BARRIERS AND ENABLERS TO THE ADOPTION OF HALAL TRANSPORTATION AND HALAL WAREHOUSING SERVICES AMONG HALAL MANUFACTURERS IN MALAYSIA

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DOCTOR OF PHILOSOPHY

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DEDICATION

I would like to dedicate this doctoral thesis to my lovely wife, Tuan Mastiniwati bt Hj Tuan Mansor, who gave me two child during my Phd journey; Damia Alani (1 year and 6 months) and Muhammad Sayf Faqeh (5 months). Despite your difficulties raising our kids, your supports and sacrifices, have gave me tremendous strength to finish my study. Also millions of thanks to my kids Muhammad Farqi Sarhidi (11 years), Qasrina Sufi (9 years) and Humaira Asyfa (6 years) for your great understanding that your father was struggling to finish his study. I am also grateful to my Mother Hajjah wan Lijah bt Hj Wan Ngah, my Father Hj Ngah bin Long and my mother in Law, Hajjah Maimon bt Yusof, who keeps on praying for me days and nights tirelessly. Without your support and encouragements, it could be hard for me to go through this journey.

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ABSTRACT

Increasing in demands for Halal products by Muslims consumers due to their religious obligation has led to the creating of new service known as Halal supply chain. Halal transportation and Halal warehousing are the activities contained in Halal supply chain services. This service were created purely to meet demand from Halal manufacturers who want to protect the credibility of their Halal status. Even more than 2000 companies have been awarded as the Halal manufacturers by Department of Islamic Development (JAKIM), but based on interviewed with the Halal certified service providers, it is only around 15% of the Halal manufacturers were adopting their services. Therefore, by adopting the TOE framework as a theory, this study will try to identify the barriers and the enablers for Halal manufacturers in adopting Halal transportation and warehousing services. By adopting convenience sampling method, a total of 344 respondents were involved in this study. Structured Equation Modeling (SEM) with Partial Least Squares (PLS) version 2.0 has been used to test the relationship between constructs in this study. The study found that perceived benefits, awareness, customer pressures and competitive pressures have significant relationship with the intention to adopt Halal transportation and Halal warehousing services. As expected, cost and complexity were found to be the significant barriers to the adoption of Halal transportation and Halal warehousing services. The study also found that organizational readiness and government support did not have a significant relationship with the intention to adopt Halal transportation and Halal warehousing services. In the early stage, supplier availability was expected to have a positive relationship with the intention to adopt Halal transportation and Halal warehousing services. However, this study found that supplier availability was found to have a negative relationship with the intention to adopt Halal transportation and Halal warehousing services. Top management attitude also did not moderate the positive relationship between perceived benefits and intention to adopt Halal transportation and Halal warehousing services. Beside illustrated the suitability of the PLS statistical analysis, the findings also provided useful information to a better understanding regarding drivers and barriers to the adoption of Halal transportation and Halal warehousing among Halal manufacturers in Malaysia. The findings of this study also could be used by Halal service providers and government agencies to develop a better plan to enhance the adoption rate of Halal transportation and Halal warehousing services among Halal industry players in Malaysia

ABSTRAK

Peningkatan permintaan terhadap barangan Halal oleh pengguna Islam yang disebabkan oleh tanggungjawab terhadap agama mereka telah mencipta satu servis baru iaitu perkhidmatan rantaian bekalan yang Halal. Perkhidmatan pengangkutan Halal dan pergudangan Halal adalah antara aktiviti yang terkandung di dalam perkhidmatan rantaian bekalan Halal. Perkhidmatan ini direka khas untuk memenuhi permintaan dari syarikat pengeluar barangan Halal yang bertujuan untuk melindungi status Halal produk mereka. Walaupun Lebih dari 2000 buah syarikat telah dianugerahkan sijil Halal oleh Jabatan Kemajuan Islam Malaysia (JAKIM). tetapi, berdasarkan temubual bersama dengan penyedia perkhidmatan rantaian bekalan Halal, daripada jumlah tersebut, hanya lebih kurang 15% daripada syarikat Halal tersebut telah menggunakan perkhidmatan yang disediakan oleh mereka. Oleh yang demikian, dengan menggunakan "TOE framework" sebagai teori, kajian ini cuba untuk mengenalpasti apakah faktor yang boleh menjadi pemangkin dan penghalang bagi pengeluar barangan Halal untuk menggunakan perkhidmatan pengangkutan Halal dan pergudangan Halal. Dengan menggunakan kaedah persampelan secara kebetulan, sejumlah 344 responden telah berjaya dilibatkan di dalam kajian ini. Konsep Pemodelan Persamaan Struktural (SEM) dengan menggunakan perisian "Partial Least Square (PLS 2.0) telah digunakan untuk menguji hubungan bagi konstruk didalam kajian ini. Kajian mendapati jangkaan manfaat, kepekaan, tekanan dari pelanggan dan tekanan persaingan merupakan pemangkin yang mempunyai hubungan yang signifikan dengan niat untuk menggunakan perkhidmatan pengangkutan Halal dan pergudangan Halal. Seperti yang dijangkakan, kos dan kesukaran adalah penghalang kepada niat untuk menggunakan perkhidmatan pengangkutan Halal dan pergudangan Halal. Kajian juga mendapati bahawa kesediaan syarikat dan sokongan dari pihak kerajaan adalah tidak mempunyai hubungan yang signifikan dengan niat untuk menggunakan pengangkutan Halal dan pergudangan Halal. Walaubagaimanapun, kajian ini mendapati bahawa keberadaan pembekal Halal mempunyai hubungan yang negatif dengan niat untuk menggunapakai perkhidmatan pengangkutan dan pergudangan Halal. Sikap pengurus atasan juga didapati tidak mempunyai kesan penyerderhana terhadap hubungan positif antara jangkaan manfaat dan niat untuk mengunapakai perkhidmatan pengangkutan dan pergudangan Halal. Selain memaparkan kesesuaian perisian PLS didalam menganalisa dapatan secara statistik, kajian ini juga menyediakan maklumat yang berguna untuk lebih memahami apakah perkara yang memotivasikan dan menghalang pengeluar barangan Halal di Malaysia untuk menggunapakai perkhidmatan pengakutan Halal dan pergudangan Halal. Penyedia perkhidmatan Halal dan agensi kerajaan yang terlibat di dalam isu Halal boleh menggunakan dapatan daripada kajian ini untuk membangunkan perancangan bagi meningkatkan kadar penggunaan perkhidmatan Halal dikalangan pemain industri Halal di Malaysia.

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LIST OF ABBREVIATION

JAKIM	Department of Islamic Development
HDC	Halal Development Corporation
NAFAS	National Farmers Organization
JAIN	State Religious Council
GMP	Good Manufacturing Practice
HACCP	Hazard Analysis Critical Control Point
MS 1500:2009	Malaysian Standard for Halal Food Certification
MS 2424: 2012	Malaysian Standard for Halal Pharmaceutical Certification
MS 2200: 2008	Malaysian Standard for Halal Cosmetic Certification
PLS	Partial Least Squares
SPSS	Statistical Package for Social Science
TAM	Technology Adoption Model
DOI	Diffusion Of Innovation
IDT	Innovation Diffusion Theory
RBV	Resource Base View
TOE	Technology, Organization and Environment
SCM	Supply Chain Management
OECD	Organization Economic Corporation and Development
EDI	Electronic Data Interchange
EC	Electronic Commerce
SME	Small and Medium Enterprise
RFID	Radio Frequency Identification Device
SEM	Structural Equation Modelling
IEBT	Internet, E-Business Technology
XBRL	eXtensible Business Reporting Language

CMV	Common Method Variance
MIHAS	Malaysian International *Halal* festival
Halfest	*Halal* Festival
CB SEM	Covariance base Structural Equation Modelling
VB SEM	Variance base Structural Equation Modelling
EM	Expected Maximization
AVE	Average Variance Explained
CA	Cronbach Alpha
CR	Composite Reliability

CHAPTER 1

INTRODUCTION

Supply chain management has emerged to become a vital industry to support economic activities in the country. According to Lambert (1998), supply chain management is defined as the integration of the business process from the end user through the original suppliers that provide products, services and information that add value to the customers. Once it is integrated with *Halal*, it becomes *Halal* supply chain. *Halal* supply chain can be defined as the integration of business process and activities from point of origin to point of consumption according to the Islamic law known as syariah. The activities involved in *Halal* supply chain are warehousing, sourcing, transportation, handling of products, inventory management and other managements. (Omar and Jaafar, 2011).

The uniqueness of Malaysia, which consists of many races, religions and cultures create a variety of demand in order to fulfil the needs of local people and markets. Increasing awareness among Muslim consumers of their religious obligations create greater demand for *Halal* products. *Halal* is based on Islamic value which means permissible, allowable or lawful (Zakaria and Abu Talib, 2010) to be consumed. *Halal* supply chain service is a new approach of handling products that was creatively created by *Halal* service providers as a compliment to the demand from the *Halal* industry. Since it purely follows all the syariah's requirements, *Halal* supply chain is being promoted as the only approach that is able to confirm the *Halal* integrity to their stakeholders.Since it is a new approach, the main challenge of new services and technology is the intention to adopt and the use of technology (Esmaeilzadeh et al., 2013). Even though the *Halal* supply chain services are invented purposely for the

Halal manufacturers, but the demand of these services are not in line with the growth of *Halal* industry. The number of *Halal* manufacturers who are adopting their services is still relatively low.

Proper transportation, storage and handling until the *Halal* products reached its final destination play a very important role in protecting the *Halal* status of the *Halal* products (Tieman, 2006). Luckily, logistic companies understand that they also have to play their part in maintaining the integrity of *Halal* products. Hence, led by the Kontena Nasional Berhad, a few other logistic companies are trying to meet the demand in this industry to help Muslim consumers have no doubt in using the *Halal* products available in the market. Even though many logistics operators tried to be certified as *Halal* service providers in many areas such as transportation, warehousing, container purification, and other services, due to the high standard set by Department of Malaysian Standard , not all of them succeed. Therefore, every logistic service providers that have been certified as *Halal* service providers, according to their capability, have their own advantages. Some of them are offering full range of the *Halal* services and some of them are specializing in certain service only such as *Halal* transportation and *Halal* warehousing activities.

At present, *Halal* is not only for food. Pharmaceuticals, cosmetics, banking service and personal care are also available as *Halal* products in Malaysia. The *Halal* products are not confirmed as *Halal* at the point of consumption if the *Halal* supply chain services are not involved in the whole supply chain activities. According to Bonne and Verbeke (2008), Muslim consumers still lack information on the supply chain and cannot be reassured that no cross-contamination has taken place during the movement and storage of the products. As the Muslim consumers require the consumption of *Halal* products, therefore, not only the production of the *Halal* products is important, but also the logistics to the consumer, in order to ensure the integrity of the product at the point of consumption. (Tieman, 2007a). Even though the concept of *Halal* is starting to play its role when considering using the products (Duan et al., 2012), however, attention regarding the adoption of *Halal* supply chain services among *Halal* manufacturers is still relatively low. Therefor, it is important to understand why *Halal* manufacturers are still not adopting *Halal* supply chain services for their *Halal* products.

Due to the broad range of *Halal* supply chain services, this study will only focus on the adoption of *Halal* transportation and *Halal* warehousing services. According to Tieman (2008), all Halal products that move through the supply chain will involve two stages which are transportation and storage. In addition, Tieman (2008) also claimed that goods spend a lot of time in the transportation and warehousing activities. Once it become finished products, the goods will be moved to the warehouse. When it is ready transported to its final destination, it will also go through the warehousing process. This shows the importance of these two activities, since all products must go through these services. Therefore, this study will only focus on the intention to adopt Halal transportation and Halal warehousing services.

Lacking of intention to adopt *Halal* supply chain services among *Halal* manufacturers in Malaysia is very odd. According to Tieman (2007b), the *Halal* integrity of the product is a result of the various activities in the supply chain, and it is very important to guarantee the *Halal* integrity at the point of consumption. This means that, there is no other way to confirm that the *Halal* products are really *Halal* at the point of consumption except adopting the *Halal* transportation and the *Halal* warehousing services. Due to that matter, adopting *Halal* services among the *Halal* manufacturers should not be an issue. Furthermore, according to Othman et al., (2004) being *Halal* is no longer a threat but a business opportunity, and also as a competitive advantage (Zailani et al., 2011). Thus this study would like to reveal what are the barriers impeding the *Halal* manufacturers to adopt the *Halal* transportation and the *Halal* warehousing services.

In addition to looking for the barriers to the adoption of the *Halal* transportation and the *Halal* warehousing services, this study will also try to identify what are the enabler variables that could lead to the adoption decision among *Halal* manufacturers in Malaysia. By revealing the factors that could enhance the adoption rate of the *Halal* transportation and the *Halal* warehousing services, many parties involved in this study will benefit from this study.

Despite the fact that many studies have been done regarding *Halal*, it still failed to convince the majority of the *Halal* manufacturers to commit themselves until the *Halal* transportation and the *Halal* warehousing services stage. It is shown by a small percentage of *Halal* manufacturers adopting *Halal* services especially in the *Halal* transportation and the *Halal* warehousing services. Even the *Halal* manufacturers noticed that the majority of the time, the *Halal* products will go through this stage before it is displayed at the rack at the supermarkets. Hence, there are probably some barriers that prevented them to adopt it. This is also one of the reasons why this study is important to be run through. Furthermore, Tieman (2013) suggested that, academic research is highly needed in this area. This study will try to investigate what are the barriers impeding and the enablers that are influencing the *Halal* manufacturers to adopt *Halal* transportation and *Halal* warehousing services from the context of technology, organization and environment. Since the coverage of variables to be used in this study is quite large, the findings of this study will hopefully help all parties involved in the *Halal* industry. Several studies has been done regarding *Halal*, but most of them focus on either *Halal* orientation or *Halal* process. There are very limited numbers of studies regarding *Halal* supply chain services. Most of the studies in adoption of innovation in an organization are only focusing in the SMEs. Thus, hopefully, at the end of this study, the barriers and the enablers of *Halal* transportation and *Halal* warehousing services can be identified in order to support Malaysia to be *Halal*-hub in this region.

1.1 BACKGROUND OF THE STUDY

Halal is an Arabic term which means allowable or permissible. For the Muslims, to decide what is *Halal* or non *Halal* is according to Islamic law known as *Syariah*. Once the goods are *Halal*, this means that the goods are permissible to be consumed by Muslims since it had already fullfilled the *Syariah* requirements. According to previous Director of the Department of Islamic Development (JAKIM), Dato' Hj. Wan Mohamad bin Dato' Sheikh Abdul Aziz, Syariah is rules decree by Allah S.W.T for His subjects whether related to faith, acts of devotion, morality, Muamalat and ways of life in various aspects of growth of human beings. Although the

Halal concept is only a matter concerning Muslims and not to other religion, but, it will be benefited to all users since it focus on purity and not only in cleanliness.

The opposite of *Halal* is *Haram* which means forbidden or prohibited. For goods or actions known as *Syubhah* which means duvious or questionable, they do not fall within those categories. Until the status of goods or action which is syubhah are confirmed as *Halal*, all muslims have to avoid it. Furthermore, it is crucial to eliminate the element of doubt before products could be used by Muslims. This statement has been mentioned by the Prophet Muhammad (peace be upon him) as reported by Bukhari, Muslim, Abu daud,Ibn Majah and Darimi, as follows;

"*What is Halal is clear, and what is Haram is also clear. And between those two are dubious area in which many people do not know about. So whoever distanced himself from it, he has acquitted himself (from blame). And those who fall int it, he has fallen into a state of haram"*

It is clearly stated in Syariah that muslims could only consume Halal products and must avoid any activities that could lead to Haram as stated in the Holy Quran. The Quran itself mentioned what could be consumed and not as mentioned :

" Forbidden to you is that which dies of itself, and blood and the flesh of swine, and that on which any other name than that of al\l has been invoked, and the strangled (animal) and that beaten to death, and that killed by a fall and that killed by being smitten with the horn, and that which wild beasts have eaten, except what you slaughter, and what is sacrified on stones set up (for idols) and that you divide by the arrows; that is transgression" Al-Maedah 5:3.

There are many kinds of *Halal* products that exist in the market today. The products are food, pharmaceuticals, cosmetics, finance and tourism (Hashim et al., 2009, Hassan and Awang, 2009; Haq and Wong, 2010, Tieman, 2011, Tieman et al., 2012, Mursyidi, 2013). The first and the most popular product regarding *Halal* is food. Other products that are getting more attention from Muslims nowadays are

pharmaceuticals products and cosmetics. In addition to this, there is also a *Halal* banking system known as the Islamic Banking system. The latest product for *Halal* is lubricant for *Halal* machines produce by National Farmers Organization (NAFAS). Islam is a way of life and every single element appears in the Islamic concept. Nowadays, Muslim consumers not only look for *Halal* products, but also the *Halal* process and the wholesome of the *Halal* aspect. It is known as *Halal* from farm to fork. Due to that matter, the new approach of handling *Halal* products known as *Halal* supply chain services which consist of *Halal* transportation, *Halal* warehousing, *Halal* terminal (Tieman, 2011) and others have been created since there is a demand for the services. According to HDC (2013), *Halal* supply chain consists of all activities such as procurement, preparation of *Halal* ingredients to the manufacturing and delivery of final products to end consumers. In addition, HDC (2013) claimed that, activities in *Halal* supply chain also includes ensuring *Halal* animal feed, animal welfare, and proper segregation between *Halal* and non-*Halal* products, in all stages during the distribution process especially in storage and transportation. Furthermore, most of the time for finished products, it will be at this stage before displaying at the rack in the retailing site.

Due to the fact that *Halal* supply chain is a new approach in handling goods, there are only few writers who have tried to define what is *Halal* supply chain. Table 1.1 below demonstrate the definition of Halal supply chain according to the authors.

Table 1.1
Halal supply chain definition

Authors	**Definition**
Omar and Jaafar (2011)	Halal is *applied in the supply chain*; thus become a halal supply chain starting from the *point of origin to the point of consumption*. These activities include warehousing, sourcing, transportation, handling of products, inventory management, procurement and order management which must follow the *Syariah Islamic perspectives*
Omar et al., (2012)	Halal supply chain is the concept starting from farm to the consumers which means *everything* must be halal and also toyyib along the chain

Table 1.1 Continued.

Tieman (2011)	Halal supply chains can be characterized as *robust supply chains* that strive for a lower vulnerability for Halal contamination.
Bahrudin, Illyas, and Desa (2011)	*Proses of managing* the procurement, movement, storage and handling of materials, parts livestock and semi- finished inventory food and non-food and related information and related documentation flows through the organization and supply chain in *compliance with the general principles of Shariah Law*. Halal Supply Chain also has the *same definition with conventional supply chain* but with the additional of Syariah *law*, whereby the Islamic law is the guideline for a proper halal process.

