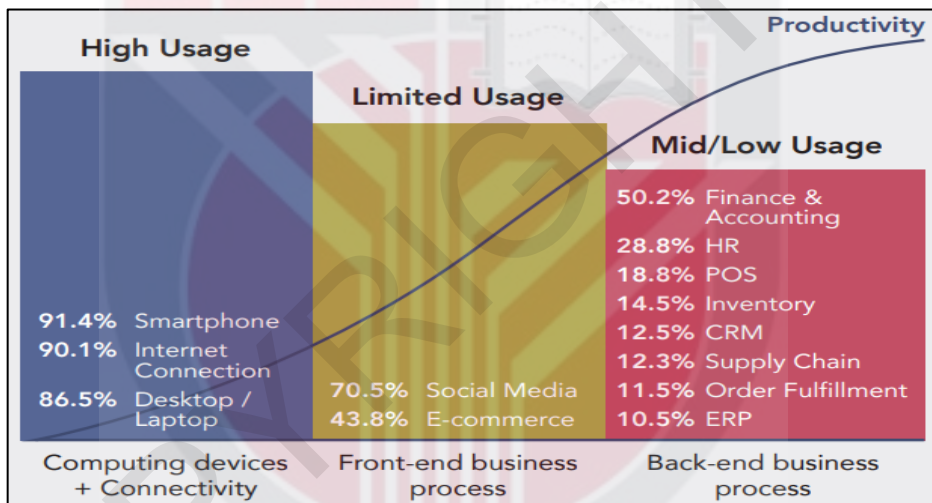
Figure 1.1: ICT Tools or System Usage
Source: SME Corporation Malaysia (2018)

The strong denial of knowledge about certain information technology that has afflicted SMEs in Malaysia is usually due to the concerns about the forthcoming challenges that need to be resolved later on (Ramayah et al., 2009). The concern arises because of the constraints faced by SMEs as they have an unconvincing technological base, limited usage of information technologies, and poor human resources (Chin et al., 2012). The Organisation for Economic Co-operation and Development (OECD) (2019) attributed several reasons that cause the lagged in digitalization among SMEs, namely less preparation in data protection to face cyber security threats, the struggle in integrating various types of innovation, unskilled in managing digital transformation, less engagement of employees with ICT training as well as limited skilled employees, particularly in communication and management.

1.6   Problem Statement

Muslim consumers who are the majority of the population in Malaysia tend to be more delicate and responsive in choosing their daily consumption explicitly of halal foods as it is their obligation towards the religion. However, a serious concern among consumers arises as the producers and manufacturers in the food industry had violated the halal food products across the supply chain as frequently revealed and reported in the local newspapers. Manufacturers and producers, particularly food SMEs, must contemplate this situation and undertake necessary action to retain and regain the customers' trust.

Halal Assurance Management System (HAS) adheres to the halal requirements as well as allowing the availability of traceability throughout the food supply chain. The system was developed by JAKIM to ensure companies to adopt a system in enhancing their efficiency in controlling the authenticity and purity of halal. Such action was taken to enhance the traceability system for business entities in the Malaysian market. However, therein lies a problem concerning the effectiveness of the guideline towards food SMEs. Both SME Corporation Malaysia and HDC revealed that the composition of SMEs for the respective category indicated that small and micro sizes represented the most of SMEs amongst the three sizes classified under SMEs.

The problem, however, arises whenever these data were not aligned with the requirement of HAS implementation as stated in the manual of halal certification procedure Malaysia (third revision). The manual highlighted that small and micro size companies are not required and bound to HAS implementation, whereas MNC and medium size companies are required to implement HAS. This means that only small representatives of SMEs are exposed and familiar to HAS which is a systematic system that could enhance their business efficiency. These would lead micro and small size SMEs to not prioritize and think lightly about the implementation of HAS. Besides, a low workforce, as well as low skilled labor, would discourage micro and small size SMEs from implementing HAS as they will find it not necessary.

Adoption of technology appears to be imperative for the traceability system. The use of devices as common as a mobile phone is needed to be a potential adopter of the traceability system. Subsequently, advanced technology devices such as labels, bar-codes, and RFID need to be utilized for the continuation of the product traceability revolution. Nonetheless, the advanced technology systems adoption among SMEs is still lagging despite being the third country that has an advanced level of policy development and implementation for SMEs among ASEAN countries. This parallels with past studies that found most companies tend to use manual traceability tools and methods instead of using semi-automated and automated approaches that have been proven to be more efficient. This must be one of the reasons that contribute to unachievable scores by Malaysia. There must be a gap that led to this situation as the usage of computers, smartphones, and the Internet among SMEs are remarkably high. The low adoption of

advanced technology among SMEs would cause the difficulty and struggle for SMEs to adopt web-based halal traceability system even though the system could systematically enhance the efficiency of the business operation.

The existence of barriers that led to the low adoption of these systems has become an apprehension that needs to be seriously contemplated. This concern also would indirectly influence the intention of food SMEs to adopt web-based halal traceability system for their business. Hence, these circumstances require an in-depth study on food SMEs' intention to adopt web-based halal traceability system.

1.7 Research Questions

Five research questions of this study were detailed out as follows:
1) What is the level of intention to adopt web-based halal traceability system among SMEs of food sub-sector in Peninsular Malaysia?
2) Are the firms' background of SMEs of food sub-sector in Peninsular Malaysia associated with their intention to adopt web-based halal traceability system?
3) Are there any relationships between the factors towards perceived usefulness of web-based halal traceability system and perceived ease of use of web-based halal traceability system?
4) What are the most influential factors that influence the intention to adopt web-based halal traceability system among SMEs of food sub-sector in Peninsular Malaysia?
5) What are the possible policy recommendations towards the adoption of web-based halal traceability system in Malaysia's halal industry?

1.8 Objectives of the Study

The main objective of the study was to identify the intention to adopt web-based halal traceability system among SMEs of food sub-sector in Peninsular Malaysia. The specific objectives of this study were established as follows:
1) To determine the level of intention to adopt web-based halal traceability system among SMEs of food sub-sector in Peninsular Malaysia.
2) To determine the association between firmographic profiles of SMEs of food sub-sector in Peninsular Malaysia and their intention to adopt web-based halal traceability system.
3) To identify the relationship between the factors towards perceived usefulness of web-based halal traceability system and perceived ease of use of web-based halal traceability system.
4) To identify the most influential factors that influence the intention to adopt web-based halal traceability system among SMEs of food sub-sector in Peninsular Malaysia.
5) To suggest possible policy recommendations towards adoption of web-based halal traceability system in Malaysia's halal industry.

1.9   Significance of the Study

Halal product producers, particularly in the food industry could reap the benefits from this study as well as government and consumers. This study would provide in-depth knowledge about web-based halal traceability system that was supposedly adopted by food SMEs in Malaysia. Moreover, the study could indirectly facilitate Malaysian food SMEs with the resolution to enhance their efficiency in managing the business, as well as improving their effectiveness in handling a web-based halal traceability system. Besides, issues regarding the web-based halal traceability system may prompt the government to explore new approaches to educate SMEs, particularly in the food industry, in terms of their competency in handling record-keeping or technological devices involved in the system. Eventually, consumers' concerns and doubts regarding transparency of halal status throughout the supply chain will be dispelled.

1.10   Scope of the Study

Agro-food SMEs or food SMEs could be used as a subject to be emphasized for this study as both agriculture and food industry are closely related as the food industry needs are agricultural products for the raw materials and ingredients. Therefore, this study focuses on the food SMEs in the food, beverages, and tobacco products sub-sector of the manufacturing sector which is one of the important sectors that require substantial improvement and innovation from time to time. The rapid growth and innovation of the food and beverages sub-sector provide a wide platform for the consumers to access their daily consumption coinciding with current trends. It is also important for the halal industry to be developed alongside the development of the food and beverages sub-sector. This study could benefit both the food and beverages sub-sector and halal industry in terms of the halal products management by SMEs. Manufacturers and producers specifically Malaysian food SMEs that are certified halal by JAKIM play an important role to ensure the foods that would be consumed by consumers follow the safety standard and Shariah-compliant. Hence, the study was conducted throughout Peninsular Malaysia in which involved a total of 260 halal-certified food SMEs. Food fraud especially in halal food products had triggered a huge concern among Muslim consumers. The implementation of a systematic system that sustains and ensure transparency across the supply chain is crucial, especially in the halal food industry. A transparent halal food supply chain could reassure Muslim consumers, who represent the majority population in Malaysia, regarding food fraud, especially in halal food products. Hence, this study was conducted generally to identify the food SMEs' intention to adopt web-based halal traceability system.