Source : Adapted from Omar et al. (2014)

Based on these definitions, the author define Halal supply chain as a robust supply chain that is purposely invented to protect the integrity of Halal products along the chain which consist of various activities and must be based on Syariah's requirements. No matter how *Halal* supply chain is defined, its purpose is still the same; to protect the *Halal* status for *Halal* products through out the supply chain processes. *Halal* supply chain has the same activities compared to the traditional supply chain activities. Manzouri et al., (2011) defined traditional supply chain as a series of process wherein raw material are converted into final products, then delivered to the end customer. Eventhough both processes look alike since they have the same activities, but there are a lot of differences due to different objectives. For traditional supply chain, the activities conducted to ensure the cost reduction, efficiency (Milestad et al., 2010) and the goods will arrive at the right location at the right time. However, for the *Halal* supply chain, the activities are more concentrated on protecting the integrity of *Halal* products as depicted in figure 1.1 and figure 1.2. Table 1.2 below demonstrates the other differences between both supply chain management.

Table 1.2
Difference between Halal supply chain and conventional supply chain

Criteria	***Halal* supply chain**	**Conventional supply chain**
Definition	Halal Supply Chain also has the *same definition with conventional supply chain* but with the additional of Syariah law, whereby the Islamic law is the guideline for a proper halal process.	Functions that plans, implements and control the efficient, effective forward and reverse flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customer requirements
Objective	Preserve the integrity of *Halal* products for whatever cost	Maximize profits by minimizing the cost and service efficiency
Activities	Gurantee that crosscontamination will not occurr during the handling processes	Possibility for cross contamination due to uncontrol activities.
Segregation	Segregation is a must with the non-*Halal* products.	High chances for no segregation between *Halal* and non-*Halal*.

Source : Adapted from Bahrudin et al., (2011),Omar et al., (2014)

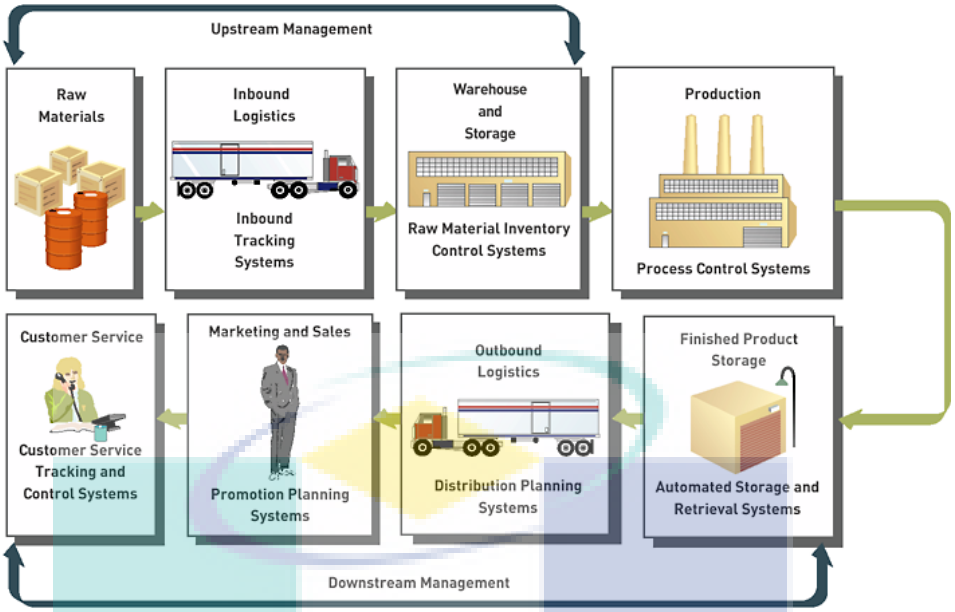

Figure 1.1. Conventional Supply Chain Framework
Source Bahruddin et al, (2011)

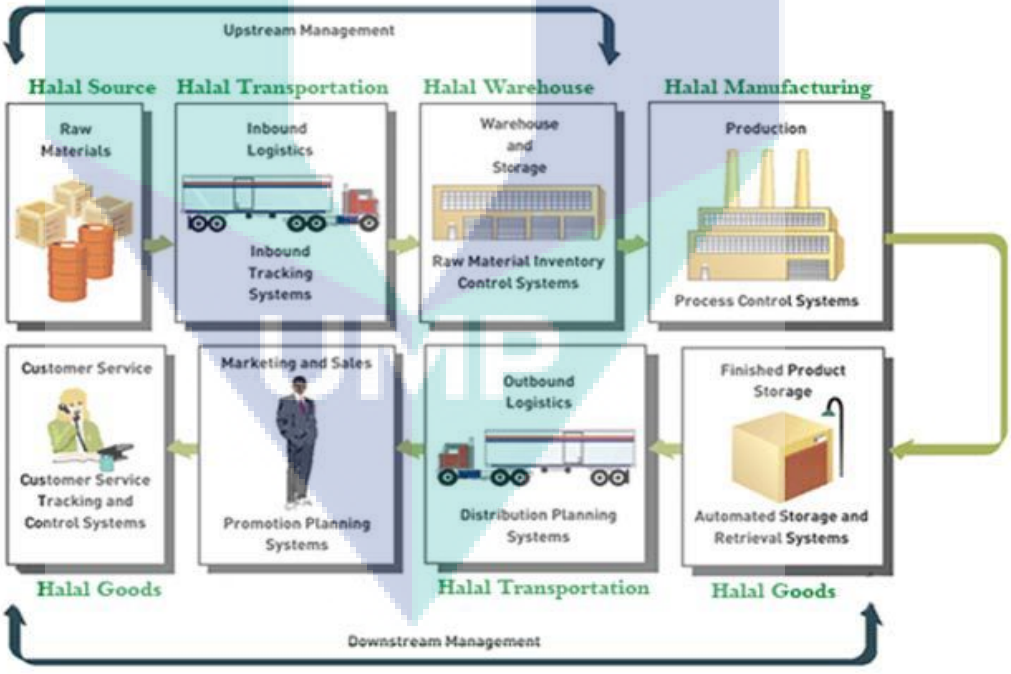

Figure 1.2. Modified *Halal* Supply Chain Framework .
Source Bahruddin et al., (2011)

JAKIM began involved in awarding verification of lawful status to food products and consumables Islamic goods for Malaysia in 1974 when Research Center,

Islamic Affair Division, under the Department of the Prime Minister gave a letter to *Halal* products that meet Islamic requirements. Even though it began in 1974, but only on the 30th September 1998, the *Halal* certification was given in the form of a certificate of authencity with *Halal* mark. During that period, *Halal* inspection was not lead by JAKIM, but was performed by Ilham Power Company, a company appointed by the government to handle the auditing process. But it did not stop there. On the 1st of September 2002, the government decided that all *Halal* matters should go back to JAKIM. With the rapid development of the *Halal* industry, especially food industry at that time, for the current needs of the Muslims, on 2 April of 2008, the *Halal* certification management was taken over by the *Halal* Industry Development Corporation (HDC).

HDC was established on 18th September 2006. Besides promoting participation and facilitating growth of Malaysian *Halal* companies, HDC also focuses on the development of *Halal* standards, audits and certification. With the mission to establish Malaysia as the Global *Halal* hub, and the mission to create value for business participating in the global *Halal* industry, HDC believes they can be a gateway towards a better understanding of *Halal* for all. Due to the rapid growth of the world *Halal* market, HDC had to focus on the promotion of *Halal*, and return the *Halal* certification management to JAKIM. To gear up the *Halal* industry in Malaysia, on the July 8, 2009, Malaysian cabinet decided that *Halal* certification management within and outside the country was to be given authority back to JAKIM.

At present, Malaysia is a world leader in the *Halal* issue. Through JAKIM, Department of Standards Malaysia and other departments, Malaysia has established many standards and guidelines for *Halal*. The standards are ;

i) MS 1500:2009 , The Malaysian Standard entitled '*Halal* Food: Production, Preparation, Handling and Storage – General Guidelines for *Halal* food processing. This standard contains practical guidelines for the food industry on the preparation and handling of *Halal* food (including nutrient enhancers). It is

used as the basis for certification for *Halal* foods manufacturer by *Halal* audit team appointed by JAKIM.

ii) MS 2424:2012, The Malaysian Standard entitled '*Halal* pharmaceuticals – General guidelines for *Halal* pharmaceuticals processing. This standard contains practical guidelines for the pharmaceuticals industry on the preparation and handling of *Halal* pharmaceutical products. It is used as the basis for certification for *Halal* pharmaceuticals manufacturer by *Halal* audit team appointed by JAKIM.

iii) MS 2200:1:2008, The Malaysian Standard entitled 'Islamic consumer goods - Part 1: Cosmetic and Personal Care - General guidelines. This standard contains practical guidelines for the Cosmetic and Personal Care industry on the preparation and handling of *Halal* Cosmetic and Personal Care products. It is used as the basis for certification for *Halal* Cosmetic and Personal Care manufacturers by *Halal* audit team appointed by JAKIM

iv) MS2400:2010 (I), The Malaysian Standard entitled '*Halal*an – Toyyiban Assurance Pipeline – Part 1 : Management system requirements for transportation of goods and/or cargo chain services. This standard contains practical guidelines for *Halal* transport certification. It is used as the basis for certification by *Halal* audit team appointed by JAKIM to confirm and award that the transport is *Halal* to be used or to become *Halal* transportation service provider.

v) MS2400:2010 (II), Management system requirements for warehousing and related activities. This standard contains practical guidelines for *Halal* warehouse certification. It is used as the basis for certification by *Halal* audit team to confirm and award that the warehouse is *Halal* to be used or to become *Halal* warehouisng service provider.

vi) MS2400:2010 (III), Management system requirements for retailing.

Instead of confirming the *Halal* integrity through standards and regulation for the manufacturers, the existence of these standards could alleviate the curiosity regarding the *Halal*ness of the products to be consumed. Furthermore, *Halal* manufacturers in Malaysia is not only exclusive for the Muslims or only certain firm size or , or for certain state only, but it is open to every type or size of companies and location without concerning the religion of the owner of the companies or the *Halal* applicant themselves. In fact, according to Tieman, (2011) majority of the certified *Halal* manufacturers in Malaysia are not Muslims.

In addition to that, Table 1.3 shows the *Halal* manufacturers according to the firm size and states where it is operated. As expected, Selangor, Kuala Lumpur and Johor have the biggest numbers of the *Halal* manufacturers since they are the most developed states in Malaysia. All the *Halal* manufacturers in Malaysia have been certified by Department of Islamic Development Malaysia (JAKIM). Even though they have been certified by JAKIM, but, JAKIM is not the only body who could run the audit process. Once the applicant applies for the *Halal* certification via online at the JAKIM's website, JAKIM will determine whether the *Halal* audit team from JAKIM or from the State Religious Council (JAIN) will visit the companies for auditing and certification process. Despite the fact that the process might be done by the *Halal* audit team from JAIN, the standard or the quality of auditing is still the same since all of them are well trained by JAKIM and they are using the same process and procedure as JAKIM audit team.

Even though most of the *Halal* manufacturers do not apply *Halal* supply chain services for their transportation and the warehousing services, but they still claim that their products are *Halal* as their products already have the *Halal* certification by JAKIM. It should be noted that JAKIM only gave their certification on the production processes, but not for the manufacturing activities. It is true that majority of the *Halal* manufacturers in Malaysia are certified with Good Manufacturing Practice (GMP) and Hazard Analysis Critical Control Point (HACCP), But these procedures are still insufficient since *Halal* is not included in the supply chain activities (Omar and Jaafar, 2011). GMP and HACCP are procedures for food manufacturers and handlers in

Malaysia in order to provide, ensure and maintain the quality of the food supply and production process only, but not after the products are completed. *Halal* is not only before and during production, but it is a whole process, from the point of origin to the point of consumption. That is why *Halal* supply chain services especially for transportation and warehousing must be included in the process to ensure the purity of *Halal* products is not in doubt. Tieman (2011) has pointed out the foundation of *Halal* supply chain services is determined by three factors as below

i) Direct contact with Haram (prohibited)

ii) Risk of contaminantion

iii) Perception of the Muslim consumer.

Table 1.3
Halal certified companies in Malaysia according to State and size (2013)

State	Small	Medium	Multi National	Total
Johor	109	160	63	332
Kedah	23	46	11	80
Kelantan	8	4	2	14
Melaka	16	33	10	59
Negeri Sembilan	26	34	11	71
Pahang	13	18	11	42
Penang	76	112	32	220
Perak	21	42	17	80
Perlis	3	3	2	8
Selangor	367	498	141	1006
Terengganu	5	14	4	23
Sabah	5	25	7	37
Sarawak	19	36	8	63
Kuala Lumpur	149	148	69	366
Total	840	1173	388	2401

Source : www.hdcglobal.com/publisher/alias/*Halal*directory

Halal Supply chain services consist of serving the customers demand from the point of origin to point of consumption without ignoring the *Halal* requirements. In Malaysia, the government has already put an effort to fulfil the needs of Muslims. Not stopping at establishing the *Halal* standards, other government's effort includes introducing *Halal* Industry Development Corporation (HDC) to provide training and promotion regarding *Halal* matters. However, all the government efforts would be useless, if *Halal* manufacturers are not serious to maintain *Halal* quality of their

products by refusing to apply *Halal* supply chain services to transport and store their products according to *Halal* requirement.

Monitoring *Halal* integrity of products is very crucial to ensure the *Halal*ness of *Halal* products are not in doubt. Therefore researchers in *Halal* supply chain (Tieman 2011, Omar and jaafar, 2011) mentioned that the *Halal* supply chain must not be excluded if manufacturers are serious to avoid cross contamination. If *Halal* products are handled by the *Halal* service providers, we can almost be certain that the products are still *Halal* at the point of consumption. But, once the products are handled by other parties who are not practicing *Halal* services, the chances of breakage in chain are higher since their activities is no longer based on Syariah. This is more critical if the manufacturers already have a contract with other supply chain providers. Currently, there is only a very small number of *Halal* transportation and *Halal* warehousing service providers available in our country. Leading way are Kontena Nasional Berhad and MISC Intergrated Logistics Sdn Bhd. *Halal* supply chain industry started to increase their providers after a few more have been certified as *Halal* Logistics service providers by JAKIM.

In the early stage of *Halal*, the *Halal* status relied solely on the manufacturers themselves, since they are also Muslims (Tieman, 2014). Nowadays, in the large scale of economic activities, *Halal* is not only for Muslims anymore. Furthermore, the issues of *Halal* integrity come into the picture since non-Muslims have also started to produce *Halal* products. Hence, the adoption of *Halal* transportation and *Halal* warehousing is a must if the *Halal* manufacturers are really concern about the *Halal* integrity of their products (Tieman, 2009).

A few studies have been conducted regarding *Halal* especially about *Halal* products but a very limited number of them looked at pharmaceuticals or cosmetics. Even though Malaysia is promoting itself as a *Halal* hub for this region, this scenario is not strong enough to convince researchers to conduct further research regarding *Halal* especially in *Halal* transportation and *Halal* warehousing services. This can be proven by looking at the small numbers of articles which have been written regarding *Halal*

transportation and *Halal* warehousing services. In order to provide more information about this issue for *Halal* industry in Malaysia, this study will try to investigate what are the barriers and the enablers to the adoption of *Halal* transportation and *Halal* warehousing services among Malaysian *Halal* manufacturers in the food, pharmaceutical and cosmetics industries from the perspectives of technology, organization involved in the industry and environmental factors that may influence the decision of adopting *Halal* supply chain services. Findings from this study are useful for many parties, *Halal* transportation and *Halal* warehousing service providers, government agencies, Muslim consumers and *Halal* manufacturers themselves. Understanding the barriers and the enablers of the adoption of *Halal* transportation and *Halal* warehousing will also help to promote Malaysia as *Halal* hub in this region.

1.2. PROBLEM STATEMENT

Malaysian logistics are currently divided into two categories which are conventional logistics and *Halal* logistics. Overall, Malaysian logistic industry grew at 9.5% in 2013 to reach at RM 139.74 billion, (USD 45.1 billion) Healthcareasia, 2015) and the trend is projected to grow until RM 207.4 billion in 2017. The increasing *Halal* manufacturers in the world and Malaysia is creating a direct impact on global *Halal* logistics industry in the world, and the same scenario also happening in Malaysia. Market value for *Halal* logistics is Malaysia is valued at USD 1.9 billion in 2013 and the trend is expecting to grow due the rapid increasing in number of *Halal* certified manufacturers in Malaysia. With nine (9) *Halal* service providers in Malaysia, these providers are leading towards Malaysia as *Halal* hub centre in this region. In 2014, the demand for *Halal* certified foods, cosmetics and pharmaceuticals globally was worth up to USD 790 billion (HDC, 2014) and the demand is projected to be increased in compound rate in the future. Overall market value for world Halal products is reported at USD 2.3 trillion. In the same year, Malaysia's Halal export have been growing consistently to reach RM 37.7 billion (USD 10.17 billion).(Healthcareasia, 2015)

At present, *Halal* food, pharmaceuticals and cosmetics manufacturers are certified as *Halal* according to MS 1500:2009, MS 2424:2012 and MS 2200: Part 1

:2008 respectively. Department of Standard Malaysia has produced those standards as a general guideline for production, preparation, handling and storage. There is a section in all those standards mentioned that all processes food is *Halal* if " *during its preparation, processing, packaging and storage @ transport, it shall be physically separated from any other food that not meet the requirements or any other things that are decreed as najs by Shariah law"* and those products *should be segregated at every stage to prevent them from being mixed or contaminated with non Halal products"*

Tieman, (2006) mentioned that, although current *Halal* standards regulate production, preparation, handling and storage to some degree, it does not ensure the *Halal* product is *Halal* at the point of consumption. It is because that *Halal* integrity of the product is a result of the various activities in the supply chain, and therefore a supply chain approach is important to guarantee the *Halal* integrity at the point of consumption (Tieman, 2007b) and could be considered as the only way to confirm the *Halal* integrity. On top of that, Tieman (2011) also claimed that the *Halal* supply chain is an important approach to confirm the integrity of *Halal* products at the point of consumption. *Halal* transportation and *Halal* warehousing services are part of the various activities in the *Halal* supply chain. Therefore, it is important for *Halal* certified companies to look beyond their production and ingredients, and should extend *Halal* to the entire supply chain in ensuring that transportation, storage and handling are in compliance with *Syariah* and meet the requirements of Muslim market (Tieman,2011). Furthermore, previously consumers are only concerned about Halal products, but at present consumers have already realized that Halal also includes the entire supply chain activities especially in transportation and warehousing activities (Omar et al., 2013). In addition to that, Omar et al., (2013) proposed that, to ensure it is completely Halal, the handling process must follow special requirements as required by *Syariah.*

When a manufacturer puts a Halal logo on the product, it is a promise that the activities including sourcing, manufacturing and distribution until the point of consumption is Halal compliant (Tieman, 2008). However, even though JAKIM has already awarded *Halal* certification to more than two thousand companies (in 2013), the numbers of *Halal* manufacturers who are adopting *Halal* supply chain services are still

relatively low. To get a better view on this, a few interviews was done with the *Halal* supply chain service provider in Malaysia. According to them, only around 15% of the *Halal* manufacturers in Malaysia are adopting *Halal* supply chain services, but at the same time, Muslim consumers still believed that their products are *Halal* to be consumed. As mentioned by Baharuddin et al., (2011), with the legitimacy of *Halal* products coming under fire, the industry is now demanding more specialized *Halal* compliant solutions for its supply chain process, it still did not move the majority of *Halal* manufacturers to adopt the *Halal* supply chain services for their products. On top of that, Bonne and Verbeke (2008) argued that Muslim consumers still do not have enough information about supply chain activities in *Halal* food industry.

At present, most of Halal studies is concern about Halal certification, intention to purchase Halal products, Halal hoteliers, Halal logo, Halal ingredients and processes, Halal certification and Halal logistics. Most of the studies were from the perspective of Halal logistics service providers or from the consumers point of view. This study tries to get idea from the main player in Halal industry which are the Halal manufacturers themselves on the factors that could be the barriers and the enablers for them in an intention to adopt Halal transportation and Halal warehousing services in their business operation.

In response to this problem, our study proposes to investigate what are the barriers that impede and what are the enablers that will motivate *Halal* manufacturers in Malaysia to adopt *Halal* supply chain services in transportation and warehousing activities.

1.3 RESEARCH OBJECTIVES

Since all Muslims realize that *Halal* is important in their daily lives, it is very hard to understand why the majority of the *Halal* manufacturers are still reluctant to adopt *Halal* transportation and *Halal* Warehousing services to handle their *Halal* products. Specifically, the research objectives are to;

a) Attempt to test a model of the adoption of the *Halal* transportation and the *Halal* warehousing services among Malaysian *Halal* manufacturers
b) Investigate the relationship between perceived benefit and intention to adopt the *Halal* transportation and the *Halal* warehousing services.
c) Investigate the relationship between complexity and intention to adopt *Halal* transportation and *Halal* warehousing services.
d) Investigate the relationship between cost and intention to adopt *Halal* transportation and *Halal* warehousing services.
e) Investigate the relationship between awareness and intention to adopt *Halal* transportation and *Halal* warehousing services.
f) Investigate the relationship between organizational readiness and intention to adopt *Halal* transportation and *Halal* warehousing services.
g) Investigate the relationship between government support and intention to adopt *Halal* transportation and *Halal* warehousing services.
h) Investigate the relationship between customer pressure and intention to adopt *Halal* transportation and *Halal* warehousing services.
i) Investigate the relationship between competitive pressure and intention to adopt *Halal* transportation and *Halal* warehousing services.
j) Investigate the relationship between supplier availability and intention to adopt *Halal* transportation and *Halal* warehousing services.
k) Analyze the moderating effects of Top Management Attitudes in the relationship between perceived benefits and intention to adopt *Halal* transportation and *Halal* warehousing services.

1.4 RESEARCH QUESTIONS

There are many factors that influences the decision for an organization to adopt a new technology. Some could be enablers or barriers to the adoption decision. Different kind of organizations requires different things based on their capability and requirements. *Halal* supply chain is a service offered by *Halal* service providers in order to complete the requirements of *Halal* products. Without *Halal* supply chain services, the *Halal*ness of *Halal* products will be questioned, whether it is a *Halal*

product or not. JAKIM has certified that more than two thousands of Malaysian manufacturers as a *Halal* manufacturer, but the number of manufacturers using *Halal* supply chain services offered by *Halal* service providers are too small to the real figure. In summary, the research questions to be answered in this study are:

a) What are the barriers impeding *Halal* manufacturers from adopting *Halal transportation and Halal warehousing* services?
b) What are the enablers that influence *Halal* manufacturers to adopt *Halal* transportation and *Halal* warehousing services?
c) What is the relationship between variables perceived benefits and the intention to adopt Halal transportation and Halal warehousing services?
d) What is the relationship between variables complexity and the intention to adopt Halal transportation and Halal warehousing services?
e) What is the relationship between variables cost and the intention to adopt Halal transportation and Halal warehousing services?
f) What is the relationship between variables awareness and the intention to adopt Halal transportation and Halal warehousing services?
g) What is the relationship between variables organizational readiness and the intention to adopt Halal transportation and Halal warehousing services?
h) What is the relationship between variables government support and the intention to adopt Halal transportation and Halal warehousing services?
i) What is the relationship between variables customer pressure and the intention to adopt Halal transportation and Halal warehousing services?
j) What is the relationship between variables competitive pressure and the intention to adopt Halal transportation and Halal warehousing services?
k) What is the relationship between variables supplier availability and the intention to adopt Halal transportation and Halal warehousing services?
l) Do top management attitudes moderate the relationship between perceived benefits and intention to adopt the *Halal* transportation and the *Halal* warehousing services among *Halal* manufacturers?
m) Are there any differences in intention to adopt *Halal* transportation and *Halal* warehousing services among the three *Halal* industries?

1.5 SCOPE OF STUDY

Halal transportation and *Halal* warehousing will only be meaningful if it is implemented to handle the *Halal* products. This is due to the main function of these services is to maintain *Halal* credential for *Halal* products from farm to fork. If *Halal* transportation and *Halal* warehousing services are used to conduct non-*Halal* products, it is still unable to change their *Halal* status since it was not *Halal* from the beginning. *Halal* transportation and *Halal* warehousing services have no capabilities to change non *Halal* products to become *Halal* products. Therefore , the scope of this study will focus on *Halal* manufacturers all around Malaysia, either local or international manufacturers who are certified as *Halal* by JAKIM, but are still not adopting *Halal* supply chain services for their transport or storage, or for both of the services. This is due to, maybe there are *Halal* manufacturers who have already adopt one of those services and may be they are not adopting it at all yet.

There are many activities involved in the *Halal* supply chain services. But, according to Riaz and Chaudury (2004), transportations and distribution activities are the most crucial components in maintaining *Halal* integrity of the products. Tieman (2008) argued that, all most of the *Halal* products that are manufactured by the Halal manufacturers will go through the transportation and warehousing activities before it reach at the point of sales. Due to that matter, even though *Halal* supply chain has various activities, Riaz and Chaudary (2008) and Tieman (2008) claimed that *Halal* transportation and *Halal* warehousing are the most crucial part in maintaining the credibility of *Halal* products,hence, this study will only focus on the intention to adopt *Halal* transportation and *Halal* warehousing. Furthermore, Pahim et al., (2012) argued that although the products have the *Halal* logo displayed, the contamination may occur during the transportation and warehousing activities.

The objective of the study is to find out what are the factors that will be the barriers and the enablers to the adoption of the services. Hence, the Halal manufacturers who have already adopted the services will not be included in the study since once they adopt, there should not be any barriers for them anymore. Therefore, this study only

focuses on the Halal manufacturers who have not adopted the services yet. Furthermore, this is a quantitative study where the size of population is very important. As mentioned before in the problem statement, the researcher noticed that the number of non-adopters are extremely higher than the adopters. Therefore, the study decides to select the non-adopters due to the bigger size of the population.

1.6 SIGNIFICANCE OF THE STUDY

Several studies conducted regarding *Halal* are available in the literature, but most of the studies are just concerned about the ingredients used to make *Halal* products, the process involved in transforming raw materials to be a finished product, consumer behaviour in purchasing *Halal* products and *Halal* trademark. Only a few researchers such as Tieman, Omar and Jaafar focus on *Halal* supply chain. But still, up to this date, there is no single study focusing on the barriers and the enablers in adoption of *Halal* supply chain especially in *Halal* transportation and *Halal* warehousing among *Halal* manufacturers in Malaysia has been done. Even though Muslims nowadays are really concerned about the *Halal* status of the product they choose to use, but Muslim consumers still lack information regarding the adoption of *Halal* transportation and *Halal* warehousing services for the product that being used in their daily lives. This is also a reason why Tieman, (2013) clearly mentioned that, academic research is highly needed in this area. Thus, this study will try to fill the gap in the literature for this area of study.

Halal supply chain is a process of transforming raw material to finished product and the products itself reach to the point of consumption with *Halal* integrity, and *Halal* transportation and *Halal* warehousing is part of the activities in the *Halal* supply chain activities. *Halal* products must be *Halal* from the beginning until it reached to the point of consumer purchase. Hence, *Halal* transportation and *Halal* warehousing services are very important factor to be considered to be studied, since it will help Muslim consumers to ease the doubt whether the *Halal* products is still *Halal* when it reached them. Despite the fact that *Halal* products are already confirmed as *Halal* by JAKIM at the moment it is produced, but, if it is not handled by the right person or the right

handling methods, the *Halal*ness of the products could be doubted. According to Islamic practices, doubt is close to Haram, and Muslims consumer are surely prohibited from used Haram products. So, this is a strong justification that the *Halal* transportation and the *Halal* warehousing services are part and partial for *Halal* products for their *Halal* status. That is why this study is very crucial to get information about what are the determinant factors for Malaysian *Halal* manufacturers to adopt the *Halal* transportation and the *Halal* warehousing services in order to maintain *Halal* integrity for the products.

According to Malaysian Logistic Council, information about the *Halal* supply chain is very important since *Halal* supply chain service providers also do not have enough information regarding this matter. It is crucial to support our government to be the *Halal*-hub in Asian region. Although the *Halal* manufacturers and the *Halal* service providers are involved in this study, but, the findings from this study will not only benefit them, but also many other parties such as consumers, potential *Halal* service providers, and also the government of Malaysia. Besides contributing to the growth of the body of the knowledge and existing literature on the *Halal* study, the results from this study will also be meaningful for the practitioners in the *Halal* industry.

As stated earlier, unlike most previous study which have focused either on consumer behaviours, *Halal* trademark, *Halal* ingredients and the process of the *Halal* itself, this study focuses on certified *Halal* manufacturers in three industries which are food, pharmaceuticals and cosmetics due to the fact that the majority of *Halal* manufacturers in Malaysia are within in these categories. As a main source of *Halal* products available in the market, the low adoption of the *Halal* transportation and the *Halal* warehousing services among them are very puzzling. Many efforts from various parties involved in this industry have been taken, but it is still unable to attract the *Halal* manufacturers to adopt these services. From the theoretical perspective, is perhaps the main significance of the study. It is expected that, the results from this research will help improve the understanding of why the *Halal* manufacturers are reluctant to adopt *Halal* transportation and *Halal* warehousing services. By acknowledging the barriers, the agencies involved in this industry could come out with a new solution on how to

overcome those barriers to enhance the adoption rate of the *Halal* transportation and the *Halal* warehousing among Malaysian certified *Halal* manufacturers.

Instead of only trying to find what are the barriers impeding the adoption of the *Halal* transportation and the *Halal* warehousing services, to increase the significance of this study, the enablers to the adoption decision also will be investigated. By providing the knowledge about what are the factors could be an enabler to the adoption decision, the results from this study will assist many parties especially the *Halal* manufacturers and the government agencies which are related to this industry. The *Halal* transportation and the *Halal* warehousing service providers can use this information to draw a new marketing plan in order to attract more *Halal* manufacturers to adopt their services. Without adopting the *Halal* transportation and the *Halal* warehousing services, nobody could guarantee that products are *Halal* to be consumed. (Tieman, 2008) Thus, it is crucial for those service providers to overcome the barriers faced by their clients to ensure that they will survive in the industry. Without those *Halal* services, there is no other way for *Halal* manufacturers to give an assurance to their Muslim customers that their products are safe to be consumed.

Tieman (2014) mentioned that the *Halal* transportation and the *Halal* warehousing service providers can not expect that the adoption of their services among the *Halal* manufacturers should be manufactured driven, but everybody who is involved in this industry has to play their role. The adoption of the *Halal* transportation and the *Halal* warehousing services require support or pressure from the government through regulations to make it as mandatory for *Halal* manufacturers. Thus the findings of this research could provide meaningful information for the government agencies such as JAKIM or other Government Link Companies like HDC to react to the scenario of low adoption of *Halal* services among the *Halal* manufacturers. It is good for them to develop a new policy, based on the results from this study, to ensure the enhancement of the adoption rate of *Halal* services among the *Halal* manufacturers in Malaysia is not impossible. Thus, surely, their effort to promote Malaysia as a *Halal*-hub in this region will be much easier.

1.7 DEFINITION OF TERMS

In order to avoid any potential confusion in interpretation of the concepts of variables used in this research, the definitions of terminologies used in this research are presented in the table 1.4 below. These definitions are used as guidelines in discussing the findings of the tested hypotheses.

Table 1.4
Operational definition

No	Variable	Operational definition	Sources
1	Personal information	Respondent personal information	
2	Organization information	Firm size, age of business, business type, Having own transport/warehouse, No. of *Halal* products, industry	
3	Food Industry	*Halal* food means food and drink and/or their ingredients permitted under the *Shariah* law that excluded from phramaceuticals and cosmetics products.	MS 1500: (2009)
4	Pharmaceuticals Industry	Pharmaceutical products in finished dosage forms, and includes both prescription and nonprescription medicinal products for human	MS 2424: (2010)
5	Cosmetics Industry	Cosmetic and personal care products are any substance or preparation intended to be placed in contact with various external parts of the human body (epidermis, hair system, nails, lips and external genital organs) or with teeth and mucous membranes of the oral cavity. The functions of these items are exclusively or mainly to cleaning them perfuming them, changing their appearance and/or correcting body odours and/or protecting them or keeping them in good condition.	MS 2200: (2008)

Table 1.4 Continued.

6	Perceived Benefits	Perceived benefit to adopt Halal transportation and Halal warehousing service	Sophonthummapharn, (2009)
7	Complexity	Complexity to adopt *Halal* transportation and *Halal* warehousing services	Wang et al. (2010), Premkumar and Roberts, (1999)
8	Cost	The cost to adopt *Halal* transportation and *Halal* warehousing services	Wang et al. (2010), Premkumar and Roberts, (1999)
9	**Awareness**	**Organization awareness regarding the existence of *Halal* transportation and *Halal* warehousing services in the market.**	**Al_Qirim, (2005) and Sophonthummapharn, (2009)**
10	Readiness	Readiness of organizations to adopt *Halal* transportation and *Halal* warehousing services	Khemtong and Roberts, (2006) Sophonthummapharn, (2009)
11	Government support	Availability of government support to adopt *Halal* transportation and *Halal* warehousing services	Khemtong and Roberts, (2006) Sophonthummapharn, (2009)
12	Customer pressure	Pressure from customer that force the *Halal* manufacturers to adopt *Halal* transportation and *Halal* warehousing services	Marimuthu et al.(2011), Lin and Ho, (2009)
13	Competitive pressure	Pressure from competitors resulting from a threat of losing competitive advantage forcing firms to adopt and diffuse *Halal* transportation and *Halal* warehousing services	Premkumar and Roberts, (1999); Lin and Lin (2008), Marimuthu et al. (2011), , Wang et al., (2010)
14	Supplier	Supplier availability to adopt Halal transportation and Halal warehousing serices	Sophonthummapharn, (2009)
15	Top management attitudes	Attitude of decision maker towards to adopt *Halal* supply chain services	Khemtong and Roberts, (2006) Sophonthummapharn, (2009)

Table 1.4 Continued.

16	*Halal* transportation adoption	Intention to adopt in *Halal* transportation services	Chen et al., (2011)
17	*Halal* warehouse adoption	Intention to adopt in *Halal* warehouse services	Chen et al., (2011)
18	*Halal transportation*	Management system requirements for assurance of the *halalan-toyyiban* integrity of goods and/or cargo being handled through various mode of transportation.	MS 2400-1:2010
19	*Halal Warehousing*	management system requirements for assurance of the halalan-toyyiban integrity of products, goods and/or cargo during the warehousing and related activities through the entire process from receiving to delivery	MS 2400-2:2010

1.8 ORGANIZATION OF THE STUDY

The current chapter introduces the context of the research covering issues such as the introduction, background, problem statement, research objectives, research questions, scope of study, significance of study and the definition of terms, in order to give an overview idea of this research. To explain the further insight of this research, the remaining sections of the thesis are as follows:

Chapter two : Underpinning theories. This chapter discusses theories related to the organizational adoption studies which is consist of Institutional theory, Diffusion of innovation, Resource base theory and Technology, Organization and Environment (TOE) framework. This chapter also discusses the advantages and disadvantages of the theories and reasons why researchers used the TOE framework .

Chapter three: The literature review chapter explains the main theories and identifies gaps, which formulate the conceptual framework of this research. This chapter also provides a review of the previous literature on the constructs used in this research. In addition, the conceptual framework and hypothesis developments is presented.

Chapter Four : Research methodology. This chapter discusses the population, sample and sampling techniques, pilot and pre-test, and data collection methods.

Chapter Five : Analysis and Results. Structured Equation Modelling (SEM) with Partial Least Squares (PLS) version 2 is used to run the analysis to test the hypothesis of the study. This study still adopts the Statistical package for social science (SPSS) version 20 to run the descriptive analysis.

Chapter Six : This chapter is for the discussion, implications and conclusion for the study. It also summarizes the findings, discusses the implications, describes the limitations of the research and offers suggestions for future research.

CHAPTER 2

THEORIES AND MODELS OF ORGANIZATION TECHNOLOGY ADOPTION

This chapter presents the theories and models developed in various disciplines and used in predicting, explaining, and understanding organizations' adoption of new products, technologies or services.

2.1 INTRODUCTION

Since the adoption of new technology is divided into two categories, either for individual or for an organizational level, there are theories which are specific for individual level of analysis, an organizational level of analysis or theories that can be used for both levels. Technology Adoption Model (TAM), Diffusion Of Innovation (DOI) frequently has been used for both level, but there certain circumstances must be met before it can be used for either level unit of analysis. Since this study focuses on the organizational level, theories that solely develop for individual level of analysis will not be discussed in this chapter.