1.11 Operational Definition of Key Terms

The terms and operational definitions for the study are summarized as follows:

a. Halal
Halal is derived from the Arabic word "Halla" which means permissible, lawful, permitted, legal, legitimate, allowed, allowable, unforbidden, and admissible by Allah the creator (Bonne & Verbeke, 2008; Al-Qaradawi, 2007).

b. Toyyib
Toyyib from the word Toyyiban means wholesomeness which emphasizes clean, pure, delightful, good, and healthy to the body (Musa & Jalil, 2012).

c. Halalan Toyyiban
Halalan Toyyiban integrates the concept of halal with the role of biotechnology in the food industry (Malboobi & Malboobi, 2012; Khattak et al., 2011).

d. Traceability
Traceability system is used as a tool to assist a firm in managing the flow of products or inputs to enhance product quality and efficiency, product differentiation as well as food safety (Golan et al., 2004).

e. Halal traceability
Halal traceability system is a full-scale traceability system that was executed while concurrently complying with the Shariah requirements where the halal status could be traced throughout the supply chain (Shafii and Khadijah, 2011; Lodhi, 2009).

f. Web-based technologies
Web-based technologies are the applications of network and electrical tools which are accessible over the internet that enables individuals to connect to each other (Morris, 2016; Croteau et al., 2010).

g. Technological aspect
The technological aspect covers both technologies that were utilized by the firm or yet to be utilized by the firm, which in other words, all technologies that are applicable for a firm (Duan et al., 2017; Baker, 2012; Oliveira & Martins, 2011; Zhu et al., 2002; Hage, 1980; Starbuck, 1976; Khandwalla, 1970; Thompson, 1967).

h. Organizational aspect
    Organizational aspect describes the size of the firm, the human resource quality, and the complexity of managerial structure as well as the way it was centralized and formalized (Zhu et al., 2002).

i. Environmental aspect
    Environmental aspect refers to industry structure, service providers of technology existence, and regulatory of government (Duan et al., 2017; Baker, 2012; Zhu et al., 2002).

j. External variables
    External variables in Technology Acceptance Model (TAM) represent other factors that might affect both of the beliefs, namely perceived usefulness (PU) and perceived ease of use (PEOU) towards a particular system (Chang et al., 2017; Chen et al., 2017; Davis, 1989).

k. Perceived usefulness (PU)
    Perceived usefulness is referred to the extent of users' insight that utilization of information technology would contribute a remarkable value for them (Amin et al., 2014; Rouibah et al., 2011; Ajzen, 1991).

l. Perceived ease of use (PEOU)
    Perceived ease of use is referred to the expectation of users about a particular system to be effortless (Lai, 2017; Bach et al., 2016; Vankatesh & Davis, 2000).

m. Behavioral intention
    Behavioral intention measures the likelihood of users to utilize certain systems or technologies (Surendran, 2012).

n. Firmographic profiles
    Descriptive characteristics of a company such as sales turnover, number of employees, or size of company that is used in segmentation processes and profiling attributes (Malcolm & Dunbar, 2012; Weinstein, 2008).

1.12 Organization of the Thesis

The thesis is organized into five chapters. The first chapter encompasses the background of Malaysian small and medium enterprises (SMEs), halal food issues in Malaysia, Malaysian guidelines on halal traceability system, problem statement, research questions, research objectives, and significance of the study. The second chapter consists of past researches on food traceability system, halal traceability system, and theories that are adapted into this study. The third chapter of the thesis focuses on the research methodology used to conduct this study where sampling design, data collection method, and data analysis used for the study are discussed together with the development of a conceptual framework for the study. The fourth chapter reveals and discusses the results obtained from all analyses to achieve the objectives. The last chapter summarizes all of the findings, provides several recommendations, determines the limitation of the study, the suggestion for future research, and conclusion.

REFERENCES

Ab, N., Supian, K., & Bojei, J. (2018). Relationship between halal traceability system adoptions on halal food supply chain integrity and performance. *International Journal of Asian Social Science, 8*(8), 569-579.

Ab Rashid, N., & Bojei, J. (2019). The relationship between halal traceability system adoption and environmental factors on halal food supply chain integrity in Malaysia. *Journal of Islamic Marketing, 11*(1), 117-142.

Abd Rahman, A., Singhry, H. B., Hanafiah, M. H., & Abdul, M. (2017). Influence of perceived benefits and traceability system on the readiness for Halal Assurance System implementation among food manufacturers. *Food Control, 73*, Part B, 1318-1326.

Abed, S. S. (2020). Social commerce adoption using TOE framework: An empirical investigation of Saudi Arabian SMEs. *International Journal of Information Management, 53*, 1-11.

Abdul Majid, M. A., Zainal Abidin, I. H., Majid, H. A., & Tamby Chik, C. (2015). Issues of Halal Food Implementation in Malaysia. *Journal of Applied Environmental and Biological Sciences. 5*, 50-56.

Abdullah, N. H., Shamsuddin, A., Wahab, E., & Hamid, N. A. (2012, December). Preliminary qualitative findings on technology adoption of Malaysian SMEs. In *2012 IEEE Colloquium on Humanities, Science and Engineering (CHUSER)* (pp. 15-20). IEEE.

Agarwal, R., & Prasad, J. (1998). A conceptual and operational definition of personal innovativeness in the domain of information technology. *Information Systems Research, 9*, 204–215.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179-211.

Ajzen, I., & Fishbein, M. (1980). *Understanding Attitudes and Predicting Social Behaviour*. Prentice-Hall.

Alfaro, J. A., & Rabade, L. A. (2009). Traceability as a strategic tool to improve inventory management: A case study in the food industry. *International Journal Production Economics*, *118*, 104-110.

Alias, H., Surin, J., Mahmud, R., Shafie, A., Zin, J. M., Nor, M. M., Ibrahim A. S., & Rundi, C. (2014). Spatial distribution of malaria in Peninsular Malaysia from 2000 to 2009. *Parasites, & Vectors, 7*(1), 186.

Allen, T.J. (1977). *Managing the Flow of Technology: Technology transfer and the dissemination of technological information within the R&D organization*. MIT Press.

78

Allison, P. D. 1999. Logistic Regression Using SAS: Theory and Application. Cary, NC: SAS Institute Inc.

Allison, P. D. (1999). *Logistic regression using SAS: Theory and application.* SAS Institute Inc.

Al-Maghrabi, T., & Dennis, C. (2011). What drives consumers' continuance intention to e-shopping? Conceptual framework and managerial implications in the case of Saudi Arabia. *International Journal of Retail, & Distribution Management, 39*(12), 899-926.

Al-Mubaraki, H. M., Aruna, M., & Busler, M. (2013, January). Entrepreneurship, innovation, incubator and economic development: a case study. In *Proceedings of World Academy of Science, Engineering and Technology* (No. 78, p. 1061). World Academy of Science, Engineering and Technology (WASET).

Al-Natour, S., & Benbasat, I. (2009). The adoption and IT artefacts: A new interaction-centric model for the study of user artefact relationships. *Journal of Association for Information Systems, 10*, 661–685.

Al-Qaradawi, Y. (2007). *The Lawful and the Prohibited in Islam*, Islamic Book Trust, Kuala Lumpur.

Al-Qirim, N., & Corbitt, B. (2002, September). An empirical investigation of an e-commerce adoption model in small to medium-sized enterprises in New Zealand. In 6th Pacific Asia conference on information systems (PACIS 2002): The next e-what, Tokyo, Japan (pp. 343–362).

Al-Qirim, N. (2006). The role of the government and e-commerce adoption in small businesses in New Zealand. *International Journal of Internet and Enterprise Management, 4*, 293–313.

Amin, M., Rezaei, S., & Abolghasemi, M. (2014). User satisfaction with mobile websites: The impact of perceived usefulness (PU), perceived ease of use (PEOU) and trust. *Nankai Business Review International, 5*(3), 258-274.

Anderson, M., & Bolton, J. (2015, October). Integration of sensors to improve customer experience: Implementing device integration for the retail sector. In *2015 IEEE 12th International Conference on e-Business Engineering* (pp. 382-386). IEEE.

Armstrong, R. A. (2019). Is there a large sample size problem? *Ophthalmic and Physiological Optics, 39*(3), 129-130.

Aryeetey, E., Baah-Nuakoh, A., Duggleby, T., Hettige, H., & Steel, W. F. (1994). *Supply and demand for finance of small enterprises in Ghana*. The World Bank.

Awa, H. O., Eze, S. C., Urieto, J. E., & Inyang, B. J. (2011). Upper echelon theory (UET): A major determinant of information technology (IT) adoption by SMEs in Nigeria. *Journal of Systems and Information Technology, 13*(2), 144-162.

Awa, H. O., Ukoha, O., & Emecheta, B. C. (2016). Using TOE theoretical framework to study the adoption of ERP solution. *Cogent Business & Management, 3*(1), 1-23.

Awa, H., Baridam, D., & Nwibere, B. (2015). Demographic determinants of e-commerce adoption: A twist by location factors. *Journal of Enterprise Information Management, 28*, 325–346.

Awa, H., Ojiabo, O., & Emecheta, B. (2015a). Integrating TAM, TPB and TOE frameworks and expanding their characteristic constructs for e-commerce adoption by SMEs. *Journal of Science and Technology Policy Management, 6*, 76–94.

Azmi, F. R., Abdullah, A., Bakri, M. H., & Musa, H. (2018a). Perception of small medium and enterprises towards halal food supply chain in Malaysia. *International Journal of Mechanical Engineering and Technology, 9*(11), 821–828.

Azmi, F. R., Abdullah, A., Bakri, M. H., Musa, H., & Jayakrishnan, M. (2018b). The adoption of halal food supply chain towards the performance of food manufacturing in Malaysia. *Management Science Letters, 8*, 755-766.

Bach, M. P., Čeljo, A., & Zoroja, J. (2016). Technology acceptance model for business intelligence systems: Preliminary research. *Procedia Computer Science, 100*, 995-1001.

Badia-Melis, R., Mishra, P., & Ruiz- García, L. (2015). Food traceability: New trends and recent advances. A review. *Food Control, 57*, 393-401.