2.2 INSTITUTIONAL THEORY

Institutional theory is useful to identify the key mechanisms expected in the institutional surrounding and allow for the understanding of how institutions become have no different while facing the pressure regarding economic and social optimization. (Dimaggio and Powell, 1983). Besides that, it also has become one of the most influential approaches in organization science today. This theory also offers a unique insight on the influences that promote survival and legitimacy of an organizational

practice.(Glover et al., 2014). According to this theory, in order to make organizationaldecisions, social and cultural factors should also be taken into account (Arpaci et al., 2012). Scott, (2008) claimed that institutional theory provides a non-economic explanation of organizational behaviour and strategies.

Institutional theory has been applied in various studies, in various settings and also in various disciplines such as marketing, economic, sociology and also political science. (Hassan and Gil Garcia, 2008). Since it has been used for a few decades before, there are many researchers who try to define the term 'institution' according to their research settings. North, (1990) defined it as a formal rule set, Jepperson, (1991), as a less formal shared interaction sequences, that the organization and individuals are expected to follow. Potts, (2007) mentioned that institutions are coordinating mechanisms between the individual and the social process of the creation of economic value, and that these process structures of coordination are just as important in explaining economic activity as the relative endowments of factors of production. Institutions are considered the collection-point for 'rules of the game (Yang and Su, 2014). However it has been defined, all institutions must have people, structures, purpose and way of communication among peoples in the organization. If it is a formal institution, usually they will have formal standard operating procedures of how the work is performed in their environment.

According to the institutional theorist, Institutional theory indicates that organizations are affected by the environment in which they operate (DiMaggio and Powell, 1983) and an environment exerts strong influence on firms' strategist and logistics. The environment will differ based on the level and unit of analysis. Therefore, organizational theorists have provided different angles to classify institutional environments. At the regional or country level, which is known as the macro level, since their broad coverage, the factors included in this level of environment are political, regulative, economic, normative and cultural-cognitive institutions. However, for a micro view such as an organization, Dimaggio and Powell, (1983) scott, (2008), Lin & Sheu, (2012) and Yang and Su, 2014) has identified three different context: regulative, normative and mimetic. It is also known as the three pillars of the

institutional theory. Coercive or also known as a regulatory factor and mimitec also used as a cultural cognitive. These are the explanation about the three pillars.

a) Coercive isomorphism: refers to the convergence of agent's behaviors in response to explicit regulative processes formulated by the authoritative power (Zhang and Dhawali, 2009). According to Dimaggio and Powell(1983) coercive isomorphism is a result from pressures upon on an organizations whether formal or informal pressure. Coercive only can be exerted by the organizations which are powerful in their industry to ensure their idea or concept is acceptable and followed by others.

b) Normative legitimization, refer to agents' adoption behaviors because they are deemed superior by other influential organizations such as market leader or pioneer. Occasionally it will occur via the interaction between members in the same group or industry. Scott, (1983) believed that the higher order or the market leader or the organization that expert in certain area will reinforce and try to stem certain behaviour to be a norm among themselves. Sarkis et al, (2011) claimed that normative drivers ensure organization to comply to ensure that they are in line with the others.

c) Mimetic or imitative legitimization processes, refer to the agents' mimicking behaviors of superior models. It can occur when an organization tends to imitate the action that has been taken by other successful organization in their industry (Hofer et al., 2011, Sarkis et al., 2011). It also will occur due uncertainties in their environment. Due to environmental uncertainties, and the firm is unsure what is best for them, they tend to model their action based on what other successful firm are doing. Firms will prefer to avoid the risk by not choosing the road that has not been taken yet. Normally, organizations prefer to follow these two types of organizations in whatever they are doing. The attributes of the company that are usually being mimetic are large and profitable. Imitation or isomorphism has a socially transmissible quality and can occur consciously or unconsciously (DiMaggio and Powell 1983; Oliver 1991).

2.2.1 Limitation of Institutional Theory

Scott (2008) has claimed that institutional theory has reached its adulthood. Nevertheless, relatively limited research on institutional theory has been conducted in the area of business marketing in a rigorous way.

Even though Institutional Theory has been used as a grounded theory for many studies, however the institutional perspective also has its critics. Oliver (1991) claimed that there is a lack of attention both to the role of organizational self-interest and to active agency in organizational responses to institutional pressures. When discussing the deinstitutionalization of practices, Kang and Li (2009) proposed that the impact of institutional distance between home and host countries varies according to the international strategy adopted by parent firms and the international experience of executives. Furthermore, the national business systems approach (Whitley, 1992) suggests that the institutional perspective provides only a 'snapshot', which does not take into account changes over time. Baptista (2009) argues that Scott's cognitive pillar is the root to understanding the process of IS institutionalization within the context of intranet use. According to Baptista (2009, p. 308), ''the role of cognition as a vehicle of institutionalization prevails [over] other pillars because people treat cultural categories as the cognitive containers in which social interests are defined and classified, argued, negotiated, and fought out.'' From this perspective, behaviour is driven not so much by the enforcement of rules, norms and values (i.e., regulative and normative pressures), but by unconscious behavior based on classifications and schemas in the minds of individuals.

Although this theory has put environment as part of the variables to be studied, but Institutional theory still failed to introduce the characteristics of the new innovation such as the perceived benefits and cost as part of their variables. Since the main purpose of business organization is all about profits, potential benefits, and cost are important variables to be considered by organizations before deciding either to adopt a new technology or to reject it. According to Chau and Tam (1997), while considering to adopt a new innovation for the organization especially for the commercial organization, a cost-benefits analysis is considered as unavoidable process. Therefore, researchers are reluctant to adopt this theory to explore the barriers and enablers of *Halal* warehousing

and *Halal* transportation adoption among Malaysian *Halal* manufacturers since the technology characteristics is believed to be as a significant factors in this study.

2.3 DIFFUSION OF INNOVATION

Diffusion of Innovation theory (DOI) has been a popular theoretical basis for studies which investigates the adoption of new technology, especially in the study of the adoption of information technology. Innovation diffusion models have been studied extensively to forecast and explain the adoption process (Ferreira & Lee, 2014). It has been applied and a theoretical background for many areas of studies, but its' main contribution come from economics, marketing, sociology and anthropology. (Tidd, 2000). Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system. An innovation, can be defined as an idea perceived as new by individual or organizations. It also could be in form of practice, system or object that is perceived as new by the unit of adoption. According to the Rogers (2003), the four elements in the diffusion of new ideas are:

a) The innovation: Rogers defined an innovation as an idea, practice, or project that is perceived new by individual or organization (Rogers, 2003) even though the innovation is already in the market for a quite some time (Sahin, 2006).

b) Communication channels: According to Rogers (2003), communication is a process in which participants create and share information with one another in order to reach mutual understanding. It occurs via channels between sources. For Rogers, channels are the way a message is conveyed from source to the receiver. Communication can be done through informing or persuading. Informing could be through mass media and persuading to adopt new innovation via interpersonal communication.

c) Time : One of the important variable that can illustrate its strength in diffusion study which has been ignored by most of the behavioural research is time (Rogers, 2003). It

has been mentioned as one of main attribute in an innovation-diffusion process due to the adopter categorization and rate of all adoptions all include in a time dimension.

d) The social system: The last element in the diffusion process is the social system. Social system has been defined by Rogers,(2003) as a set of interrelated units engaged in joint problem solving to accomplish a common goal. The diffusion of innovation has taken place everywhere including in the social structure of the social system. Rogers agreed that how the shape of the social system will influence the innovativeness' culture among the society. Karakaya et al., (2014) claimed that the social structure of the systems capable to affect the innovation diffusion in several ways such as through the social norms, opinions of the leaders and social consequences.

2.3.1 The Innovation Decision Process

According to the Rogers, there are five stages of the technological innovation decision processes namely; knowledge, persuasion, decision, implementation and confirmation.

2.3.1.1 Knowledge

The knowledge stage is the beginning of the innovation-decision process. At this preliminary stage, the individual or an organizations will learn regarding the existence of innovation and attempts to look for valuable information about what, why, when, where and how they could adopt it. Rogers (2003) outlined three types of knowledge;

- ***Awareness-knowledge***: When individual or organizations is expose to the existence or availability of the innovation in the market. This knowledge encourage to them to look forward in detail about the innovation, and eventually trying to adopt it. It also may lead them to learn about other two types of knowledge.
- ***How-to-knowledge***: Contains essential information about how to use the innovation. Without understanding how to operate the innovation properly, the most powerful innovation also cannot be performed at the level it should be performed. Lack of knowledge about this knowledge will drive to the

organizations to reject the innovation even though the innovation is best for them.

- ***Principles-knowledge***: Includes the information describing how and why innovation works. Lack of knowledge of how and why we should integrate the innovation could be a vital barrier to the adoption of an innovation.

2.3.1.2 Persuasion

The next step is the persuasion stage. At this stage, individuals or organizations already have an opinion about the innovations, either positive or negative. They shaped their opinion after they have started to learn and understand about the innovation. Even though they already have a favorable or unfavorable attitude toward an innovation, it does not always lead them directly or indirectly to an adoption or rejection (Rogers, 2003). If the knowledge stage is known as a cognitive process, the persuasion step is more on affective since it involves feelings in their decision-making process. Therefore, the person involve at this stage is more sensitive towards the innovation.

2.3.1.3 Decision

After they noticed and formed their beliefs regarding the innovation, they reach the third stage; the decision stage. At this level, they choose either to adopt or reject the innovation. To make it complete, Rogers also has his definition about adoption and rejection. According to Rogers (2003), adoption is the full use of an innovation as the best course available, and rejection means not to adopt an innovation. Trialability will play their role at this stage. If the innovation can be tried at the real situation, it is usually adopted quicker since most of the organization would like to test the innovation at the real situation before they come to conclusion, either to adopt or reject it. If they want to reject the innovation, Rogers (2003) also outline two types of rejections, active rejection, which is after they try the innovation, and they refuse to adopt it; and the passive rejection is the situation when the individual or organization is not thinking at all about to adopt it.

2.3.1.4 Implementation

The fourth stage is the Implementation stage. At this stage an innovation will be put into practice. Even though the innovation is believed to give a better result or performance due the newness that brought by the innovation, uncertainty of the outcomes will still be a problem at this stage. (Rogers, 2003). In the early stage of the implementation, the implementer may need a huge assistance from the technology providers to reduce the uncertainty about the consequences in order to avoid the rejection at the early stage of implementation. It is because if at the early stage of the implementation, if any inconvenience cannot be solved, it will lead to the implementer avoidance to adopt the new innovation. That is also a reason why at the early stage, most of the new technology provider will provide an assist until their clients totally understand how to operate their new technology.

At this stage also, reinvention may occur to customize the new technology to fit the implementer requirements. According to Rogers, (2003), reinvention is defined as the degree to which an innovation is changed or modified by a user in the process of adoption and implementation. Rogers (2003) also agreed that, the more reinvention takes place, faster the innovation is adopted and become institutionalized.

2.3.1.5 Confirmation

The last stage in the innovation decision process is the confirmation stage. Although at this stage, the implementer had already made their decision to adopt the innovation, but they are still looking for support regarding their decision. Rogers (2003) reminded that the decision to adopt still can be reversed if they exposed to the conflicting messages about the innovation. If they still want to continue adopting the innovation, they will try to avoid this kind of messages, but seek supportive messages that confirm their decision. Moreover, based on the support and the attitude of the implementer themselves, later adoption or discontinuance happens during this stage (Sahin, 2006).

There are two types of discontinuance; replacement discontinuance and the disenchantment discontinuance. The replacement discontinuance occurs when the implementer reject the innovation and replaces it with a better innovation. The disenchantment discontinuance happened when the innovations do not meet the implementer requirements or the innovation performance was not satisfying.

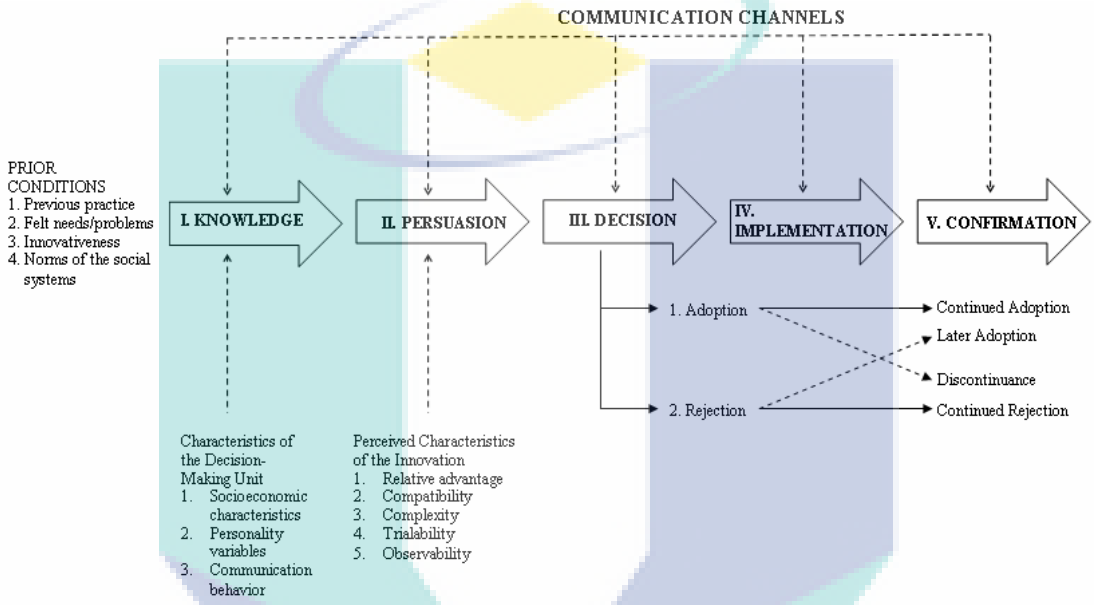

Figure 2.1. A Model of Five Stages in the Innovation-Decision Process
Source: Rogers (2003)

2.3.2 Attributes of Innovations And Rate of Adoption

According to Geroski (2000), research on the diffusion of innovation is trying to identify the factors that influence the rate and the direction of the adoption of an innovation. Therefore, Rogers (2003) points out that adoption behaviour are influenced by five variables and they are; relative advantages, complexity, compatibility, trialability and observability. Rogers also claimed that 49-87% of the variance in the adoption rate of innovation could be explained by those attributes.

2.3.2.1 Relative advantage

Relative advantage has been defined by Rogers (2003) as the degree to which an innovation is perceived as being better than the idea it supersedes. The degree of the relative advantage is mostly measured in economic terms; either lower the cost or increase the profit, but we should not ignore the other terms of relative advantage such as in social prestige, convenience and satisfaction. This is due to the fact that there are individual or organizations are looking for increasing their profit, but there may be other businesses looking for prestige or satisfaction.

2.3.2.2 Complexity

Complexity is the degree to which an innovation is perceived as difficult to understand or use. There are innovations that can be easily understood by the people, but some are not that easy to be followed. The easier the innovations are to understand, the easier it will be adopted. But it does not mean, if the innovations are complex, there is no chance for the innovations to be adopted. New high technology sometimes will make the innovations very user friendly and attractive to be used, but some new technology also could be quite hard to be operated. That is the reason why, Rogers believed that, among the five attributes of the innovation, complexity is the only variable which is believed to have a negative relationship with the intention to the adoption.

2.3.2.3 Compatibility

Rogers (2003) defined compatibility as a degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters. The innovation is considered to have compatibility characteristics if it fit the needs of the adopters even though the adopters have to change the whole system. The innovation is adopted for the sake of the organization either for short term or long term. An idea which is not incompatible to the values, experiences and social norm at the organizations, even it is good for the organizations, will need some prior actions or activities before it will be fully adopted. The adoption process for this type is usually

relatively slow compared to the innovation which is aligned with the values, experiences and social norm in the organization.

2.3.2.4 Trialability

According to Rogers, (2003) trialability is the degree to which an innovation may be experimented with on a limited basis. Technology provider or the innovation creator will install the innovation to the potential adopters, so, they can demonstrate the true capability of the innovation instead of showing them during the exhibition. The willingness of the technology provider to give a trial for their potential adopters also show that they are confident that the innovation will impress the potential adopters and encourage them to adopt after the trial period. It will also reduce the uncertainty about what the innovation could do to them.

2.3.2.5 Observability

Observability represents the last characteristics of an innovation. Rogers, (2003) defined it as the degree to which the results of an innovation are visible to others. According to Parisot, (1997), role modelling or peer observation is the key motivational factors in the adoption of innovation on a new technology. As the potential adopters could see the benefits that they could get from the innovation, after being stimulated by their colleagues or peers who are already adopted the innovation via discussion and sharing sessions, it will encourage them to adopt the new technology. As the numbers of adopter keep on increasing, the higher the chances for them to follow their peers' steps to use the new innovation.

To summarise, based on the five attributes of innovation mentioned above, four of them are positively related to the rate of adoption of new innovation. The attributes are; relative advantage, compatibility, triability and the observability. Furthermore, Rogers, (2003) also mentioned that, even if there are obvious advantages of adoption, the presence of other three attributes will speed up the adoption process.

Even if an organization is likely to adopt the innovation introduced to them, the process of an adoption for the organization is different compared to an individual decision adoption. For the organization, the decision making process is not based on a single person, but may be a few people, or according to the decision during the meeting. The higher the number of people involved in the decision making process, the slower the adoption decision will occur. In contrast, for an individual or small business entity, once the person or the owner of the company agree to adopt the innovation, the adoption process will just happened right away. Due to that matter, Rogers (2003) also classified adopters to five categories which are; the innovators, early adopters, early majority, late majority and laggards.