Baker, J. (2012). The technology-organization-environment framework. In Dwivedi, Y. K., Wade, M. R., & Schneberger, S. L. (Eds.), *Information system theory: Explaining and predicting our digital society, Vol 1* (pp. 231-245). New York: Springer.

Bandura, A., & Walters, R. H. (1977). *Social learning theory (Vol. 1).* Prentice-hall.

Bartlett, J. E., Kotrlik, J. W., & Higgins, C. C. (2001). Organizational research: Determining appropriate sample size in survey research. *Information Technology, Learning, and Performance Journal, 19*, 43-50.

Bayo-Moriones, A., & Lera-López, F. (2007). A firm-level analysis of determinants of ICT adoption in Spain, *Technovation, 27* (6–7), 352-366.

Becheikh, N., Landry, R., & Amara, N. (2006). Lessons from innovation empirical studies in the manufacturing sector: A systematic review of the literature from 1993–2003. *Technovation, 26*(5-6), 644-664.

Behnke, K., & Janssen, M.F.W.H.A. (2020). Boundary conditions for traceability in food supply chains using blockchain technology. *International Journal of Information Management, 52*, 1-10.

Bessen, J. (2002). Technology adoption costs and productivity growth: The transition to information technology. *Review of Economic Dynamics*, *5*, 443-469.

Biau, D. J., Kernéis, S., & Porcher, R. (2008). Statistics in brief: The importance of sample size in the planning and interpretation of medical research. *Clinical orthopedics and related research, 466*(9), 2282–2288.

Biemer, P. P., & Lyberg, L. E. (2003). *Introduction to survey quality (Vol. 335).* John Wiley & Sons.

Bonne, K., & Verbeke, W. (2008). Muslim consumer trust in halal meat status and control in Belgium. *Meat science, 79*(1), 113-123.

Brousseau, K. R., Driver, M. J., Hourihan, G., & Larsson, R. (2006). The seasoned executive's decision-making style. *Harvard Business Review, 84*(2), 110-125.

Butt, I., Tabassam, S., Chaudhry, N. G., & Nusair, K. (2016). Using technology acceptance model to study adoption of online shopping in an emerging economy. *Journal of Internet Banking and Commerce*, *21*(2), 202.

Can-Trace. (2004). *Can-Trace decision support system for food traceability*. Can-Trace Business Case Final Report. Agriculture and Agri-Food Canada. https://gs1ca.org/gs1ca-components/documents/Can-Trace-Decision-Support-System-for-Food-Traceability-2004.pdf

Cao, Y., Liu, X., Guan, C., & Mao, B. (2017). Implementation and current status of food traceability system in Jiangsu China. *Procedia Computer Science*, *122*, 617-621.

Cappelli, P., & Hamori, M. (2005). The new road to the top. *Communications, 3*, 1-9.

Carmeli, A. (2001). High-and low-performance firms: do they have different profiles of perceived core intangible resources and business environment? *Technovation, 21*(10), 661-671.

Carnochan, S., Samples, M., Myers, M., & Austin, M. J. (2014). Performance measurement challenges in non-profit human service organizations. *Non-profit and Voluntary Sector Quarterly, 43*(6), 1014-1032.

Chang, C. T., Hajiyev, J., & Su, C. R. (2017). Examining the students' behavioral intention to use e-learning in Azerbaijan? The General Extended Technology Acceptance Model for E-learning approach. *Computers & Education, 111*, 128-143.

Chatterjee, D., Grewal, R., & Sambamurthy, V. (2002). Shaping up for e-commerce: Institutional enablers of the organizational assimilation of web technologies. *MIS Quarterly, 26*, 65–89.

Chee, J. (2015). *Pearson's Product-Moment Correlation: Sample Analysis*. University of Hawaii, Manoa School of Nursing. The Queen Medical Center.

Chen, C. D., Fan, Y. W., & Farn, C. K. (2007). Predicting electronic toll collection service adoption: An integration of the technology acceptance model and the theory of planned behavior. *Transportation Research Part C: Emerging Technologies, 15*(5), 300-311.

Chen, H., Rong, W., Ma, X., Qu, Y., & Xiong, Z. (2017). An extended technology acceptance model for mobile social gaming service popularity analysis. *Mobile Information Systems, 2017*, 1-12.

Chin, T.A., Hamid, A.B.A., Rasli, A. and Baharun, R. (2012). Adoption of supply chain management in SMEs. *Procedia-Social and Behavioral Sciences, 65*, 614-619.

Choe, Y.C., Joowon, P., Chung, M., & Moon, J. (2009). Effect of the food traceability system for building trust: Price premium and buying behaviour. *Information System Frontiers, 11*, 167–179.

Cochran, W. G. (1977). *Sampling techniques (3rd Ed.)*. John Wiley & Sons.

Cohen, J. (1988). *Statistical power analysis for the behavioural sciences (2nd Ed.)*. Lawrence Erlbaum Associates.

Collins, P. D., Hage, J., & Hull, F. M. (1988). Organizational and technological predictors of change in automaticity. *Academy of Management Journal, 31*(3), 512–543.

Cramer, D. (1998). *Fundamental statistics for social research: step-by-step calculations and computer techniques using SPSS for Windows*. Psychology Press.

Croteau, A., Beaudry, A., & Holm, J. (2010). Assessing Relational E-Strategy Supporting Business Relationships. In Lee, I. (Ed.), Encyclopedia of E-Business Development and Management in the Global Economy (pp. 284-295). IGI Global.

Cruz-Jesus, F., Pinheiro, A., & Oliveira, T. (2019). Understanding CRM adoption stages: empirical analysis building on the TOE framework. *Computers in Industry, 109*, 1-13.

D'Angelo, G., Luca, G. D., & Rampone, S. (2015). A food safety and traceability system based on RFID technologies and services. Paper presented at the Proceeding First International Workshop "Global Sustainability Inside and Outside the Territory", Benevento, 1-7.

Dabbene, F., Gay, P., & Tortia, C. (2013). Traceability issues in food supply chain management: A review. *Biosystems Engineering*, 1-16.

Das, S., & Das, K. K. (2012). Factors influencing the information technology adoption of micro, small and medium enterprises (MSME): An empirical study. *International Journal of Engineering Research and Applications*, *2*(3), 2493-2498.

Davis, F.D. (1986). *Technology acceptance model for empirically testing new end-user information systems: Theory and results* (Doctoral thesis, Massachusetts Institute of Technology Sloan School of Management, Cambridge, United States). file:///D:/Downloads/14927137-MIT.pdf

Davis, F.D. (1989). Perceived usefulness, perceived ease of use and user acceptance of information technology. *MIS Quarterly. 13*(3) 319-340.

Davis, F.D., Bagozzi, R.P., & Warshaw, P.R. (1989). User Acceptance of Computer Technology: A Comparison of two Theoretical models. *Management Science. 35*(8) 982-1003.

Dediu, L., Moga, L. M., & Cristea, V. (2016). The barriers for the adoption of traceability systems by Romanian fish farm. *AACL Bioflux*, *9*(6), 1323-1330.

Department of Islamic Development Malaysia. (2011). Guidelines for halal assurance management system of Malaysia halal certification. Retrieved from http://www.halal.gov.my/v4/images/pdf/halalassurancesystem.pdf

Department of Islamic Development Malaysia. (2015). Manual procedure for Malaysia halal certification third revision 2014. Firdaus Press. Retrieved from http://www.halal.gov.my/v4/images/pdf/MPPHM2014BI.pdf

Department of Islamic Development Malaysia. (2016). Fungsi JAKIM. Retrieved from http://www.islam.gov.my/en/about-jakim/jakim-functions

Department of Islamic Development Malaysia. (2018). Halal Malaysia Official Portal: Check Halal status. http://www.halal.gov.my/v4/

Department of Standard Malaysia. (2009). Halal food – production, preparation, handling and storage – general guidelines second revision. SIRIM Berhad. Retrieved from https://law.resource.org/pub/my/ibr/ms.1500.2009.pdf

Department of Standard Malaysia. (2018). Halal supply chain management system – Part 1: Transportation – general requirements first revision. Retrieved from http://www.jsm.gov.my/documents/10180/2793318/DMS2400-1+Halal+supply+chain+management+system+-+Part+1+-+Transportation+-+General+Requirements+-+PC.pdf/c799c21a-014f-47d0-9114-bf1912a253f5

Department of Standard Malaysia. (2018). Halal supply chain management system – Part 2: Warehousing – general requirements first revision. Retrieved from http://www.jsm.gov.my/documents/10180/2793318/DMS2400-2+Halal+supply+chain+management+system+-+Part+2+-+Warehousing+-+General+Requirements+-+PC.pdf/1d71ebff-a2e7-41fd-b6e8-49518dfd5c9d

Department of Standard Malaysia. (2018). Halal supply chain management system – Part 3: Retailing – general requirements first revision. Retrieved from http://www.jsm.gov.my/documents/10180/2793318/DMS2400-3+Halal+supply+chain+management+system+-+Part+3+-+Retailing-+General+Requirements+-+PC.pdf/e33a8c0b-641a-4c07-959c-a8866cc05241

Department of Statistics Malaysia. (2010). Population and housing census of Malaysia: Population distribution and basic demographic characteristics 2010. Retrieved from https://www.mycensus.gov.my/index.php/ms/produk-banci/penerbitan/banci-2010/664-taburan-penduduk-dan-ciri-ciri-asas-demografi-2010

Department of Statistics Malaysia. (2017). Economic census 2016 – halal statistics. Retrieved from: https://www.dosm.gov.my/v1/index.php?r=column/cthemeByCat, &cat=445, &bul_id=MER3eWZ3eUQ5TklKdFNMc1JoRDJCUT09, &menu_id=WjJGK0Z5bTk1ZElVT09yUW1tRG41Zz09

Department of Statistics Malaysia. (2018). Small and medium enterprises (SMEs) Performance 2018. Retrieved from: https://www.dosm.gov.my/v1/index.php?r=column/cthemeByCat, &cat=159, &bul_id=R0Vka2RpeVJ0cUlpR3BqdjhudDZhdz09, &menu_id=TE5CRUZCblh4ZTZMODZIbmk2aWRRQT09

Dessureault, S. (2019). Costs, Benefits and Business Value of Traceability: A Literature Review. 1-29.

Detlor, B., Hupfer, M. E., Ruhi, U., & Zhao, L. (2013). Information quality and community municipal portal use. *Government Information Quarterly, 30*(1), 23-32.

Duan, Y., Miao, M., Wang, R., Fu, Z., & Xu, M. (2017). A framework for the successful implementation of food traceability systems in China. *The Information Society, 33*(4), 226-242.

Dubé, F. N., Hongxia, Z., Haijuan, Y., & Lijun, H. (2016). Halal certification system as a resource for firm internationalization: comparison of china and Malaysia. *International Journal of Asia Pacific Studies, 12* (1), 125-141.

EC (2018), *DG Trade Statistical Guide*, Publications Office of the European Union,
Luxembourg,
http://trade.ec.europa.eu/doclib/docs/2013/may/tradoc_151348.pdf

Elbeltagi, I., Al Sharji, Y., Hardaker, G., & Elsetouhi, A. (2013). The role of the owner-manager in SMEs' adoption of Information and Communication Technology in the United Arab Emirates. *Journal of Global Information Management (JGIM), 21*(2), 23–50.

Elias, E.M., Nawi, M.N., Mahidin, N., & Pozin, M.A. (2019). Improving 3RD party halal local service providers in halal logistics: The driving factors from Malaysian F&B manufacturing perspectives. *International Journal of Supply Chain Management, 8*, 644-652.

Engelseth, P. (2009). Food product traceability and supply network integration. *Journal of Business and Industrial Marketing, 24*(5/6), 421-430.

Ernest, C. D., & Lau, W. M. (2012). *Will those targeted pay more? The Issue of Halal Logo. Osman Mohd Zain (Ed).* Reading in Marketing: An Islamic Perspective. 2nd Edition. IIUM Press.

Field, A. (2009). *Discovering Statistics Using SPSS, Third Edition*. Sage Publications Ltd.

Folinas, D., Ioannis, M., & Manos, B. (2006). Traceability data management for food chains. *British Food Journal, 108*(8), 622–633.

Forman, C., & Zeebroeck, N. V. (2019). Digital technology adoption and knowledge flows within firms: Can the Internet overcome geographic and technological distance? *Research Policy, 48*(8), 1-16.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of marketing research, 18*(1), 39-50.

Franke, T. M., Ho, T., & Christie, C. A. (2012). The chi-square test: Often used and more often misinterpreted. *American Journal of Evaluation, 33*(3), 448-458.

Galbraith, J. (1973). *Designing complex organizations*. Addison-Wesley.

85

Gambardella, A., & Torrisi S. (2001). New industry or new economy? The impact of information technology on the productivity of manufacturing sectors in Italy. *Moneta and Credito, 213*, 39 – 76.

Gangwar, H., Date, H., & Raoot, A. (2014). Review on IT adoption: Insights from recent technologies. *Journal of Enterprise Information Management, 27*, 488–502.

George, D., & Mallery, P. (2003). SPSS for Windows step by step: A simple guide and reference. 11.0 update (4th Ed.). Allyn & Bacon.

Giunta, A., & Trivieri, F. (2007). Understanding the determinants of information technology adoption: Evidence from Italian manufacturing firms. *Applied Economics. 39*(10), 1325-1334.

Glenn, D. I. (1992). *Determining sample size. A series of the Program Evaluation and Organizational Development.* University of Florida.

Golan, E., B. Krissoff, F.F. Kuchler, L. Calvin, K. Nelson and G. Price. (2004). Traceability in the U.S. Food Supply: Economic Theory and Industry Studies. *Economic Research Service, USDA,* 1-48*.*

Golan, E., Krissoff, B., & Kuchler, F. (2004b). Food traceability—one ingredient in a safe and efficient food supply. *Amber Waves, 2*(2), 14–21.

Gouk, S. Y. (2012). Linkages between agriculture and food industry, and food processing by farmers in Korea. *Journal of Rural Development/Nongchon-Gyeongje, 35*(1071-2016-86924), 103-118.

Guilford, J. P. (1954). *Psychometric Methods. (2nd Ed).* Mc-Graw-Hill.

Gunnar, S. E. F., & Fremme, K. M. (2007). Challenges regarding implementation of electronic chain traceability. *British Food Journal, 109*(10), 805–818.

Gupta, S. C., & Kapoor, V. K. (1970). *Fundamentals of mathematical statistics.* Sultan Chand & Sons.

Hage, J. (1980). *Theories of organizations: Forms, process and transformation.* John Wiley & Sons.

Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). *Multivariate data analysis 5th Edition.* Prentice-Hall.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis (7th Ed.).* Prentice-Hall.

Hair, J., Money, A., Samuel, P., & Page, M. (2007). *Research methods for business.* John Wiley & Sons, Inc.

Halal Development Corporation Berhad. (2016). Halal certified statistics. Retrieved from http://knowledge.hdcglobal.com/publisher/gwm_industry_statistics

Halal Development Corporation Berhad. (2020). Executive summary: Halal industry master plan 2030. Retrieved from http://www.hdcglobal.com/wp-content/uploads/2020/02/Halal-Industri-Master-Plan-2030.pdf

Halal Development Corporation Berhad. (2020). HDC roles and responsibility. Retrieved from http://www.hdcglobal.com/about-hdc/roles-responsibility/

Hall, J. A., & Dornan, M. C. (1988). Meta-analysis of satisfaction with medical care: Description of research domain and analysis of overall satisfaction levels. *Social science & medicine, 27*(6), 637-644.

Hameed, M. A., & Arachchilage, N. A. G. (2018). Understanding the influence of Individual's Self-efficacy for Information Systems Security Innovation Adoption: A Systematic Literature Review. Paper presented at the 17th Australian Cyber Warfare Conference (CWAR), Melbourne, Victoria, Australia. arXiv preprint arXiv:1809.10890.

Hameed, M. A., Counsell, S., & Swift, S. (2012). A conceptual model for the process of IT innovation adoption in organizations. *Journal of Engineering and Technology Management, 29*(3), 358-390.

Haneem, F., Ali, R., Kama, N., & Basri, S. (2017, July). Descriptive analysis and text analysis in systematic literature review: a review of master data management. In *2017 International Conference on Research and Innovation in Information Systems (ICRIIS)* (pp. 1-6). IEEE.

Harlow, L. L. (1985). Behaviour of some elliptical theory estimators with non-normal data in a covariance structures framework: A Monte Carlo study. *Dissertation Abstracts International 46*, 2495B.

Hart, P.J., & Saunders, C.S. (1998). Emerging electronic partnerships: Antecedents and dimensions of EDI use from the supplier's perspective. *Journal of Management Information Systems, 14*(4), 87-111.

Hashim, H. I., & Mohd Shariff, S. (2016). Halal Supply Chain Management Training: Issues and Challenges. *Procedia Economics and Finance, 37*, 33-38.

Hassan, H., Nasir, M. H. M., Khairudin, N & Adon, I. (2017). Factor influencing cloud computing adoption in small and medium enterprises. *Journal of Information and Communication Technology (JICT), 16*(1), 21-41.

Hazelrigg, L. (2009). *Inference. In: M. Hardy and A. Bryman (Eds.). The Handbook of Data Analysis.* Sage Publication Inc.

Hess, T. J., McNab, A. L., & Basoglu, K. A. (2014). Reliability generalization of perceived ease of use, perceived usefulness, and behavioral intentions. *MIS Quarterly, 38*(1), 1-28.

Hew, J. J., Wong, L. W., Tan, G. W. H., Ooi, K. B., & Lin, B. (2020). The blockchain-based Halal traceability systems: a hype or reality? *Supply Chain Management: An International Journal, 25*(6), 863-879.

Hill, R. (1998). What sample size is "enough" in internet survey research? *Interpersonal Computing and Technology: An electronic journal for the 21st century, 6*(3-4), 1-12.

Hobbs, J. E. (2004). Information asymmetry and the role of traceability systems. *Agribusiness, 20*(4), 397–415.

Hollenstein, H. (2004). Determinants of the adoption of information and communication technologies, an empirical analysis based on firm-level data for the Swiss business sector. *Structural Change and Economic Dynamic, 15*(3), 315-342.

Hosmer Jr, D. W., Lemeshow, S., & Sturdivant, R. X. (2013). *Applied logistic regression (Vol. 398).* John Wiley & Sons.