2.3.3 Adopters Categories / Characteristics of Innovators

Organizations differ in their adoption patterns. Since the adoption of new innovation will likely involve certain sum of money, even though they are willing to adopt, but not all of them are capable of adopting the new innovation. Money capability is always related to the size of an organization. Therefore, Rogers (2003) has classified the characteristics of innovator based on their social system on the basis of innovativeness, and also how long the time they need before they become the adopters of the new innovation. The bell shape curve below demonstrates the categories of the adopters clearly according to the percentage of the adoptions.

a) The innovators (2.5%) : This category of adopters are classified as venturesomeness. They are willing to take the calculated risk from the unproven innovation and become the pioneer to adopt the innovation. This group is also willing to accept an unprofitable and unsuccessful innovation due to high level of uncertainty regarding the innovation. They are willing this way since they have a high level of knowledge or complex technical knowledge that the others do not have.

b) Early adopters (13.5%). Rogers suggested that this category of adopters is someone or an organization which have a reputation in the society or leader in their industries. In other words, the innovators. Since they have the reputation, this group is the group that the others will look up to while seeking a new opinion about the innovation. As we

believed that, leaders play a central role about everything, then, once they have adopted the new innovations, it is a big encouragement for others to follow what are people from this group have adopted. Once their success is noticed by others, it also decreases the uncertainty about the innovation and the diffusion process will start to flow to others, especially via their interpersonnel networks. That is a reason why Rogers (2003) proposed that early adopters put their stamp of approval on a new idea by adopting it.

c) Early majority (34%). Early majority is a group of people or organizations that have good interaction with others and also have important position in the market positioning for an organization. However, this group of adopters do not have a role as a leader in their social system or in their industries. They are very careful and unhurried to adopt the new innovation, but still becomes at average speed to be an adopter to the innovation. Even though they seldomly lead the innovation, but, they are still willingnessly deliberate the innovation. They are also an important bridge in the diffusion process since they are at the middle of two categories; early adopters and late majority group.

d) Late Majority (34%). This group is known as late majority because they represent among the last 50% of the adopters. They adopt the innovation due to pressure from peers, and not because they see that it is good for them to be adopters of the innovation. Their salient characteristic is sceptical and they only adopt the innovation after they are really sure there is no harm for them to adopt it since most of others in their system have already done so. As they have limited resources, they need to depleted most of the uncertainty before they gain their confidence to adopt that kind of innovation.

e) Laggards (16%). This group of people or organization are in this category due to their limited resources and cannot afford to gamble their decision to adopt the innovation at the earlier stage. Since they are more on traditional methods, and just interact with the members of the society who are similar to them, they are not aware of the new innovation and will only adopt the new innovation if they are really sure of the success of their adoption. Therefore, laggards' innovation decision period is relatively long. (Sahin, 2006).

To sum up about the characteristics of the adopters, Rogers divided this five categories in two groups; early and late adopters. Early adopters consist of 3 categories which are the innovators, early adopters and early majority. Where as for the late adopter they consist of late majority and laggards. Rogers also mentioned the several reasons why they are different. The reasons are due to socioeconomic status, personality variables and communication behaviours.

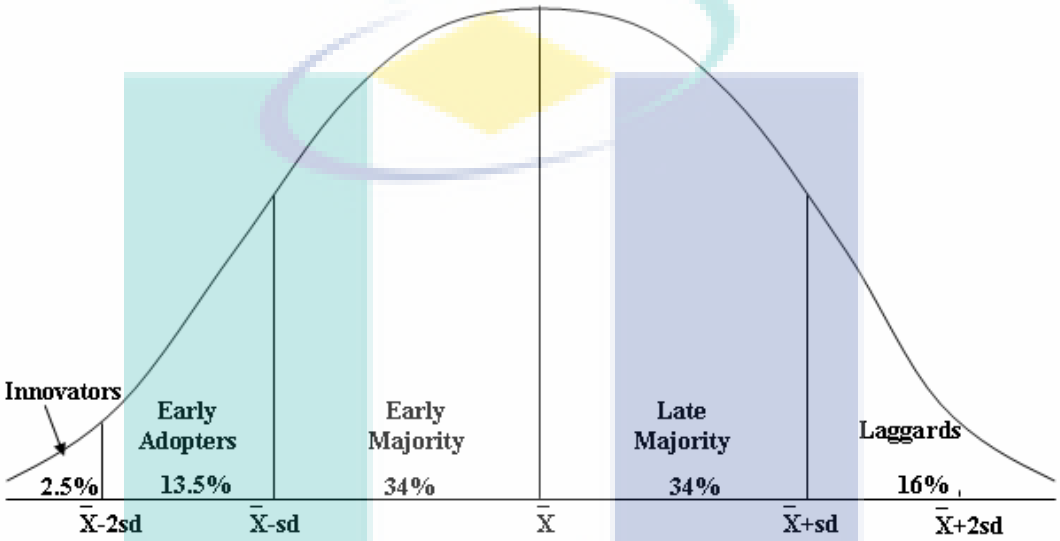

Figure 2.2. Adopter Categorization on the Basis of Innovativeness

Source: Rogers (2003)

2.3.4 The limitation of DOI

Although Rogers' model has been used extensively to explain an organizational technological adoption studies, it falls short in detailing the role of other influential factors (Azadegan and Teich, 2010). Oliveira and Martins(2011) stress that the environmental issue is not included in the theory. Since this study uses an environmental factor as one of its variables to be explored, researchers tend to use another prominent framework which is almost similar to DOI, but at the same time offer an environment as a part of the variable to be studied. Furthermore, most of the literatures agreed that firms are not operating by themselves, their adoption decision to adopt a new approach of running their businesses are clearly affected by their consumers, competitors and other social constituencies.

DOI theory tries to explain the innovation decision process, factors contributing the rate of adoption, and categories of adopters. It helps in predicting the likelihood rate of adoption of an innovation. However, it has been argued that the theory does not provide evidence on how attitude evolves into accept/reject decisions, and how innovation characteristics fit into this process (Karahanna et al., 1999; Chen et al., 2002). Furthermore, Rogers mentioned that rejection decisions can happen at any stage in the decision process and that attitudes are formed along the way in the Knowledge-Reinforcement path, he did not fully explain the role innovation attributes can play in forming these attitudes. Nevertheless, it is also important to remember that there are a few categories of adopters; it is unrealistic to expect one model to be able to generalize how positive or negative attitudes can be formed in respect of innovation attributes, stages of adoption and categories of adopters. On top of that, this study is not interested on the categories of adopters but rather on the intention to adopt the new innovation. Hence, this study is also reluctant to adopt this theory as a grounded theory to investigate the barriers and enablers of the adoption of *Halal* transportation and *Halal* warehousing among Malaysian *Halal* manufacturers.

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2.4 RESOURCE BASED VIEW (RBV)

According to Newbert, (2008) Barney (1991) is the person who is acknowledged as the first scholar to develop the theoretical tool explanatory of the Resource Based View (RBV). Barney, (1991, 1994, 2002), claimed that the RBV is a model that proposed competitive advantage could be sustained if the organization acquire and control the valuable, rare inimitable and non-substitute resources and capabilities, added with the organization is ready and could absorb and apply them. To be a valuable resource, a resource itself must enable firm to employ a value –creating strategy that will outperforming its rivals or overcome firm's weaknesses.(Barney, 1991). If most of the competitors hold the same valuable resources, and will utilize it the same way, thus the word rare does not exist in this context. This would not result in any company gaining a competitive advantage by having such a valuable resource since it does not have the rare criteria. Even if the form firm has valuable and rare resources, but does

not has inimitable value, the competitors will easily imitable it and the competitive advantage that the firm has would be disappear in a short while. Resources enable firms to conceive and implement strategies, thereby improving their effectiveness. (Tan & Cross, 2012). By having the unique resources, that is hard to be imitated by other competitors, it will facilitate firms to establish their competitive advantages towards their competitors.

Prahalad and Hamel, (1990) have outlined four barriers that preventing competitors from imitating a firm's resources and capabilities. The barriers are;

i. Durability,
ii. Transparency,
iii. Transferability, and
iv. Replicability.

Other than that, resource is very hard to be imitated if,

i) they are path dependant (Vergne & Durand, 2011),

ii) there is ambiguous relationship between the resources that enhances competitive advantage. (Reed & DeFilipi, 1990, Barney, 1995)

iii) they are socially complex (Barney, 1991)

iv) there is a patent for the resources (Johnson, 2008)

v) there is a long processes needed since the resources are complex and the competitors needs a long training and process before enable to imitate the resources.(Johnson, 2008)

Caldera and Ward, (2003) believed that the theory has been develop to ease the process of understanding of how organizations could achieve sustainable competitive advantages. All assets, capabilities, organizational process such as system, organizational attributes, information and knowledge possessed by the organization in order for them to be survived in the markets, skills and strategies to improve its efficiency are consider as their sources. (Barney, 1991).

RBV also believed that the sustained competitive advantage is originated from the firm unique bundle of resources at the core of the firm (Conner & Prahalad, 1996). Dollinger, (1999) mentioned that the resources and capabilities is the core of the firm when the company started to operate. Prahalad & Hamel (1990) believed that the core competencies are the collective learning in the organization and will be enhanced as

they are continuing applied and kept on sharing among their members, especially on how to coordinate diverse production skills and integrate multiple streams of technologies. Core competencies are unlike physical assets, which do deteriorate over time. Even it is used and practised continuously, it will not diminish with use, but it will become better and better if it is embedded with the new technology. The real sources of advantage are to be found in management's ability to consolidate corporatewide technologies and production skills into competencies that empower individual businesses to adapt quickly to changing opportunities. (Prahalad & Hamel, 1990)

If the resources are more about the organizational inner capability, opposite to that is strategies; the means by which firm relate to their environment (Tan & Cross, 2012). The way the firm handle their business operation could also be a source that will help firms to gain their competitive advantages. By having good relationships with their trading partners, suppliers or related government agencies will ensure firm to have extra benefits compared to the competitors who do not have this.

The beauty about this theory in comparison to other technology adoption theories is, the RBV is the soft theory which is does not has a specific variable that must be used while applying it in the study. If we looked at the other theories, most of them already have a specific variables representing them, but not for the RBV. All variables that can be related as resources could be used as a variable for this theory. Due to its flexibility, the RBV theory has emerge as one of the most popular theory that used to study technology adoption for the organization.

2.4.1 The Limitation of The RBV

Despite being widely used in the innovation adoption studies, RBV is still far from being perfect. Barney (1991) claimed that a firm has a competitive advantage when they have a relative advantage over another firm and when this advantage is not being implemented by any competitor. A firm has a sustained competitive advantage when they have a relative advantage over another firm and when this advantage is not being implemented by any competitors and competitors are unable to duplicate the

benefits of this strategy. But for this study, the adoption of *Halal* transportation and *Halal* warehousing are not inimitable. Any firms that are willing to adopt it can easily adopt this services and it makes the adoption of *Halal* transportation and *Halal* warehousing are not a source of competitive advantage and sustained competitive advantage.

Akio (2005) also argues that the resource-based view is focused on the internal organization of a firm and it does not consider the external factors like the demand side of the market. So even if a firm has the resources and the capabilities to gain a competitive advantage, it might be that there is no demand, because the model does not consider the "customer". Furthermore, Priem & Butler, (2001) claimed that the resource-based view has a limited ability to make reliable predictions.

Instead of those reasons, when discussing about the intention to adopt hew innovation such as *Halal* transportation and *Halal* warehousing services, there is a lot of factors should be considered, and it is not only about resources. The RBV only focuses on resources but ignore other important variables such as environmental factors and the characteristics of the new innovations itself. Hence, the researchers reluctant to use this theory as a grounded theory based on the above reasons.

2.5 TECHNOLOGY, ORGANIZATION AND ENVIRONMENT (TOE) FRAMEWORK

A criticism of classical diffusion theories is that they tend to neglect market and industry characteristics as important factors in the adoption decision (Chau and Tam, 1997; Robertson and Gatignon, 1986; Kwon and Zmud, 1987). Realizing the importance of technology adoption and understanding the limitedness of existing technology adoption theories at that time, Tornatzky and Fleischer (1990) developed another model of to fit with their study known as TOE framework. Tornatzky and Fleischer, (1990) used Contigency Theory of Organizations as a base on developing the TOE framework (Aparci et al., 2012). The original theory mentioned that an effective organization should have a structure wich is consistent with its environmental needs

(Lawrence & lorsch, 1967). Once established among the researchers, the TOE framework has been a popular foundational model used for studying the drives and the contributing factors to the successful e commerce initiatives.(Salwani et al., 2009) and become a seminal work in an innovation studies at the organizational level. Researchers in information system have used the TOE framework to analyze the adoption of Electronic Data Interchange (EDI), open systems and e-business Chau & Tam, 1997; Iacovou et al., 1995; Kuan & Chau, 2001, Zhu et al., 2002, 2003: Nkhoma and Dang, 2013). But the TOE framework not only contributes a significant effect on the information system studies, it has also been used regularly in other studies such as shown on the Table 1.

Tornatzky and Fleischer, (1990) claimed that the TOE framework is a comprehensive tool for studying the adoption of technology in an organization. They also believed that the TOE framework could excellently explain the innovation adoption decisions through the mutual influence of three categories of factors. Those categories are;

1) Technological context, which in essence are the existing and emerging technologies relevant to the firm. Technologies can be different based on their varying characteristics. The main focus of technological context is on how the characteristic of the technology will affect the adoption decision. The awareness and the availability of the cost-benefit information could enhance the intention to adopt new technology (Lin, 2014; Walker & Jones, 2012). It is due to the decision on whether to adopt a new technology, cost-benefits analysis is considered as an unavoidable process (Chau & Tam, 1997)

2) The organizational context, such as the firm's managerial structure, organizational size and its slack resources. For example, organizations can be more (or less) rule-bound, procedural or formal. Organizations can also be more centrally controlled and hierarchical in directing their resources. Organizational readiness in term of financial and human resource is one of the most frequently variable been used for this theory, together with the firm's size and top management attitude.

3) The environment, and perhaps most relevant contribution to our work here – is TOE's explanation of factors related to the environmental context. TOE distinguishes how the industry, competitors, government and other near and far institutions can influence the adoption decision. Firms operating in markets with an abundance of support infrastructure will have a more uncomplicated and less-costly adoption. Environmental context focuses on areas which the organization conducts its business operation, with the priority given to external factors influencing the industry that have a great impacts on the organization such as competitors, customers and government support. These factors are believed to have effect on how a firm respond to adopting available technologies to effectively compete in its industry. Figure one below exhibit the original model of the TOE framework developed by the Tornatzky and Fleischer, (1990).

2.5.1 Reasons To Use TOE Framework

TOE has been used by many studies to explain technology adoption phenomena (Thong, 1999; Kuan and Chau, 2001). For example, Hong and Zhu (2006) use TOE to explain how the integration of inter-organizational systems affects e-commerce adoption in US and Canadian firms. Using TOE, Vadapalli and Ramamurthy (1997) suggest that organization-specific characteristics, technological context and the social aspects associated with the use of the internet are among the key factors for its quick diffusion among organizations. The TOE framework is particularly useful for investigating the adoption of IT innovations at the organizational level (DePietro et al., 1990). Lin and Lin (2008) suggest for the new innovation diffusion to be affected by the expertise and technological infrastructure surrounding the firm. Cordery et al., (2011) used this theory to explain regarding the adoption of Extensible Business reporting Language (XBRL). Researchers have applied the TOE framework to investigate a variety of innovations such as e-business use and business value, e-business adoption, EDI adoption, web services adoption, electronic signature adoption, RFID tag adoption, internet use in the procurement process, adoption of open systems, IS adoption by small businesses, and customer-based inter-organizational systems (Henderson et al., 2012). To prove that the TOE framework has been successfully applied in various researches in

various technology adoption studies, Table 2.1 provide the summary of studies which have adopted the TOE framework as their theory.

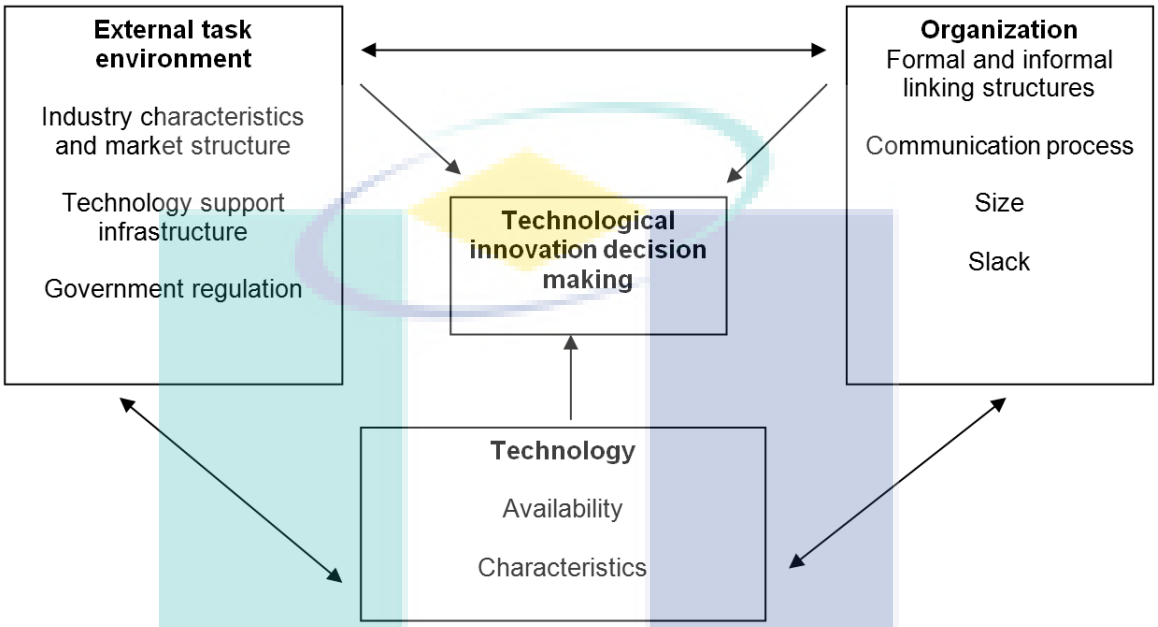

Figure 2.3 : TOE framework
Source : Tornatzky and Fleischer 1990

Table 2.1
The studies that used the TOE framework

Authors	**Area of study**
Yoon & George (2013)	Virtual Word
Nkhoma & Dang (2013)	Cloud Computing
Alshamaila & Papagiannidis (2012)	Cloud Computing
Ifinedo (2011)	E-Business
Marimuthu et al. (2011)	E Business
Wu & Subramaniam (2011)	RFID
Troshani et al. (2011)	HRIS
Bose and Luo (2011)	Green IT
Oliviera and martins (2010,2012,2013)	E Business
Wang et al., 2010	RFID

Table 2.1 Continued.

Fosso Wamba et al., (2008)	RFID
Lee et al. (2009)	KMS
Lin & Lin (2008)	E-Business
Doolin and Al Haj Ali (2008)	Mobile Commerce
Bellaj et al. (2008)	Website
Liu (2008)	E –Commerce
Lin & Lin (2008)	E-Business
Elliot (2007)	E Business
Brown & russel (2007)	RFID
Zhang et al. (2007)	IT
Chang et al.(2007)	E-Signature
Sparling and Toleman (2007)	E –Commerce
Hong & Zhu (2006)	E-Commerce
Teo et al.(2006)	E-Commerce
Zhu & Kramer (2005)	E-Business
Grandon and Pearson (2004),	E Business
Xu et al.(2004)	Internet
Zhu et al.(2004)	E-Business
Lertwongsatien and Wongpinunwatana (2003)	E-Commerce
Mehrtens et al. (2001)	E Business
Premkumar & Robert (1999)	IT
Chau & Tam (1997)	Open System
Iacovou et al. (1995),),	E Business

The wholesome of the TOE framework make it a very useful theory to be used as a theory for this study. Beside the technological factors and organizational factors, the strength of this framework is the environmental context is already embedded in the theory. Therefore, it becomes a better choice as it could predict the relationship between intra-firm innovation technology adoption in an organization (Zhu et al., 2004).