Husny, Z. J. M., Hussien, M. Z. S. M., & Tan, M. I. I. (2017). Service innovation: Halal logistics intention adoption model. *International Journal Supply Chain Management, 6*(1), 146-154.

Hussein, Z. (2017). Leading to intention: The role of attitude in relation to technology acceptance model in E-Learning. *Procedia Computer Science, 105*, 159-164.

Iacobucci, D., Posavac, S. S., Kardes, F. R., Schneider, M. J., & Popovich, D. L. (2015). Toward a more nuanced understanding of the statistical properties of a median split. *Journal of Consumer Psychology, 25*(4), 652-665.

Iacovou, C. L., Benbasat, I., & Dexter, A. S. (1995). Electronic data interchange and small organizations: Adoption and impact of technology. *MIS Quarterly, 19*(4), 465–485.

Idris, N. A. H. (2013). Business Networks in Halal Food Industries in Malaysia. *Jurnal Ekonomi Malaysia, 47*(1), 87-98.

Intan Salwani, M., Marthandan, G., Daud Norzaidi, M., & Choy Chong, S. (2009). E-commerce usage and business performance in the Malaysian tourism sector: Empirical analysis. *Information Management & Computer Security, 17*(2), 166–185.

Ismail, M.M., Islam, M.S., & Bakar, W.M.M. (2013). Export barriers to halal food processing small and medium enterprises (SMEs) in Malaysia. *Pertanika Journal Social Sciences & Humanities, 21*(S), 31-46.

88

Jamaludin, M. A., Kamarudin, N. K. H., Ramli, M. A. (2015). Halal executive's perception towards halal training programme based on training needs analysis. *The International Journal of Humanities & Social Studies, 3*(1), 1-10.

Jansen-Vullers, M. H., Van Dorp, C. A., & Beulens, A. J. M. (2003). Managing traceability information in manufacture. *International Journal of Information Management, 23*(5), 395–413.

Jeyaraj, A., Rottman, J., & Lacity, M. (2006). A review of the predictors, linkages, and biases in IT innovation adoption research. *Journal of Information Technology, 21*, 1–23.

Johnson, L. H. (1953). Limitations of the descriptive method. *The Phi Delta Kappan, 34*(6), 241-245.

Kal-Kausar, M. A., Norhayati Rafida, A.R., Nurulhusna, N. H., Alina, A. R., & Siti Mashitoh, A. (2013). Crisis Communication and Management on Food Recall in the Malaysian Food Industry. *Middle-East Journal of Scientific Research, 13*, 54-60.

Kauffman, R., & Walden, E. (2001). Economics and electronic commerce: Survey and directions for research. *International Journal of Electronic Commerce, 5*, 5–116.

Kelepouris, T., Katerina, P., & Georgios, D. (2007). RFID-enabled traceability in the food supply chain. *Industrial Management and Data Systems, 107*(2), 183–200.

Khalifa, A. (2016). Determinants of information and communication technologies adoption by Tunisian firms. *Journal of Innovation Economics, 20*, 151-177.

Khalilzadeh, J., & Tasci, A. D. (2017). Large sample size, significance level, and the effect size: Solutions to perils of using big data for academic research. *Tourism Management, 62*, 89-96.

Khandwalla, P. (1972). Environment and its impact on the organization. *International Studies of Management & Organization, 2*(3), 297-313.

Khattak, J. Z. K., Mir, A., Anwar, Z., Abbas, G., Khattak, H. Z. K., & Ismatullah, H. (2011). Concept of halal food and biotechnology. *Advance Journal of Food Science and Technology, 3*(5), 385-389.

Kim, C., Hwang, J. S., & Cho, J. (2015). Relationships among mobile fashion shopping characteristics, perceived usefulness, perceived enjoyment, and purchase intention-Mediating effect of ease of use. *Journal of the Korean Society of Clothing and Textiles, 39*(2), 161-174.

Korkmaz, M., Güney, S., & Yiğiter, Ş. Y. (2012). The importance of logistic regression implementations in the Turkish livestock sector and logistic regression implementations/fields. *Journal of the Faculty of Agriculture of Harran University (Turkey), 16*(2), 25-36.

Kowath, N., & Choon, T. (2001). Determinants of website development: A study of electronic commerce in Singapore. *Information & Management, 39*, 227–242.

Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and psychological measurement, 30*(3), 607-610.

Kuan, K., & Chau, P. (2001). A Perception-Based Model for EDI Adoption in Small Businesses Using a Technology-Organization-Environment Framework. *Information & Management. 38*. 507-521.

Lai, PC. (2017). The literature review of technology adoption models and theories for the novelty technology. *Journal of Information Systems and Technology Management, 14*(1), 21 – 38.

Lazzeri J., & Fabbe-Costes N. (2014). Total traceability of supply chains: concept and theoretical model of implementation. *French Journal of Industrial Management (RFGI), 33*, 55-79.

Leech, N. L., Barrett, K. C., & Morgan, G. A. (2005). *SPSS for intermediate statistics: Use and interpretation.* 2nd Edition, Lawrence Erlbaum Associates Inc.

Lin, F., Fofanah, S.S., & Liang, D. (2011). Assessing citizen adoption of e-Government initiatives in Gambia: A validation of the technology acceptance model in information systems success. *Government Information Quarterly. 28*(2) 271-279.

Lin, M., Lucas Jr, H. C., & Shmueli, G. (2013). Research commentary—too big to fail: Large samples and the p-value problem. *Information Systems Research, 24*(4), 906-917.

Lodhi, A. U. H. (2009). *Understanding Halal Food Supply Chain.* HFRC UK Ltd.

Lopez Gonzalez, J. (2016), "Using foreign factors to enhance domestic export performance: A focus on Southeast Asia"*, OECD Trade Policy Papers*, No. 191, OECD Publishing, Paris, http://dx.doi.org/10.1787/5jlpq82v1jxw-en

López-Núñez, M. I., Rubio-Valdehita, S., Aparicio-García, M. E., & Díaz-Ramiro, E. M. (2020). Are entrepreneurs born or made? The influence of personality. *Personality and Individual Differences, 154*, 1-5.

Majumdar, S., Vora, D., & Nag, A. (2012). Legal form of the firm and overseas market choice in India's software and IT industry. *Asia Pacific Journal of Management*, *Springer*, *29*(3), 659-687.

Malboobi, M. T., & Malboobi, M. A. (2012). *Halal concept and products derived from modern biotechnology*. Paper presented at the International workshop for Islamic scholars on agribiotechnology: Shariah compliance.

Malcolm M., & Dunbar I. (2012). *Market Segmentation: How to do it and how to profit from it 4th edition*, Wiley.

Manimala, M. J., & Vijay, D. (2012). Technology Business Incubators (TBIs): A perspective for the emerging economies. *IIM Bangalore Research Paper*, (358).

Manis, K. T., & Choi, D. (2019). The virtual reality hardware acceptance model (VR-HAM): Extending and individuating the technology acceptance model (TAM) for virtual reality hardware. *Journal of Business Research, 100*, 503-513.

Manzouri, M. (2012). How lean supply chain implementation affect halal food companies. *Advances in Natural and Applied Sciences*, *6*(8), 1485-1490.

Marsh, H. W., & Hoceuar, D. (1988). Goodness-of-fit indices in confirmatory factor analysis: The effect of sample size. *Psychological Bulletin, 103*, 391-410.

Martins, C., Oliveira, T., & Popovič, A. (2014). Understanding the Internet banking adoption: A unified theory of acceptance and use of technology and perceived risk application. *International Journal of Information Management, 34*(1), 1-13.

Maynard, N. C. (2007). Technology Adoption and the role of government: Examining the national information and communication technology policies in developing countries (Doctoral thesis, University of North Carolina at Chapel Hill, North Carolina, United State). https://cdr.lib.unc.edu/concern/dissertations/rx913q62j

Meuwissen, M. P. M., Velthuis, A. G. J., Hogeveen, H., & Huirne, R. B. M. (2003). Traceability and certification in meat supply chains. *Journal of Agribusiness, 21*, 167-181.

Mhenni, H., Youssef, A., & Walid, H. (2011). Intra-firm diffusion of innovation: Evidence from Tunisian SMEs regarding information and communication technologies. *Middle East Development Journal, 3*, 75-97.

Miles, S. U., Øydis, F., & Lynn, J. (2005). Public attitudes towards genetically-modified food. *British Food Journal, 107*(4), 246–262.

Ministry of International Trade and Industry Malaysia. (2018). MITI report 2018. Retrieved from https://www.miti.gov.my/miti/resources/MITI%20Report/MITI_Report_2018.pdf

Mlote, S. N., Mdoe, N. S., Isinika, A. C., & Mtenga, L. A. (2013). Factors affecting agro-pastoralist and pastoralists' willingness to adopt beef cattle fattening in the Lake Zone in Tanzania. *Journal of Agricultural Science, 5*(10), 140.

Mohamed, Y.H., Rahim, A.R.A., Ma'ram, A. and Hamza, M.G. (2016). Halal traceability in enhancing halal integrity for food industry in Malaysia. *International Research Journal of Engineering and Technology, 3*(3), 68-74.

Monsuwé, T. P., Dellaert, B. C., & Ruyter, K. (2004). What drives consumers to shop online? A literature review. *International Journal of Service Industry Management, 15*, 102-121.

Moore, G., & Benbasat, I. (1991). Development of an instrument to measure the perceptions of adopting an information technology innovation. *Information Systems Research, 2*, 192–222.

Morana, J. (2016). Barriers and dangers of traceability. *International* Association *for Research in Logistics Supply Chain Management*, 1-14.

Morck, R., Wolfenzon, D. and Yeung, B. (2005). Corporate governance, economic entrenchment, and growth. *Journal of Economic Literature*, *43* (3), 655-720.

Morgan, L., & Finnegan, P. (2007). *How perceptions of open-source software influence adoption: an exploratory study*. Paper presented at the Proceedings of the 15th European Conference on Information Systems. St. Gallen. Association for Information Systems, No. 118, 973-984.

Morosan, C. (2012). Theoretical and empirical considerations of guests' perceptions of biometric systems in hotels: Extending the technology acceptance model. *Journal of Hospitality & Tourism Research, 36*(1), 52-84.

Morris, M., & Dillon, A. (1997). How user perceptions influence software use. *IEEE Software, 14*(4), 58-65.

Morris, O. P. (2016). Web-Based Technologies for Ensuring Interaction in Online Courses: Faculty Choice and Student Perception of Web-Based Technologies for Interaction in Online Economics. In Kyei-Blankson, L., Blankson, J., Ntuli, E., & Agyeman, C. (Eds.), *Handbook of Research on Strategic Management of Interaction, Presence, and Participation in Online Courses* (pp. 244-279). IGI Global.

Morrissey, M. T., & Almonacid, S. (2005). Rethinking technology transfer. *Journal of Food Engineering, 67*, 135-145.

Muhamed, A. A., Rahman, M. N. A., & Zain, C. R. C. M. (2019). Drivers for the willingness of small and medium enterprise in implementing halal supply chain management. *International Journal of Engineering & Technology, 8*(1.2), 146-152.

Muk, A., & Chung, C. (2015). Applying the technology acceptance model in a two-country study of SMS advertising. *Journal of Business Research, 68*(1), 1-6.

Multon, K.D., & Coleman, J.S. (2018). *The SAGE encyclopedia of educational research, measurement and Evaluation (4th Ed).* SAGE Publications.

Mumford, T. V., Campion, M. A., & Morgeson, F. P. (2007). The leadership skills strataplex: Leadership skill requirements across organizational levels. *The Leadership Quarterly, 18*(2), 154-166.

Musa, N., & Jalil, F. (2012). *Halal Products–Malaysian Constitution Perspective.* Paper presented at the International Halal Conference (INHAC 2012), Kuala Lumpur, Malaysia.

Muthén, B. (2004). Latent variable analysis. *The Sage handbook of quantitative methodology for the social sciences, 345*(368), 106-109.

Neumuller, C., & Grunbacher, P. (2006). *Automating software traceability in very small companies: A case study and lessons learned.* Paper presented at the 21st IEEE/ACM International Conference Automated Software Engineering (ASE '06), Tokyo. 145-156.

Ngah, A.H., Zainuddin, Y., & Thurasamy, R. (2014). Contributing factors of Halal warehouse adoption. In F.L. Gaol, W. Mars & H. Saragih (Eds.). *Management and Technology in Knowledge, Service, Tourism & Hospitality* (pp. 89-94). CRC Press.

Ngah, A.H., Zainuddin, Y., & Thurasamy, R. (2015). Barriers and enablers in adopting of Halal warehousing. *Journal of Islamic Marketing*, *6*(3), 354-376.

Nosenko, V., Silaev, A., Efremkin, S., & Grednikov, S. (2019). Study of the Assembly Manufacturing Automated Traceability System Identification Tools. In MATEC Web of Conferences (Vol. 297, p. 01005). EDP Sciences.

Nuar, K.A. (2018, 5 January). Keropok udang logo halal meragukan dirampas. Utusan Online. Retrieved on 26 August 2019 from http://www.utusan.com.my/ berita/terkini/keropok-udang-logo-halal-meragukandirampas-1.585201

Nugroho, M. A., Susilo, A. Z., Fajar, M. A., & Rahmawati, D. (2017). Exploratory study of SMEs technology adoption readiness factors. *Procedia Computer Science 124*, 329-336.

OECD (2019), OECD SME and Entrepreneurship Outlook 2019, OECD Publishing, Paris, https://doi.org/10.1787/34907e9c-en

OECD/ERIA (2018), *SME Policy Index: ASEAN 2018: Boosting Competitiveness and Inclusive Growth*, OECD Publishing, Paris/Economic Research Institute for ASEAN and East Asia, Jakarta. *https://doi.org/10.1787/9789264305328-en*

Oliveira, T., & Martins, M, F. (2011). Literature Review of Information Technology Adoption Models at Firm Level. *The Electronic Journal Information Systems Evaluation, 14*(1), 110-121.

Othman, B., Shaarani, S. M., Bahron, A., & Nawi, N. H. M. (2019). The Influence of Halal Practices on Organizational Performance among Food Industries (SMEs) in Malaysia. *Halal Journal, 3*, 40-60.

Othman, F.S. (2018, July 27). Kilang makanan ringan pamer logo halal palsu diserbu. Retrieved on 20 August 2019 from Berita Harian Online: https://www.bharian.com.my/berita/kes/2018/07/454545/ kilang-makanan-ringan-pamer-logo-halal-palsudiserbu. [In Bahasa Malaysia].

Pagano, R. R. (2012). *Understanding statistics in the behavioral sciences*. Nelson Education.

Pallant, J. (2011). *SPSS survival manual: A step-by-step guide to data analysis using SPSS program 4th Edition*. Allen & Unwin.

Pallant, J. (2007). *SPSS: Survival manual*. McGraw-Hill.

Pallant, J. (2005). *SPSS survival guide*. Allen & Unwin.

Patel, NC, Kistler, JS, James, EB, & Crimson, ML (2004). A retrospective analysis of the short-term effects of olanzapine and quetiapine on weight and body mass index in children and adolescents. *Pharmacotherapy, 24*(7), 824830.

Paudel, K. P., Poudel, B. N., Dunn, M. A., & Pandit, M. (2009). An Analysis of Rank Ordered Data, Agricultural and Applied Economics Association. Milwaukee, Wisconsin.

Peng, C. Y. J., Lee, K. L., & Ingersoll, G. M. (2002). An introduction to logistic regression analysis and reporting. *The journal of educational research, 96*(1), 3-14.

Petroni, A., & Rizzi, A. (2001). Antecedents of MRP adoption in small and medium-sized firms. *Benchmarking: An International Journal, 8*(2), 144-156.

Poniman, D., Purchase, S. and Sneddon, J. (2015). Traceability systems in the Western Australia halal food supply chain. *Asia Pacific Journal of Marketing and Logistics, 27*(2), 324-348.

Poon, J. M. L., Ainuddin, R. A., & Junit, S. H. (2006). Effects of Self-concept Traits and Entrepreneurial Orientation on Firm Performance. *International Small Business Journal, 24*(1), 61–82.

Premkumar, G., & Ramamurthy, K. (1995). The role of interorganizational and organizational factors on the decision mode for adoption of interorganizational systems. *Decision Sciences, 26*, 303-336.

Premkumar, G., & Roberts, M. (1999). Adoption of new information technologies in rural small businesses. *Omega, 27*(4), 467–484.

Qiang, C. Z., Clarke, G. R., & Halewood, N. (2006). *The role of ICT in doing business information and communications for development—Global trends and policies*. World Bank.

Radipere, S., & Dhliwayo, S. (2014). The Role of Gender and Education on Small Business Performance in the South African Small Enterprise Sector. *Mediterranean Journal of Social Sciences. 5*(9), 104-110.

Rahman, A., & Abdul, M. (2017). Establishment of traceability practices through halal assurance system (HAS) implementation. *International Journal of Academic Research in Business and Social Sciences, 7*, 130-139.

Rahman, H., & Ramos, I. (2014). Information systems for small and medium-sized enterprises. In J. Devos, H. van Landeghem, & D. Deschoolmeester (Eds.), *Progress in IS*. Verlag. 313–335. Springer.

Ramayah, T., Mohamad, O., Omar, A., & Marimuthu, M. (2009). Technology adoption among small and medium enterprises (SME's): A research agenda. *World Academy of Science Engineering & Technology Journal, 53*, 943-946.

Ramsey, E., & McCole, P. (2005) E-business in professional SMEs: The case of New Zealand. *Journal of Small Business and Enterprise Development, 12* (4), 528–544.

Rao, N. S. N. (1985). *Elements of Health Statistics 1st edition*. R. Publication.

Raymond, L., Bergeron, F., & Blili, S. (2005). The assimilation of E-business in manufacturing SMEs: Determinants and effects on growth and internationalization. *Electronic Markets, 15*(2), 106-118.

Regan, G., McCaffery F., McDaid K., & Flood, D. (2012). *The Barriers to Traceability and their Potential Solutions: Towards a Reference Framework. Paper presented at the 38th Euromicro Conference on Software Engineering and Advanced Applications,* Cesme, Izmir, 319-322.

Regattieri, A., Gamberi, M., & Manzini, R. (2007). Traceability of food products: General framework and experimental evidence. *Journal of Food Engineering, 81*(2), 347-356.

Rejeb, A. (2018). Halal Meat Supply Chain Traceability Based on HACCP, Blockchain and Internet of Things. *Acta Tech. Jaurinensis*, *11*(4), 218–247.