The other reason for selecting this theory is the flexibility of the TOE framework. Since it is a soft theory, that only provide the context of the theory without stating the variables must be used in the study, researchers may include any other variables from other framework or theory to be included in their studies as long as they can justify that the variables are related to the contexts within the TOE framework (Rui, 2007). Nevertheless, *Halal* transportation and *Halal* warehousing is a new approach of running the business, it should be useful to include new variables from other theories that might be contributed as a factor to explain the barriers and the enablers to its' adoption. On top of that, according to the literature, this theory has not been used by others to investigate the intention to adopt *Halal* supply chain services for transport and warehousing activities.

Finally, the strength of TOE is in its ability to provide further specificity on how various network-based factors can affect adoption decisions. Despite TOE's potency in well establishing the importance of industry level factors, it falls short in effectively differentiating the effects of trade partners. For example, TOE does not distinguish the effects that the trade partners' influence may have on the adoption decision. With regards to EPT, such "contextual factors" (Bakker et al., 2008) are influential enough to be better differentiated and separated from the broad-based environmental factors. As addition to that, Arpaci et al. (2012) also suggested that decision makers should take into account technology, organizational and environmental factors to make a decision on adoption of new technology. Dedrick and West (2003) agreed that TOE framework is a useful analytical tool to distinguish between inherent qualities of an innovation itself and the motivation, capabilities and a wider environmental context of adopting organizations. Assimakopoulos and Wu (2010) claimed that the TOE framework is a powerful framework for understanding the contributing factors to the adoption of new innovation. Hence, the solid theoretical basis and the consistent empirical support discussed as above promise that the TOE framework can be extended for studying the intention to adopt the *Halal* supply chain services for transportation and warehousing among Malaysian *Halal* manufacturers. This study also believed that the TOE framework is the best theory to be adopted to explain the barriers and the enablers to the

adoption of *Halal* transportation and *Halal* warehousing among Malaysian *Halal* manufacturers.

CHAPTER 3

LITERATURE REVIEW

3.1 INTRODUCTION

Due to the fact that *Halal* supply chain, especially in transportation and warehousing services, are very new services emerged in logistic and supply chain industry, there are not many papers that have wrote about it. Since there is lack of literature review regarding this subject matter, researchers are using other areas articles as a literature review regarding independent, control and dependant variables that will be studied. The purpose of this Literature review is to review the related constructs which are regarding Technology, Organization and Environment as exogenous constructs and intention to adopt *Halal* transportation and *Halal* warehousing services as a endogenous constructs. There are four constructs for technology, which are perceived benefits, complexity, cost and awareness. Two constructs for organization which are top management attitude and readiness and another four constructs for environment which is consist of government support, customer pressure, competitive pressure and supplier. Beside those constructs, this study is going to introduce as a moderating factor for perceived benefit. Firm size has been used as a control variable for this study. In the end, the section also trying to explore regarding *Halal* supply chain services which is focusing on *Halal* transport and *Halal* warehouse. Before going into details for each variables used in the study, it is better to have an overview about Halal supply chain industry in Malaysia.

3.2 HALAL SUPPLY CHAIN

Growth of world Muslim population along with their purchasing power has changed the supply and demand in the world market. Understanding their obligation, as a Muslim, they must use only *Halal* product, though, the demand for *Halal* products increased tremendously all around the world, either in a Muslim country like Malaysia, or non-Muslim country especially in Europe. Currently, *Halal* is not only for goods such as foods, Pharmaceuticals, and cosmetics, but also has spread to the services like banking and supply chain activities. When Muslim consumers start requiring pure *Halal* products which is not only focus on manufacturing process (Omar and Jaafar, 2011), the industry demands more specialized supply chain process (Bonne and Verbake, 2008). Hence, the logistics providers have reacted to this demand by creating *Halal* supply chain. *Halal* supply chain is a new approach of handling products (Tieman, 2011) that created purposely to meet the demand from *Halal* industry players.

Table 1.1 displays the definitions of *Halal* supply chain that was given by various researchers. For this study the author defined *Halal* supply chain as a robust supply chain that purposely invented to protect the integrity of *Halal* products along the chain which consist of various activities and must be based on *Syariah's* requirements. Activities involve in *Halal* supply chain are *Halal* transportation, *Halal* warehousing, product's handling, procurement, container purification and many other activities. However, Riaz and Chaudury (2004) and Tieman (2011) claimed that *Halal* transportation and *Halal* warehousing are the most crucial part that has to be concern in order to maintain the integrity of *Halal* products at the point of consumption. The contamination also possibly to occur during the delivery and storage activities (Pahim et al., 2012)

Currently, there are two kinds of supply chain activities exist in Malaysia, traditional supply chain and *Halal* supply chain. Basically, the activities in both methods are same, but due to the different purposes, there are differences between traditional and *Halal* supply chain. The main different between traditional and *Halal* supply chain is that the objective of traditional supply chain to minimize the cost, but for the *Halal* supply chain is to maintain the *Halal* integrity of the Halal products. It is

reported that the market value for *Halal* supply chain in Malaysia has reached at USD 1.9 billion in 2013(Healthcareasia, 2015), and this figure should be increase in tandem to the growth of *Halal* industry in Malaysia. According to Ministry of International Trade and Industry (MITI)(2016), the global *Halal* economy is now valued at an estimated USD 2.3 trillion, and in 2015 Malaysian *Halal* export was reach at RM 39 billion, a big increase from RM 24 billion in 2011.

The basic principle in *Halal* supply chain is the segregation between *Halal* and *non-Halal* product in every stages of activities Tieman (2007,2011). Since there are many activities in the supply chain, the handing process for *Halal* supply chain becomes more complex. It is not only required to be segregated in term of location, but also in the tools used to handle the products itself. The tools used for *Halal* products cannot be shared with the tools used for *non-Halal* products. The main reason for segregation is to avoid any cross contamination for the *Halal* products (Tieman, 2009). The details will be explained on the next sub-chapter which is about *Halal* transportation and *Halal* warehousing.

3.3 INTENTION TO ADOPT *HALAL* SUPPLY CHAIN SERVICES

According to Tieman (2011), there are three factors that could put *Halal* products status in doubt namely ;

i) Direct contact with haram (prohibited)

ii) Risk of contamination; based on products characteristics such as dry versus wet products and bulk versus unified products.

iii) Perception of Muslim consumers; based on the market requirements, such as Islamic school of thought, local *fatwas* and local customs.

Hence, Omar and Jaafar (2011) stressed that the application of *Halal* supply chain services could guarantee that there is no contamination between *Halal* and Haram or anything mixing between them. The adoption of *Halal* supply chain services will not turn Haram products to *Halal*, but when there is contamination between *Halal* and Haram, the *Halal* contaminated products will become *Haram* (Tieman, 2011).

Application of *Halal* supply chain services among Malaysian *Halal* manufacturers as mentioned before, *Halal* transportation and *Halal* warehousing services are part of the *Halal* supply chain services. This study will try to investigate the intention to adopt *Halal* transportation and *Halal* warehousing services among Malaysian *Halal* manufacturers. Adoption is often conceived as the dependent variable. (Kamariah and Zulkifli, 2008). Adoption is a component of the diffusion process that refers to the evaluation of the results of a trial use of the innovation and decision to continue using the innovation (Rogers, 2003). Adoption occurs when the organization decides to invest in and put into use an innovation (Russell and Hoag, 2004), in a recap of an organizational innovation studies. Damanpour (1991) noted that the adoption of innovations is conceived to encompass the generation, development and implementation of new ideas or behaviours. An innovation can be new products or service, a new production process technology (Kamariah and Zulkifli). *Halal* supply chain services adoption in a situation where manufacturers especially *Halal* manufacturers using *Halal* supply chain services in their supply chain activities in order to maintain the *Halal* integrity of their products. It is known as *Halal* from farm to fork. Based on Khan (2009), the implementation of 'farm to table' operations in *Halal* industry has opened up opportunities for those that are involved in the logistics industry including ports, shipping and freight forwarding, warehousing and handling facilities. *Halal* supply chain is a new dimension of supply chain in which *Halal* products are handled separately with non *Halal* products according to Syariah to avoid cross contamination in order to maintain their *Halal* integrity. Che Man and Sazili (2010) defined *Halal* supply chain as the process of planning, implementing and controlling the efficient flow and storage of *Halal* certified products from source to the demand point. According to the technological innovation literature (Rodgers, 1995,2003) innovation adoption generally refers to the adoption of new methods, processes, or production systems; it intends to maintain or improve firm performance and to respond to changes in the external environment. For this study, researcher only focuses on the two areas of *Halal* supply chain which are *Halal* transportation and *Halal* warehousing services.

3.3.1 Halal Transportation

Tieman (2013) stressed that one of the key elements in *Halal* supply chain is transportation since products have to move several times before reaching at the point of sales. Furthermore, good and quality transportation system will lead to the service efficiency that enables goods to be at the destinations at the right time with the preserving of the *Halal* status. This view has also been pointed out by Riaz and Chaudury (2004). They claimed that transportations and distribution activities are the most crucial components in maintaining *Halal* integrity of the products. Figure 3.1 demonstrates the importance of transportation in in *Halal* supply chain activities.

There are several stages that need a *Halal* transportation before the goods reach to the hand of consumers. Without transportation, finished goods cannot be moved from manufacturers' location to the warehouse and retailing locations.

According to Tieman (2011), transporting *Halal* products, *Halal* and non-*Halal* goods are not mixed on a load carrier (like trolley or pallet) or in a container/ common transportation vehicle (in case of bulk shipments). There is also a clear difference in transportation in case of ambient or reefer (chilled or frozen)(Tieman, 2007a). This is the uniqueness of *Halal* in Islam. It is so detailed and clear since there is a Hadith mentioned the clear distinction between *Halal* and Haram. In order to maintain the *Halal*ness of the *Halal* products, it must be handled by the right person with the right process. It cannot be as simple as putting together all the products in the same transport and ignoring the *Halal* status of the products going to be moved to the right destination. If there is any misconduct, the *Halal* integrity of the products could be questioned. Tieman, (2007b) said that for refrigerated shipments there should be no mixing in the same container/common transportation storage of *Halal* and severe *Najis* (items regarded as ritually unclean) like pork. In case of ambient transports, there should be no mixing of *Halal* and non-*Halal* goods on a pallet or load carrier, and tertiary packaging should be used to protect the *Halal* cargo along the supply chain.

At present, in Malaysia, all *Halal* transport providers are certified based on the standard of MS 2400-1:2010; *Halal*an Toyyiban Assurance Pipeline Part 1: Management System Requirements for Transportation of goods and/or cargo chain services. This standard prescribes management system requirements for assurance of the *Halalan-toyyiban* integrity of products, goods and/or cargo being handled through various mode of transportation during the transportation and related activities through the entire process from receiving to delivery. According to this standard, the factors that are important to be considered to become *Halal* transportation operators are location, premise design and layout, equipment, facilities and others. The premise design and layout should permit good hygiene practices. The service providers should also develop training programs to ensure all manpower involved in the process has adequate knowledge the handle the process. (MS 2400-2:2010, SIRIM)

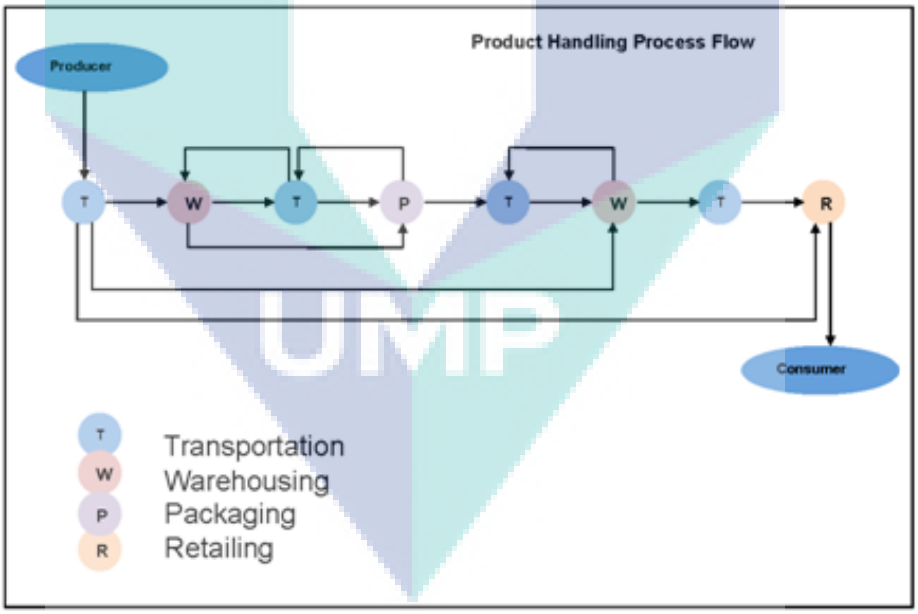

Figure 3.1 : Halal Transport handling process flow
Source : MS 2400-1:2010-.

3.3.2 Halal Warehouse

Tieman (2008) claimed that goods spend a lot of time in storage and relatively little time in movements and transformations. This is one of the critical argument to address the *Halal* products need a *Halal* warehousing to ensure its integrity at the point of customer purchase (Tieman,2008). *Halal* warehousing activities is part of all activities in *Halal* supply chain. As mentioned before, *Halal* supply chain is created to ensure that *Halal* products will be cleaned and hygiene form farm to fork. It is similar to the *Halal* transport concept, where *Halal* and non *Halal* product cannot be mixed together or even share the rack during the storage activities (Riaz and Chaudury, 2004. . Omar and Jaafar (2011) had pointed out that *Halal* and non-*Halal* food should be stored separately even if it is in any cold room and the temperature is maintained. Not only that, all tools use for *Halal* products cannot be used to handle non-*Halal* products (Tieman, 2007b; Talib et al., 2010). This view has been supported by Omar and Jaafar (2011) by claiming that the handling material for *Halal* food must be clean and safe to be consumed by Muslim consumers. It is as a preventive action to avoid contamination that may cause *Halal* becoming Haram. In addition, the location also must be far from any pigs' farm. (Omar et al., 2013).

Container and carrier also have an effect to maintain *Halal* integrity during the distribution process (Tieman, 2012). *Halal* products are special and special products also need a special system to handle it to ensure the specialness lasting till the point of purchase. Every goods has their own way to preserve the *Halal* credence *Halal* products. Foods such as meat, pharmaceutical products and cosmetics products have their own characteristics. Since there are differences in products characteristics, it also needs a different treatment to maintain their *Halal* status. Alam and Sayuti (2011) addressed that if products are not handled or stored accordingly, the products' *Halal* status is doubtful. As an example, machine like forklift that was used to handle non-*Halal* products, cannot be used to handle *Halal* products to prevent contamination from occurring that might affect the status *Halal* for the products. This idea has also been mentioned by Che Man and Sazili, 2010) where they proposed that for *Halal* food handling, it is important that food manufacturers to ensure that none of the equipment and machinery are associated with unclean (Haram) or najs.

Halal warehousing service is a new approach of handling products, therefore (Talib et al.,2013) argued that there are still small numbers of providers applying the correct method unless the one who are certified by JAKIM. Illyas et al., (2012) point out that *Halal* warehousing plays a big role in the success story of the *Halal* industry by ensuring the integrity of the *Halal* products. At present, in Malaysia, all *Halal* warehouse providers are certified based on standard of MS 2400-2:2010; *Halal*an Toyyiban Assurance Pipeline Part 2: Management System Requirements for Warehousing and Related Activities. This standard prescribes management system requirements for assurance of the *Halalan-toyyiban* integrity of products, goods and/or cargo during the warehousing and related activities through the entire process from receiving to delivery. According to this standard, the factors that are important to be considered to become a *Halal* warehouse operator are location, premise design and layout, equipment, facilities and many more. The warehouse should mitigate or be located away from environmentally polluted areas, flooding, pest infestation and areas where wastes, either solid of liquid cannot be removed effectively. The premise design and layout should permit good hygiene practices. The equipment should be made of materials with no toxic effect, can be adequately cleaned, disinfected, durable, moveable and maintained to avoid the contamination of products. The facilities that must be provided in the warehouse are water supply, drainage and waste disposal systems, cleaning and sanitary operation, lighting, storage and many more. (MS 2400-2:2010, SIRIM)

3.4 TECHNOLOGY

Technological factors are referred to as innovation characteristics in some studies of organizational adoption (Premkumar and Roberts, 1999). Technology characteristics differ according to the nature, purpose, scope and benefits of each technology (Markus and Keil; 1994; Kaplan and Sahwney, 2000; Swanson, 1994). Different industries have different technology requirements. Technology characteristics can be described by both, either internal or external technological factors that are relevant to the organizations. Tornatzky and Fleischer, (1990) mentioned that the

technology context focuses on how features of the technologies themselves can influence the adoption of new innovation process. Lin (2014) agreed with those statements by mentioning that the main focus of technological context is on how technology characteristics influence the adoption decision.

There are many constructs that have been used in this variable and it depends on the area of study and industry. Perceived Benefits, compatibility, complexity and cost have all been suggested as important to adoption of RFID technology (Raganathan and Jha, 2005; Sharma and Citrus, 2005). Many researches including the Meta-analysis of 75 diffusion articles conducted by Tornatzky and Klein, (1982), found that perceived benefits or relative advantage, compatibility and complexity are consistently related to innovation adoption. But nothing is fixed in this world. Paralel with the time changes, there are also changes in technology. Every new technology has its own unique characteristics. Therefore, those variables are not the only variables that are important for the technology adoption study for an organization.

Beside those factors, cost also cannot be separated with the adoption of new technology. Even though new technology adoption will bring more benefits to the adopters, before enjoying the benefits, the adopters must incurred the cost of the adoption of the new technology. Though, cost will also be included in this study.

Awareness of the new technology also will play a major role to the adoption decision. Without noticing about the existence of new technology available in the market, adopters will not have a chance to adopt it. Even though it is difficult to find awareness in the study which used TOE framework as a theory, but this study will use it as a variable since this variable has been proposed by respondents during the pilot study. Hence, this study will use four variables representing the technology dimension which are ; the perceived benefits, cost, complexity and awareness as the variables in technology factor.