Richardson, A. J., Ampt, E. S., & Meyburg, A. H. (1995). *Survey methods for transport planning (p. 314).* Eucalyptus Press.

Rogers, E. M., & Shoemaker, F. F. (1971). *Communication of Innovations: a cross-culture approach 2nd Ed.* Free Press.

Rohmah, D.U., Maharani, S., Kholis, M.N., Umma, S., Taqwa, & Setyaningrum, H. (2019). *Traceability and Tracking Systems of Halal Food Using Blockchain Technology to Improve Food Industry Competitiveness.* Paper presented at the Proceedings of the 1st International Conference on Business, Law and Pedagogy, (ICBLP 2019). Sidoarjo, Indonesia.

Rouibah, K., Abbas, H., & Rouibah, S. (2011). Factors affecting camera mobile phone adoption before e-shopping in the Arab world. *Technology in Society, 33*(3–4), 271-283.

Sabherwal, R., Jeyaraj, A., & Chowa, C. (2006). Information system success: Individual and organizational determinants. *Management Science, 52*, 1849–1864.

Sage, C. (2018). *Agro-food systems: In Companion to Environmental Studies (pp. 486-490).* Taylor & Francis Group.

Sahin, E., Dallery, Y., & Gershwin, S., (2002). *Performance evaluation of a traceability system.* Paper presented at the Proceedings of IEEE International Conference on Systems, Man and Cybernetics, Vol. 3, Tunisia. 6.

Samsi, S. Z. M., Tasnim, R., & Ibrahim, O. (2011). *Stakeholders' role for an efficient traceability system in halal industry supply chain*. Paper presented at the Annual International Conference on Enterprise Resource Planning & Supply Chain Management. 1-5.

Samuels, P. (2017). *Advice on Reliability Analysis with Small Samples-Revised Version.* Birmingham City University. 1-4.

Sarig, Y. (2003). Traceability of Food Products. *Agricultural Engineering International: The CIGR Journal of Scientific Research and Development, 5*, 1-17.

Saxton, G. D. (2007, March). Social capital and vitality of community-based organisations. In Annual Meeting of the Western Academy of Management March 21st to 24th.

Schober, P., Boer, C., & Schwarte, L. A. (2018). Correlation coefficients: appropriate use and interpretation. *Anesthesia & Analgesia, 126*(5), 1763-1768.

Schumacker, R. E. (1996). Editor's Note. *Structural Equation Modeling, 3*(1), 1-3.

Sekaran, U. (2012). *Research Methods for Business – A Skill Building Approach*. John Wiley and Sons.

Shafii, Z. and Khadijah, W.S. (2011). Halal traceability framework for halal production. *World Applied Science Journal, 15*, 1-5.

Sharma, R., & Mishra, R. (2014). A review of evolution of theories and models of technology adoption. *Indore management Journal, 6*(2), 17-29.

Shiau, W., Hsu, P., & Wang, J. (2009). Development of measures to assess the ERP adoption of small and medium enterprises. *Journal of Enterprise Information Management, 22*(1/2), 99–118.

Shiying, W. (2020, 30 Jun). Winter melon products recalled due to excessive levels of sulphur dioxide. Singapore The Straits Times. Retrieved on 12 September 2020 from https://www.straitstimes.com/singapore/winter-melon-products-recalled-due-to-excessive-levels-of-sulphur-dioxide

Shunan, Z., Boli, G., Jiarong, P. (2007). Application of RFID Technique in Food Tracking and Tracing. *Food Research and Development, 28*(09), 148–150.

Singh, A. S., & Masuku, M. B. (2012). An insight statistical techniques and design in agricultural and applied research. *World Journal of Agricultural Sciences, 8*(6), 568-584.

Singh, A. S., & Masuku, M. B. (2013). Fundamentals of applied research and sampling techniques. *International Journal of Medical and Applied Sciences, 2*(4), 124-132.

Singh, A. S., & Masuku, M. B. (2014). Sampling techniques and determination of sample size in applied statistics research: An overview. *International Journal of Economics, Commerce and Management, 2*, 1-22.

Siregar, J. J., Puspokusumo, R.A. A. W., & Rahayu, A. (2017). Analysis of affecting factors technology acceptance model in the application of knowledge management for small medium enterprises in industry creative. *Procedia Computer Science, 116*, 500-508.

Sivo, S. A., Ku, C.-H., & Acharya, P. (2018). Understanding how university student perceptions of resources affect technology acceptance in online learning courses. *Australasian Journal of Educational Technology, 34*(4), 72-91.

Skripak, S. J. (2016). *Fundamentals of business*. Pamplin College of Business and Virginia Tech Libraries.

SME Corporation Malaysia. (2013). Guideline for new SME definition. Retrieved from https://www.smecorp.gov.my/images/pdf/Guideline_for_New_SME_Def inition_7Jan2014.pdf

SME Corporation Malaysia. (2018). Appendix 1: Key statistics on SMEs. Retrieved from https://www.smecorp.gov.my/images/SMEAR/SMEAR2017/ENG/appe ndix1.pdf

SME Corporation Malaysia. (2018). Chapter 2: SME developments and outlook. Retrieved from https://www.smecorp.gov.my/images/SMEAR/SMEAR2018_2019/SME %20AR%202018_19%20-%20Chapter%202.pdf

SME Corporation Malaysia. (2018). Digitalisation survey of SMEs in 2018. Retrieved from https://www.smecorp.gov.my/images/SMEAR/SMEAR2017/ENG/Chapt er2BoxArticle2.pdf

Spink, J., & Moyer, D. C. (2011). Defining the public health threat of food fraud. *Journal of Food Science, 76*(9), R157-R163.

Starbuck, W. H. (1976). Organisations and their environments. In M.D. Dunette (Ed.), *Handbook of Industrial and Organisational Psychology* (pp. 1069–1124). Rand McNally Publishers.

Stigler, S. (1999). *Statistics on the table: The history of statistical concepts and methods.* Harvard University Press.

Stiglitz, J. E. (2006). *Making globalisation work*. Norton & Company, Inc.

Stigler, S. (1999). Statistics on the table: The history of statistical concepts and methods. Cambridge, MA: Harvard University Press.

Stopher, P. (2012). *Collecting, managing, and assessing data using sample surveys*. Cambridge University Press.

Stopher, P. R., Kockelman, K., Greaves, S. P., & Clifford, E. (2008). Reducing burden and sample sizes in multiday household travel surveys. *Transportation Research Record, 2064*(1), 12-18.

Sudman, S. (1976). *Applied sampling*. Academic Press.

Suhaiza, H., Zainal, A., Nabsiah, A., Rosly, O. and Yudi, F. (2010a). Recommendation to strengthen halal food supply chain for food industry in Malaysia. *Journal of Agribusiness Marketing Special Edition, 3*, 91-105.

Surendran, P. (2012). Technology acceptance model: A survey of literature. *International Journal of Business and Social Research, 2*(4), 175-178.

Taherdoost, H., & Masrom, M. (2009). *An examination of smart card technology acceptance using adoption model*. Paper presented at the ITI 31st International Conference on Information Technology Interfaces. Cavtat, Croatia: IEEE.

Taherdoost, H., Zamani, M., & Namayandeh, M. (2009). *Study of smart card technology and probe user awareness about it: a case study of Middle Eastern students*. Paper presented at the International Conference on Management Technology and Applications, Beijing, China: IEEE.

Taherdoost, H. (2018). A review of technology acceptance and adoption models and theories, *Procedia Manufacturing, 22*, 960-967.

Tahir, P. R. (2013). Moderating Role of Marketing Environment on the Lead Success Factors of Halal Small and Medium Enterprises in Pahang (Doctoral thesis, University of Malaya, Kuala Lumpur, Malaysia). Retrieved from http://studentsrepo.um.edu.my/4371/1/PutriFinalSubmission_thesis.pdf

Tahir, P. R., Hanaysha, J., & Sultana, M. (2016). Level of success of halal small and medium entrepreneurs in Malaysia. *Asian Journal of Scientific Research, 9*, 214-218.

Tanaka, J. (1987). How big is enough? Sample size and goodness-of-fit in structural equation models with latent variables. *Child Development, 58*, 134-146.

Tanaka, J. C. (1984). Some results on the estimation of covariance structure models. Dissertation Abstracts International 45, 924B.

Teece, D. J. (1977). Technology transfer by multinational firms: the resource cost of transferring technological know-how, *The Economic Journal, 87* (346), 242-261.

Teo, T., Lee, C. B., Chai, C. S., & Wong, S. L. (2009). Assessing the intention to use technology among pre-service teachers in Singapore and Malaysia: A multigroup invariance analysis of the Technology Acceptance Model (TAM). *Computers & Education, 53*(3), 1000-1009.

Thimothy, G. (2019, 13 Jun). Bottled water recalled after bacteria found in samples. Singapore The Straits Times. Retrieved on 6 September 2020 from https://www.straitstimes.com/singapore/bottled-water-recalled-after-bacteria-found-in-samples

Thompson, C. B. (2009). Descriptive data analysis. *Air medical journal, 28*(2), 56-59.

Thompson, J.D. (1967). *Organizations in action*. McGraw-Hill.

Thong, J. Y. (1999). An integrated model of information systems adoption in small businesses. *Journal of Management Information Systems, 15*(4), 187–214.

Thong, J. Y. L., & Yap, C. (1995). CEO characteristics, organizational characteristics and information technology adoption in small businesses. *Omega, 23*, 429–442.