3.4.1 Perceived Benefits

The perceived benefits of a technological innovation encompass the expected advantages for the organization and the extent to which it is perceived as better than old ones (Brown and Russell, 2007; Premkumar et al., 1997, Rogers, 2003; Tornatzky and Klein, (1982). Lin and Lin (2008) mentioned that the perceived benefits refer to the degree in which new technology provide more benefits than the technology to be substituted. For this study, perceived benefits refer to the extent of management recognition that *Halal* transportation and *Halal* warehousing services can provide benefits to the firms. Organizations will try to adopt new technologies when there is a perceived need for using the technologies to overcome a perceived performance gap or exploit a business opportunity (Duan et al., 2012). According to Rogers (1995) perceived benefits of adopting technology are important factors in influencing top management's investment decisions. The adoption of new technology innovation can be positively influenced if adopters or decision makers are capable to recognize the benefits of such technology over current systems and practices. (Darbanhosseiniamirkhiz and Ismail, 2012). To and Ngai (2006) claimed that it is reasonable that an organizations take into consideration the advantages that stem from adopting an innovations. Furthermore, perceived benefits are one of key determinants of technology adoption decision for organization. (Alberto and Fernando, 2007).

The higher the perceived positive benefits, the more likely an organisation will adopt the technology. Sharma et al. (2008), Iacovou, (1995) Kuan and Chau (2001) and Chwelos (2001) classified the benefits in two categories which are ;

i) Direct impact on operational process such as reducing the cost, time saving or improve in quality.

ii)Indirect impact which affects management process, such as improved in image and increase in competitiveness

Zhu and Kramer (2005) claimed the other benefits as increased sales, greater efficiency of internal processes, increased employee productivity, improved customer

service, reduced inventory and procurement costs, and improved coordination with trading partners

Characteristics of the technology are an important element to be concerned with before firms decide to adopt or not the new innovation. Kendall et al., (2001) also agreed by mentioning that the characteristics of the technology are generally considered as the most significant factors in explaining the rate of adoption. It is also a reason why it has been studied more frequently in adoption studies at the organizational level. This study would love to do the same since the unit of analysis for this study is at organizational level. Perceived benefits have also been defined by Agrawal and Prasad (1997) as an advantage for an organization over previous ways of performing the same task.

Tornatzky and Klein (1982) found that relative advantage is the characteristics which explain best the behaviour for adoption of innovation. Several prior studies have shown that perceived benefits or relative advantage was the best predictor of the adoption innovation (Khemtong & Roberts, 2006). Most of the studies in technology adoption found that perceived benefits is significantly associated with the intention to adopt new technologies. That is also a reason why perceived benefits are an important variable that should not be excluded while studying the adoption of new innovation for the organization. The more perceived benefits of an innovation, the higher speed of adopting it. Hoppe et al., (2001) agreed that perceived benefits are the strongest prediction of E-commerce adoption. As mentioned before, for this study, the perceived benefits refer to the extent of management recognition that *Halal* transportation and *Halal* warehousing services can provide benefits to the firms. Some researchers (Bellaj et.al, 2008 , Ghobakhloo et.al, 2011) use it as a perceived relative advantage but it still carry the same meaning. Perceived benefits or relative advantage has been found as one of the best predictors and positively related to the adoption of new innovation. Although the construct of perceived benefits has been operationalized somewhat differently across different information system studies, it has consistently been found to be a significant predictor of new technology in information system adoption (Teo et al., 2009;Lee, 2009; Oliviera and Martin, 2010). To support that, Tan and Teo (2000)

confirmed that from the past literature, they found that perceived relative advantage consistently shown to have a significant and positive influence on the adoption of new innovations.

Halal transportation and *Halal* warehousing are designed purposely to meet the demand from the *Halal* industry manufacturer. Potential benefits that could be found on the side of the adopters are increases the capability of being *Halal* producers and enhances competitive advantages. Changes in supply change management process is believed to increase the competitive advantage and capable of providing better products and services (Raganatahn et al, 2011; Li et al., 2006)

There are mix findings regarding perceived benefit as a adoption factor. Researchers including (Iacovou et al., 1995; Premkumar and Roberts, 1999; Chwelos et al., 2001; Mehrtens et al., 2001; Chau and Jim, 2002; GunaSekaran and Ngai, 2005; Al-Qirim, 2007; Chong and Pervan, 2007) have reported that perceived benefits is a strong predictor of new technology adoption. Ghobakhloo et.al, (2011), Lertwongsatien and Mongpinunwatana (2003) found that perceived benefit has a significant relationship with the adoption of new technology. Alam et al.,(2008) found that Perceived Benefits is positively related to the adoption of e-commerce among electronic manufacturing companies in Malaysia. Perceived Benefits also found to have a significant relationship with intention to adopt electronic supply chain management system (Lin, 2014). However, Low et.al 2011; Nkhoma and Dang, 2013) found that perceived benefit was negatively related to organizational adoption of cloud computing.

3.4.2. Complexity

The second variable representing the technology dimension is complexity. Rogers (2003) and Seymour et al., (2007), argue that technological complexity denotes the difficulties associated with the understanding, implementing and using the innovation. According to Corrocher, (2003), Complexity is the extent to which new innovation is assumed as relatively difficult to understand and use. For this study, complexity refers to the difficulties to adopt *Halal* transportation and *Halal*

warehousing services to *Halal* manufacturers' business operation. Even though complexity may not be as important as the relative advantage, it still could be used to explain about technology adoption, but in opposite way to the relative advantage. Rogers (1995) argued that the complexity of an innovation is negatively related to its rate of adoption. Rogers (2003) confirmed that complexity will act as a barrier to technology adoption. It could be a barrier to the adoption since users may need a long time to understand and implement about the new technology (Premkumar et al., 1994). Since it is still new, users still lack of information about it. According to the Ngai et al., (2007) consumer may not have confidence in RFID system since it is still relative new to them. In many recent studies, complexity has been found to be a significant factor in the adoption decision (e.g. Tiwana and Bush, 2007; Chaudhury and Bharati, 2008). In contrast to other innovation characteristics, this factor is negatively linked with the adoption probability. According to Grover (1993), an increase in complexity will increase the uncertainty related to a successful adoption and implementation. Therefore, Premkumar et al., (1994) agreed that complexity usually found as a barrier to the adoption of new innovation.

Since complexity is usually negatively associated with the adoption, it could be claimed that complexity is inhibitor for adoption of new innovation (Tornatzky and Fleischer, 1982, Premkumar et al., 1994, Premkumar & Roberts, 1999). Lian et al (2014) argued that technology complexity is a key criterion to the adoption decision in cloud computing in healthcare industry. Complexity is also found to have a negative effect for an organization to adopt cloud computing (Gangwar et al ., 2015; Oliviera et at., 2014). Previous research has indicated that the adoption of complex innovations requires organizational personnel to possess sufficient operational resources and technical competencies (Cooper and Zmud, 1990). Since *Halal* is Islamic terms, and usually related to the Muslim people, it may be complex to be understood by the non-Muslim since not all of *Halal* manufacturers are muslims.

The lucrative Halal market which attract interest not only for Muslim consumers globally, but also for non-Muslim especially in non-Muslim countries make the supply chain for Halal products become complex (Jaafar et al., 2012 ; Omar et al.,2013). *Halal*

supply chain services which consist of *Halal* transportation and *Halal* warehousing is a new approach which is reason why the adoption rate is still low. Since it is a new approach that is bound to *Shariah's* requirements, it also needs new tools and requirements that make it become more complex compared to traditional transportation and warehousing services. Tools, machineries, pallets and terminals that are used for *Halal* products cannot be shared with other non-*Halal* products. Non-*Halal* products also cannot be mixed in the same racks since *Halal* and non-*Halal* should be segregated in all supply chain activities. For certain products, temperature must be controlled at certain degree to maintain it Halalness, or Halal integrity could be questioned. To make it become more complex, most of the big companies in Malaysia who are certified as *Halal* manufacturers are non-Muslim companies. Most of them believe that as long as their products do not mix with pork or lard, it is already *Halal*. So, understanding the real concept of *Halal* itself is already a problem, to understand the importance of adopting *Halal* transportation and *Halal* warehousing services also should be a problem for them. Most of the *Halal* manufacturers in Malaysia are still curious to why they should apply *Halal* transportation and *Halal* warehousing services which are complex and costly (Omar and Jaafar, 2011) compared to the traditional transportation and warehousing services.

The complexities of the *Halal* supply chain extend much further than the usual concerns regarding unbroken cool chains and the efficient delivery of fresh food produce. (Tieman, 2007c). Increasing in number of *Halal* certified companies, the procurement profession is increasingly dealing with the complexity of *Halal* requirements in sourcing of products and services. (Tieman and Che Ghazali, 2012). Hence not only *Halal* transportation and *Halal* warehousing servicers, *Halal* manufacturers also need to be well versed in order to maintain the integrity of *Halal* products. They should take note that *Halal* supply chain especially *Halal* transportation and *Halal* warehousing services are more complex than traditional supply chain services. (Tieman, 2008) With a wide range of products, it is complex to produce an economies of scale for *Halal* transportation and *Halal* warehousing service providers. Bonne and Verbeke, (2008) support this statement by arguing *Halal* supply chain are vulnerable due to their credence quality attributes, and these vulnerabilities in *Halal*

supply chain make it complex to design and manage.(Tieman et al.,2012). Therefore, due to increasing in complexity in *Halal* transportation and *Halal* warehousing services, the *Halal* integrity issues are more likely to occur than before. (Tieman, 2014)

3.4.3 Cost

The purpose of the business entities is to gain profit from their operation. Though, cost is oppositely related to the profit. Therefore, organization is keen to have benefits of adopting new innovation more than it cost. (Premkumar and Roberts, 1999). Potential adopters typically evaluate the benefits will gain from the adoption of new technology against the perceived costs delivered (Doolin and Troshani, 2007; Oliver and Whymark, 2005; Premkumar et al., 1994). It is not only switching cost or installation costs, adopters will also weigh the ongoing cost of adopting the technology (Rogers, 2003) against potential benefits such as a reduction in compliance costs and increased competitive advantage (Oliver and Whymark, 2005). All cost for the technology adoption will not stop at the early stages of adoption, but it will be beared as long they use the technology. To ensure a successful of an adoption of e-supply chain management (SCM) not only requires substantial administrative and implementation costs, but also another investment in operating, setup, and training costs. Firms which perceive these costs to be unduly high or that are unable to invest financially will be reluctant to adopt e-SCM. Zhu et al. (2006), since higher cost will reduce their profits. Further argued that the cost of implementing necessary technologies for online transactions, including installing hardware and software, as well as employee training, was a significant barrier for some organizations to adopt e-business. Therefore, cost is one of a major variable to be considered before organizations decide either to adopt a new technology or not. According to Irwin and Brown, (2007), the costs associated with a new technology have a major bearing on the decision as to whether organizations choose to adopt it or not. In addition to that, new technology is usually to be too expensive to deploy over the subsequent 2-3 years (Hoske, 2004) especially at the initial stage.

The literature in technology innovation mentioned costs as an inhibitor of technology use (Tornatzky and Klein, 1982). It is similar in the information system study, regarding information system (Chau and Tam, 1997) and electronic data interchange (Premkumar et al., 1997). For this research setting, cost refers to any expenses to be borne by *Halal* manufacturers on adopting *Halal* supply chain services in order to maintain *Halal*ness of their *Halal* products. Since *Halal* transportation and *Halal* warehousing services are devoted to the *Halal* manufacturers only, it needs special equipments and procedures to be followed. The concept of *Halal* supply chain services is the separation between *Halal* and non *Halal* goods to avoid contamination and to maintain its *Halal* integrity. Due to that matter, all equipments used in *Halal* supply chain activities cannot be used in other non *Halal* supply chain activities. Since it is specialized equipments, and the limitation in terms of capability to be used in other products, it may lead to higher cost for both *Halal* manufacturers and *Halal* supply chain service providers. The concern on *Halal* integrity issues in the supply chain especially in transportation and warehousing have arguably become more costly for brand owners and retails chains to repair (Tieman and Ghazali, 2012; Zakaria and Abdul-Talib, 2010; New Straits Times, 2005). Eventhough *Halal* supply chain focus on maintaining the *Halal* quality, at the same time it should limit the impact cost on the adopters (Tieman et al, 2014). In industries where products and technologies are well established, firms attempt to improve their product quality and lower their costs to obtain competitive advantage (Kekre et al., 1995).

3.4.4 Awareness

The last variable representing the technology dimension is awareness. According to Good (1973), awareness is knowing something, knowing that something exist. Awareness of innovation was defined by Rogers (1983) as an innovation existence and gaining some understanding of how it is functioning. Whereas, Sathye (1999, p. 325) defined awareness of innovation as an understanding whether the potential clients is aware or not aware of service itself and its benefits. However, for this study, awareness is defined as an organization awareness regarding the existence of *Halal* transportation and *Halal* warehousing services in the market. It can be noted as a

state of being conscious about the existence of *Halal* transportation and *Halal* warehousing services in the market. Awareness was argued by Velmurugan and Velmurugan (2014) as one of key determinants to consumers' adoption of new technology. Lionberger (1968) claimed that awareness was one of the best known acts for utilising the innovative products. Dinev et al., (2005), mentioned that "awareness raises consciousness and knowledge about a certain technology and its personal and social benefits". This view was supported by (Obuh and Bozimo, 2012) in their study which established awareness as the central determinant of user attitude and behaviour towards technology. On top of that, in the open access environment, awareness has also been acknowledged as an important factor contributing to the usage of this mode of scholarly communication (Fichman, 1992; Thong,1999).

According to Papazafeiropoulou, (2002), awareness is considered to be a fundamental element of new technology diffusion. Therefore, organizations adopting a new technology go through certain phase or process according to their priority. Certain organization will look at the cost, and there are also organizations that do not bother about this. The main differences between them is the amount of time they spend on each stage and how much overlap there is between the steps. Understanding the phases helps us understand how to shape the technology adoption process. According to Straub (2009), either individual or organizational decide to adopt the new innovation, they goes through a predictable series of steps. Those steps are as follows;

i) Awareness of the technology ;

At this stage, the organizations just notice about the existence of the technology in the market. It should not be currently exist in the market. It may be already in the market for quite some time, but the organization just acknowledge about it existence

ii) Assessment of whether it is for them or not;

This is the phase to evaluate either the technology is good for the organization or not. It will make a comparison in every angle especially in cost and the benefit of the new technology with the existing technology currently used.

iii) Acceptance of the technology;

After thoroughly assessed, the organization decides to replace the current technology with the new technology

.

iv) Learning to use it;

At this stage, the new technology is already installed at the organization. Usually at this stage, supplier will provide strong support to their new clients. Training will probably be provided before it is installed at their places.

v) Usage

At this point, organization have already used the technology and totally removed the old technology

Awareness is a very important variable in order to help organization to adopt or reject new innovation. It was commonly used in marketing and also new innovation adoption studies. At this phase, people gain their first knowledge and possibly first contact with the technology. If organizations are not aware of the availability of the new technology in the market, how can organizations consider adopting it or not? Thus, awareness creation and information provision are considered to be very important elements for adoption of an innovation. (Papazafeiropoulou et al., 2002). The Organization for Economic Cooperation and Development (OECD) (1998) reports that lack of awareness is one of the most reported barriers to the adoption of electronic commerce as they can't see the advantages, benefits and business opportunity offered by electronic commerce. Awareness of products in the business environment may have an influence on the adoption of an innovation. (Grover, 1993; Lee, 1998; Thong and Yap, 1995). Due to that matter, for a new innovation, marketing strategies should be designed to inform and educate organizations about the existence and benefits of new technology since awareness can impact on the organization's decision to accept this new technology. (Carolyn et al., 2011).

According to Dyes (2010), in order to ensure *Halal* cosmetics to succeed in the market, the marketing strategy need to create awareness among consumers that the products they are using are not *Halal*. That shows the importance of awareness for

consumers before deciding to choose the type of products that they are going to use. So, in order to increase adoption rate of *Halal* supply chain services among *Halal* manufacturers in Malaysia, all parties involved in the decision making must be aware that there is a service call as *Halal* supply chain services which are related to the purity of their *Halal* products. In the context of Malaysia, government support is perceived as not playing an important role in e-business adoption due to the lack of awareness among the SMEs concerning the support provided by the government (Marimuthu et.al, 2011). In *Halal* context, awareness level regarding *Halal* products and services is relatively low among Muslim consumers. (Sungkar,2008)

3.5 ORGANIZATION

The organisational context represents the factors internal to an organisation influencing an innovation adoption and implementation (Tornatzky and Fleischer, 1990) Organizations can have different perspectives on how useful a technology for them, especially if the technology is relatively new in the market. Tornatzky and Fleischer, (1990) proposed that organizational factors are extremely relevant and should not be left out in any organizational adoption research. This research defines organization as a context into which technology is going to be implemented (Orlikowski, 1993) as mentioned by Brown and Rusell (2007) as extremely relevant to the adoption process. Most commonly used for descriptive measure for this variable are firm size, organizational readiness, organizational structure and top management attitude. Ramdani et al, 2009) proposed that Top management attitude, organisational readiness, and size are considered to be factors that influence SMEs' adoption of enterprise systems

3.5.1 Firm Size (Control Variable)

The organizational context includes attributes such as size, quality of human resources, and complexity of the firm's managerial structure (Hong and Zhu, 2006; Oliveira and Martins, 2010). In Malaysia, firm size has been categorized according to the number of full time employees and sales per year. Since the nature of companies are

different according to industry or scope of business, sometimes sales cannot be reflected by the numbers of fulltime workers, therefore, to make it clearer, this study used number of full time employees to determine the firm size. Table 3.1 shows all the detail regarding firm size classification.

Table 3.1:
SMEs category base on approved SME definitions in Malaysia

Size	No of employees	Sales (RM)
Micro	< 5 employees	< 250,000
Small	Between 5 - 50	250,000 to 10 million
Medium	Between 51 - 150	10 Million – to 25 million
Others	More than 150	> 25 million

Source: http://www.smecorp.gov.my/vn2/sites/default/files/appendix%204.pdf

Size is one of the most widely investigated variables for innovation adoption. Since literature suggest that size should be a control variable for the adoption study industry (Danese and Romano, 2013; Ifinedo, 2011; Lew and Sinkovics, 2013; Berghman et al., 2013), this study will also do the same.