Thong, J. Y. L., Yap, C. S., & Raman, K. S. (1996). Top management support, external expertise and information systems implementation in small business. *Information Systems Research, 7*(2), 248-67.

Tian, F. (2012). *A Supply Chain Traceability System for Food Safety Based on HACCP, Blockchain & Internet of Things*. Paper presented at the 2017 International Conference on Service Systems and Service Management. Dalian. 1-6.

Tidd, J., & Bessant, J. R. (2018). *Managing innovation: integrating technological, market and organizational change*. John Wiley & Sons.

Tieman M., & Darun, M. R. (2018). Leveraging Blockchain Technology for Halal Supply Chains. *Islam and Civilisational Renewal, 8*(4), 547–550.

Tornatzky, L. & Fleischer, M. (1990). *The process of technology innovation.* Lexington Books.

Tushman, M. L., & Anderson, P. (1986). Technological discontinuities and organizational environments. *Administrative Science Quarterly, 31*(3), 439–465.

Tushman, M., & Nadler, D. (1986). Organizing for innovation. *California Management Review, 28*(3), 74–94.

Usman, Y. V., Fauzi, A. M., Irawadi, T. T., & Diatna, T. (2018). *Augmented halal food traceability system: analysis and design using UML*. Paper presented at the International Conference in Industrial and System Engineering, Denpasar, Bali, Indonesia. 1-7.

Uwalomwa, U., & Ranti, O. O. (2009). Adoption of information and communication technology among small and medium scale enterprises in Nigeria. *African Journal of Business and Economic Research, 4*(2_3), 73-84.

Van Alstyne, M., & Brynjolfsson, E. (2005). Global Village or Cyber-Balkans? Modeling and Measuring the Integration of Electronic Communities. *Management Science, 51*(6), 851-868.

Van Hoek, R. (2019). Developing a framework for considering blockchain pilots in the supply chain – lessons from early industry adopters. *Supply Chain Management, 25*(1), 115-121.

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science, 46*(2), 186-204.

Venkatesh, V., & Davis, F. D. (1996). A model of the antecedents of perceived ease of use: Development and test. *Decision Sciences, 27*,451-481.

Venkatesh, V., Speier, C., & Morris, M.G. (2002), User Acceptance Enablers in Individual Decision Making About Technology: Toward an Integrated Model. *Decision Sciences, 33*, 297-316.

Venkatesh, V., & Bala, H. (2008). Technology acceptance model 3 and a research agenda on interventions. *Decision Sciences, 39*, 273–315.

Wahid, F., & Indarti, N. (2007). Rendah, Adopsi Teknologi Informasi oleh UKM di Indonesia. *Majalah Pusat Informasi Perkoperasian*.

Wang, Y., Wang, Y., & Yang, Y. (2010). Understanding the determinants of RFID adoption in the manufacturing industry. *Technological Forecasting & Social Change, 77*, 803–815.

Weinstein, A. (2008). *Handbook of Market Segmentation 3rd edition*. Routledge.

Wu, P.F. (2009). *User acceptance of emergency alert technology: A case study*. Paper presented at the Proceedings of the 6th International ISCRAM Conference, Gothenburg, Sweden. https://www.researchgate.net/publication/228951268_User_acceptance_of_emergency_alert_technology_A_case_study

Yahya, O. (2018). 10 tahun guna logo halal palsu. Retrieved on 15 August 2019 from Kosmo Online: http://www.kosmo.com.my/negara/10-tahun-gunalogo-halal-palsu-1.587690. [In Bahasa Malaysia]

Yang, Y., & Bao, W. (2011). The Design and Implementation of Halal Beef Wholly Quality Traceability System. In Li D., Liu Y., & Chen Y. (Ed.), *Computer and Computing Technologies in Agriculture IV. CCTA 2010. IFIP Advances in Information and Communication Technology vol 346.* Springer.

Yuan, C., Wang, S., & Yu, X. (2020). The impact of food traceability system on consumer perceived value and purchase intention in China. *Industrial Management & Data Systems, 120*(4), 810-824.

Zailani, S., Arrifin, Z., Wahid, N.A., Othman, R. and Fernando, Y. (2010). Halal traceability and halal tracking system in strengthening halal food supply chain for food industry in Malaysia. *Journal of Food Technology, 8*(3), 74-81.

Zhang, Y., & Zou, T. (2017). *A review of food traceability in food supply chain*. Paper presented at the Proceedings of the International Multi Conference of Engineers and Computer Scientists (IMECS 2017) Vol 2, Hong Kong, 1-4.

Zhu, K., & Kraemer, K. L. (2005). Post-adoption variations in usage and value of e-business by organizations: Cross-country evidence from the retail industry. *Information Systems Research, 16*(1), 61–84.

Zhu, K., Kraemer, K. L., & Xu, S. (2006b). The process of innovation assimilation by firms in different countries: A technology diffusion perspective on e-business. *Management Science, 52*(10), 1557–1576.

Zhu, K., Kraemer, K. L., Gurbaxani, V., & Xu, S. X. (2006a). Migration to open-standard interorganizational systems: Network effects, switching costs, and path dependency. *MIS Quarterly, 30*, 515–539.

Zhu, K., Kraemer, K., & Xu, S. (2002). *A cross-country study of electronic business adoption using the technology-organization-environment framework*. Paper presented at the International Conference on Information Systems (ICIS 2002 Proceedings), Barcelona, Spain, 337-348.

Zhu, K., Kraemer, K., & Xu, S. (2003). Electronic business adoption by European firms: A cross-country assessment of the facilitators and inhibitors. *European Journal of Information Systems, 12*, 251–268.

Zulfakar, M.H., Anuar, M.M. & Ab Talib, M.S. (2014). Conceptual framework on halal food supply chain integrity enhancement. *Procedia-Social and Behavioural Sciences, 121*, 58-67.

BIODATA OF STUDENT

Nur Aminin Muhamad who was born on 12th September 1995 in Kelantan state. Since young the author has great interest in pursuing her study to the maximum level of education. She received her early education in Sekolah Kebangsaan Sri Wangi. She completed her study for her secondary education at MARA Junior Science College Jeli. She later attended Perak Matriculation College. She obtains her Bachelor's Degree in Agribusiness at UPM in 2018. She is dedicated to achieve her dreams.

LIST OF PUBLICATIONS

Research Paper

Muhamad, N. A., Kamarulzaman, N. H., & Nawi, N. M. (2020). Agro-food SMEs' intention to adopt halal traceability system. *Food Research, 4*(Suppl. 1), 93-98.

Muhamad, N.A., Kamarulzaman, N.H. and Nawi, N.M. (2019). Adoption Intention of Halal Traceability System among Agro-Food SMEs. Journal of Contemporary Islamic Studies, 5(1), 1-18.

Proceeding Papers

Muhamad, N. A., Kamarulzaman, N.H., & Nawi, N. M. (2019). Agro-food SMEs' intention to adopt Halal traceability system. Global Halal Sphere Conference 2019, International Islamic University Malaysia, Malaysia. 21st-22nd August 2019.

Muhamad, N.A., Kamarulzaman, N.H. and Nawi, N.M. (2020). Halal Traceability System Implementation along Food-Based SMEs Supply Chain. IPB-UPM Joint Seminar on Agriculture, Resources, and Environmental Economics Issues, Faculty of Agriculture, Universiti Putra Malaysia. 10 December 2018.

Muhamad, N. A. & Kamarulzaman, N. H. (2018). Implementation of Halal Traceability System along SMEs Food Supply Chain. 8th International Agriculture Congress and 6th International Symposium for Food and Agriculture 2018, TNCPI Building, Universiti Putra Malaysia. 13th-15th November 2018.

Kamarulzaman, N. H., Muhamad, N. A. & Ruslan, A. A. A. (2018). Determining Consumers' Awareness and Perception of Artificial Food Products. International Conference on Science and Technology 2018 (ICOSAT), TNCPI Building, Universiti Putra Malaysia. 1st-2nd November 2018.

UNIVERSITI PUTRA MALAYSIA

STATUS CONFIRMATION FOR THESIS / PROJECT REPORT
AND COPYRIGHT

ACADEMIC SESSION: <u>SECOND SEMESTER 2020/2021</u>

TITLE OF THESIS / PROJECT REPORT:

<u>INTENTION TO ADOPT WEB-BASED HALAL TRACEABILITY SYSTEM AMONG SMALL AND MEDIUM ENTERPRISES OF FOOD SUB-SECTOR IN PENINSULAR MALAYSIA</u>

NAME OF STUDENT:

<u>NUR AMININ BINTI MUHAMAD</u>

I acknowledge that the copyright and other intellectual property in the thesis/project report belonged to Universiti Putra Malaysia and I agree to allow this thesis/project report to be placed at the library under the following terms:

1. This thesis/project report is the property of Universiti Putra Malaysia.

2. The library of Universiti Putra Malaysia has the right to make copies for educational purposes only.

3. The library of Universiti Putra Malaysia is allowed to make copies of this thesis for academic exchange.

I declare that this thesis is classified as:

*Please tick (√)

☐	**CONFIDENTIAL**	(Contain confidential information under Official Secret Act 1972).
☐	**RESTRICTED**	(Contains restricted information as specified by the organization/institution where research was done).
√	**OPEN ACCESS**	I agree that my thesis/project report to be published as hard copy or online open access.