3.5.2 Readiness

Readiness of the organization to adopt new technology varies according to the organization's property and internal characteristics. Different type of organizations requires different type of innovation. Wei and Ling (2011) argued that, even though there are differences in organizational readiness, it still has an important role in the decision to adopt new innovations. This construct has been used by Chong et al., (2009) to assess whether the organization has the necessary attributes that ensure the readiness to adopt e-commerce in the supply chain activities. Organisational readiness has been defined by Iacovou et al., (1995) as "the availability of the needed organisational resources for adoption". Tran et al., (2011) define readiness as firm's propensity forward and its available capacity before implementing new technology. There is no specific definition for the concept of readiness since it is depends on contexts used, situations and users (Tran et al., 2011). For this study, organizational readiness is defined as the capability of the organizational operation to adopt *Halal* transportation

and *Halal* warehousing services. Organization is claimed to have a lack of readiness if they are lacking in technological capabilities and possess low level of innovative knowledge and skills (Dosi, 1991). Before that, Cragg and King (1993) claimed that economic costs and lack of technical knowledge are identified as two of the most important factors that hinder information system growth in small organisations.

The level of organizational readiness on financial and human resource has often been identified as a predictor towards information technology adoption (Grandon & Person, 2002; Thatcher and Foster 2002; Chwelos et al. 2001; Iacovou, 1995). Lack of financial resources will act as impeding factor to the adoption of new technology. (Love et al., 2001). According to Duan et al., (2012), organizational readiness is determined by the financial readiness and the technological readiness. Dosi (1991) claimed that organizational readiness indicates a firm's technological capability, or level of use of innovative knowledge and skills. Organizational readiness varies according to the internal characteristics and property of a firm to the type of new technology going to be adopted. Although there are differences in organizational readiness, it is still plays an important role in the decision to adapt an innovation (Wei & Ling, 2011). Organizational readiness is defined here as capability of the operation management to adopt *Halal* supply chain services. According to Iacovou (1995) and Mehrtens et al., (2001) readiness is in essence an organization's internal capability in accepting new technology. Brown and Russell (2007) found that organizational readiness is a vital variable in RFID adoption. Previously, in 1995, Iacovou et al proved that the availability of financial and technology resources (i.e., people, technology, and expertise) is a major derived behind the adoption of electronic data interchange. According to Chwelos et al. (2001) technical support, expertise, infrastructure and the existence of champions and organizational compatibility (Premkumar and Ramamurthy, 1995) are also important components of organizational readiness.

Organizational readiness is an important variable to be considered in new technology adoption (Asif and Mandivalla, 2005). Kinsella (2003) stated that organizations must be prepared to make changes is their business process, and potential areas also need to be rearrange (Loebbecke and Palmer, 2006) to make sure *Halal*

supply chain activities could be run in the organizations. It is a result from the *Halal* requirement which mentioned that *Halal* products must be segregated along the way and even tools that are used for *Halal*, cannot be used for non *Halal* products at the same time. Therefore, to confirm the successful of the new style of business processes especially in adopting *Halal* transportation and *Halal* warehousing services, a cultural willingness to move beyond traditional methods need to be developed (Hoske, 2004)

3.6 ENVIRONMENT

The last dimension in the TOE framework is an environment. Environmental context focuses on areas which the organization conducts its business operation, with the priority given to external factors influencing the industry that have a great impacts on the organization. The founder of the TOE framework, Tornatzky and Fleischer, (1990) defined environment as the arena in which firm conducts its business – its industry, competitors, access to resource supplied by others and dealing with government. Environmental context refers to the influences from external factors surrounding the firms and it is usually beyond of the firm's control. The two main sources of environmental pressure to adopt IS are competitive pressure, and more importantly pressure by trading partners, customers, and government (Iacovou et al., 1995).

Environmental factors have been frequently used in the previous studies and found to be significant factors towards the adoption of new technology for the organizations (Sophonthummapharn, 2009). Khemtong and Roberts (2008) agreed with this view by mentioning that environmental factors are important factors that have been investigated in many previous studies. The role and influence of environmental factors influencing organizational adoption decision has been highlighted by Orlikowski (1993).

Environmental factor can be classified to two sectors; pressure and support. (Sophonthummapharn, 2009). The pressure factors refer to any kind of pressure that might affect an adoption decision such as competitive pressure, customer pressure and industry. For supporting factors, it refers to the support from other firms that might

affect an adoption decision such as support from government/ private agencies and technology suppliers. Though, for this study, researchers will use government support, customer pressure, competitive pressure and the supplier availability to represent environmental factor

3.6.1 Government support

Government can enhance the adoption of new technologies by several ways such as by providing a good infrastructure, new policies and giving incentives to the adopters. This applies to the adoption of *Halal* transportation and *Halal* warehousing services among *Halal* manufacturers in Malaysia. It is believed that government support could play a crucial role to encourage the adoption of *Halal* transportation and *Halal* warehousing services among Malaysian's *Halal* manufacturers. Literatures in technology adoption at the organizational level frequently used government factor in their studies (e.g. Khemtong and Roberts, 2008; Marimuthu et al., 2011; Sophonthummapharn, 2009). Khemtong and Roberts (2008) defined government support as supports that are easily and readily available to the potential firms to adopt new technology. Sophonthummapharn (2009) defined government support as the policies, initiatives, agencies and everything organized by government to facilitate the rate of adopting a techno-relationship innovation and relevant components. For this study, government support is defined as an availability of government support to adopt *Halal* transportation and *Halal* warehousing services. Government support by introducing a new regulation is another critical factor influencing innovation diffusion (Jie et al., 2013). Government regulation can encourage or discourage the adoption of innovation, as the government sets the environmental regulations for industry (Scupola, 2003; Oliviera et al., 2014). According to Ngah et al., (2014) *Halal* supply chain service provider claimed that the government support has an impact on supporting the growth in demand for *Halal* supply chain services due to the fact that the government has power to enforce rules and regulation regarding issues in *Halal* supply chain. Cui et al., (2008) confirmed that government regulations are the important factors which influence technology adoption among business firm. This view has been supported by Oliveira et al., (2014) as they mentioned that the impact of existing laws and regulations can be

critical in the adoption of new technologies. Therefore, if the government would like to enhance the adoption of *Halal* transportation and *Halal* warehousing services, laws and policy is one of the best methods to encourage *Halal* manufacturers to use those services. Furthermore, Zhu and Kramer (2005) already mentioned that without parallel development of laws, policies and strategic directions by the government, it can result in discouraging the adoption of e-commerce.

Literatures have illustrated that governmental support in funding infrastructure projects, adoption schemes and initiatives have resulted in faster technology diffusion (Tan, 2000). Governmental subsidy and supports have been shown to have a positive impact on the enhancement of information technology use and innovative business practice by organisations, especially SMEs (Wagner et al., 2003). At present, in Malaysia, the government has provided so many incentives to the *Halal* industry players and *Halal* logistics providers to support the growth and enhancement in demand for *Halal* products and services. As an effort to increase Malaysia's competitiveness in the global *Halal* market particularly for inward and outward investment into the country, the government proposed that incentives be granted to *Halal* manufacturers in

i) Specialty processes Food

ii) Pharmaceuticals, Cosmetics and personel care products

iii) Livestocks and meat products

iv) *Halal* ingredients,

which are operating in the designed *Halal* park are as belows;

a) 100% income tax exemption on qualifying capital expenditure for a period of 10 years; OR Income tax exemption on export sales for a period of 5 years

b) Exemption from import duty and sales tax on raw materials used for the development and production of *Halal* promoted products.

c) Double deduction on expenses incurred in obtaining international quality standards such as HACCP, GMP, Codex Alimentarius (Food standard guidelines of FAO & WHO), Sanitation Std Operating Procedures and

regulations for compliance for export markets such as Food and Traceability from farm to fork.

Malaysian government is not only looking at the *Halal* manufacturers, but also for the *Halal* service providers especially in *Halal* logistics which is consist of *Halal* transportation and *Halal* warehousing. In an effort to promote *Halal* Industry and *Halal* supply chain in Malaysia, the incentives are broaden up to the logistics operators. The recommended incentives are:

i. Full income tax exemption for a period of 5 years ; OR 100% income tax exemption on qualifying capital expenditure for a period of 5 years;
and
ii. Exemption on import duty import duty and sales tax on equipment, components and machinery used directly in the Cold Room Operations subject to the current policies.

Services provided by *Halal* Logistic Operators must be integrated which comprises of the three (3) principal activities:

- Forwarding
- Warehousing
- Transportation

And at least one of the following activities:

- Distribution
- Other related and value-added services/activities (e.g. palletising, product assembly/installation, bulk breaking, consolidation, packaging/re-packaging, procurement, quality control, labeling/re-labeling, testing, etc.)
- Supply chain management The *Halal* Logistic Operator must own minimum infrastructure as follows :
- Commercial Vehicles – 20 units
- Warehousing facilities – 5,000 sq. metres

(http://www.hdcglobal.com/publisher/gi_invesment_incentives)

3.6.2 Customer Pressure

"The customers are always right", the term used in the marketing strategy to ensure customers will always be satisfied with our services. Customers will decide what kind of products that they are looking for, and manufacturers should fulfil the customers' needs to stay afloat in the industry. Sophonthumpmapharn (2009) defined customer pressure as the behaviour and demand of customers that force a frim to adopt a techno-relationship innovation in order to keep and satisfy customers. This study defines customer pressure as pressure from customer that force the *Halal* manufacturers to adopt *Halal* transportation and *Halal* warehousing services

Buhalis and Main, (1998) reported that customer demand is the pull factor for the small and medium hotel to use the information technology. This statement is in line with the Khemtong and Roberts (2008). Without customers, how good your services or products are, it will not turn it to a profit. In relation to customers, the firm must necessarily be sensitive to clients' needs and demands (Chong, 2008). Competitive pressure, customer pressure, and industry pressure are an external pressure which are kind of pressure that might affect an adoption decision. Several studies have demonstrated the association between these factors and an adoption decision (Al-Qirim, 2005; Chwelos et al., 2001; Dholakia and Kshetri, 2004; Grandon and Pearson, 2004; Jeon et al., 2006; Kuan and Chau, 2001; Lee, 2004; Lertwongsatien and Wongpinunwatana, 2003; Mehrtens et al., 2001; Premkumar and Roberts, 1999; Seyal et al., 2004; Thong, 1999; Sophonthummapharn, 2009). Customer pressure has been ranked by Sophonthummapharn, (2009) as a third most important variable among twelve variables has been studied regarding adoption of electronic customer relationship management.

Studies indicate a significant influence of customer pressure on innovation implementation in different contexts (Sophonthummapharn, 2009). Iacovou et.al (1995) mentioned the importance of customers as a pressure to adopt information system. Zhu et al., (2003) stated that, consumer readiness will create customer pressure which is an important factor for decision makers of e-business adoption. Marimuthu et.al (2011) also classify customer as one of a direct external pressure and support to adopt new

technology. Henriques and Sadorsky (1996) mentioned that environmental plan is positively influenced by customer pressure.

3.6.3 Competitors Pressure

External factors could also have big impact on decision to adopt new innovation in firm's business operation. One of those factors is competitive pressure. Competitive pressure has been defined in various studies as a key determinant of firm's readiness to and acceptance of new technology (Aboelmaged, 2014). Competitive pressure refers to peer pressure on using a new technology (Rodgers, 2003). To and Ngai, (2006) and Oliviera and Martins, (2010) defined competitive pressure as the level of pressure felt by the firm from competitors within the industry. Sophonthumpmapharm (2009) defined it as the intensity level of competition that makes a feeling of being underperformed to a firm. Lin and Lin (2008), Lin (2014) defined competitive pressure as pressure resulting from a threat of losing competitive advantage, forcing firms to adopt and diffuse e-business and e-supply chain management respectively. This research will use the definition by Lin and Lin (2008) and Lin (2014), but in the context of an adoption of *Halal* transportation and *Halal* warehousing services.

Oliveira and Martins (2010) suggested that using a new innovation reinforces firms' competitiveness and creates new ways to outperform competitors. Firms that are first-movers in deploying new technology are believed to derive the greatest advantages compare to their followers. Even the pioneer is believed to have the greatest advantages, their competitors will not just look for whatever they are doing, and if they believed the adoption of new innovations will make put them in a better circumstance, they also will adopt the new innovation to stay competitive in the market. Furthermore, as market competition increases, firms may feel that they need to seek competitive advantage through innovations (Wang et al., 2010). Normally, market leader or larger retailers are often keenly aware of what their competitors are doing, with respect to new technology that may provide competitive advantage. (Brown and Russell, 2007). Porter and Millar (1985) suggested that, by adopting new technology, firms might able to change the rule

of competition, affect the industry structure and leverage new ways of outperforming rivals, thus changing the competitive environments.

The competitive pressure has long been recognized as a driving force for new technology usage. The adoption literature (e.g. Grover, 1993; Iacovou et al., 1995; Premkumar et al., 1997; Crook and Kumar, 1998, Zhu et al., 2003) has no objection to mention that competitive pressure as an adoption driver especially in the studies in the organizational level. Majmudar et al.,(1992) claimed that the competitive pressure faced by firms as a strong enabler for them to adopt new technologies.

In a competitive environment, in order to survive, businesses are forced to be innovative by the rivalry (Pfeffer and Leblebici, 1977), especially when engaged in a sector in which there is fierce rivalry and uncertainty with regard to what competitors are doing (Pavlou and El Sawy, 2010). If there are rapid changes in industry, firms will face pressure and become increasing aware and tend to follow their competitors adoption of new technology. (Low et al., 2011). Firms are driven by intensified completion to seek a strong competitive advantage in their served market. (Kekre et al., 1995) As cited by Shankar (2010), competitive pressure is known as a further factor in the growth and spread of mobile commerce. It is believed that competitive pressure tends to press companies to seek competitive edge by using new innovations (Gatignon and Robertson, 1989). Jeyaraj et al. (2006) proposed that competitive pressure is one of the best predictors for organizational to adopt information system technology. It will have a significant impact if the innovation directly affects the competition (Kuan and Chau, 2001). On top of that, Premkumar and Ramamurthy (1995) claim that it can become a strategic necessity to adopt new technologies to compete in the market place. This shows that, competitive pressure is a vital factor that influence the adoption decision in technology not matter what kind of technology. Therefore, there are a numbers of past studies that have identified competitive pressure as an important determinant of degree of computerization (Dasgupta et al., 1999) Electronic Data Interchange (EDI) diffusion (Chwelos,2001), adoption and use of e-business (Lin and Lin, 2008) or cloud computing adoption (Low et al, 2011).

To prove the vitality of competitive pressure towards the adoption decision, for the certain reasons, organizations will still adopt new technology even if the adoption will not make a significant impact to the organizational performance. Martin et al., (2010) claimed that, even the adoption of new technology will not bring more benefits to the organization, but due to the competitive pressure, the organization will make a move to adopt the new technology to ensure that they are still competitive in the market. Hence, this new situation will arise since the new strategies could be implemented just because of increasing in the competitive pressure among players in industries (Grant, 2003). Additional to that, competitive pressures reflect a threat of losing competitive advantage, so that it forces firms to seek competitive edge by adopting new innovations (Grover, 1993; Oliveira and Martins, 2010). Cohen (1996) claimed that merchants will adopt EC technology as they observe competitors' success in using this channel to attract customers and generate revenue and profits.

3.6.4. Supplier availability

The numbers of supplier available in the market will influence potential clients to adopt new innovations. The huge number of suppliers available in the market will enhance the awareness of new technology that could create interest among potential adopters. Rogers (2003) highlighted the important role played by technology vendors, consultants and change agents in persuading potential adopters about new innovations. Good relationship with the supplier has a crucial impact on the technology adoption decision. (Rahman and Bennett, 2009). A system and implementation services provider should be competent and knowledgeable to convince potential customers to use their services. Suppliers or vendors can be considered as the main source of expertise and knowledge and could be a significant factor to the adoption of new innovation (Thong et al., 1999). Intention to adopt new technologies could be developed by potential adopters by tapping into experiental learning of technology's supplier (Sarkar,2009). knowledge and resources possessed by suppliers that are perceived as being valuable by customers (Harmsen and Jensen, 2004) could be a secret weapon for the supplier to convince their potential customers. As the source of expertise and knowledgeable party regarding the new innovation, suppliers should promote the use of the innovation by

demonstrating its feasibility and disseminating information about its benefits (Dos Santos and peffers, 1998). Without proper knowledge about the innovation, managers would not easily make a decision to adopt it to their business operation. Therefore, suppliers' marketing efforts as tool to announce its existence in the market would be vital to influence manager decision to adopt the innovation especially in the early stage of the innovations (Santos and peffers, 1998).

Supplier promotion by explanation will enhance buyers' understanding of the convenience of the internet for B2B online purchasing. (Cool et al., 1997). Appropriate approach in marketing activities used by suppliers can significantly influence SMEs adoption decisions (Alshamaila et al., 2013). This view is parallel to the idea of Cool et al., (1997) when they mentioned that marketing activities that suppliers run can significantly influence organizations adoption decision. Additional to this, it also may affect the diffusion process of the innovation itself. Furthermore, past literatures (Hultink et al., 1997; Frambach et al., 1998, Woodside and Biemans, 2005) have already succeed to relate between suppliers effort and client's adoption decision.

Greater effort from suppliers could alleviate those fears for the new innovations. Frambach and Schillewaert (2002) have identified the importance of activities such as targeting and communicating in order to reduce the perceived risk from the potential customers. Once potential clients are aware of its availability and capabilities, good support service from supplier could also be a factor to the adoption of new innovations. The availability of supplier's support reflects the degree to which purchasing professionals perceive that their supplier are providing encouragement, guidance, and incentives for purchasing via internet, and this will directly impact buyer adoption decision. Barriers are connected with the system provider's restricted resources and its inability to guarantee adequate consulting and training services (Piotr, 2011). For instance, Weigelt and Sarkar (2009) suggest that a client firm may be able to develop innovation-related capabilities by tapping into the experiential learning of its supplier, which, by implication, is a potentially important source of capabilities for the client firm, potentially influencing the firm's innovation adoption.

This study defines supplier as a *Halal* transportation and *Halal* warehousing service providers as who have a *Halal* certificate. Since the numbers of *Halal* transportation and *Halal* warehousing service providers who are certified by JAKIM are very small, this study expands the coverage of *Halal* service providers to any logistic operators who are approved by HDC and other international agencies who are approved by JAKIM. This study would like to investigate whether the small number of *Halal* service providers is a barrier or not for *Halal* manufacturers to adopt their services

3.7 MODERATING FACTOR (TOP MANAGEMENT ATTITUDES)

Top management attitude has been widely used as a variable in adoption studies. (e.g. Brown and Russell, 2008; Y-M.Wang et al.,2010;). But for this study, top management attitudes will also be used as a moderating factor. Moderating factor is a variable which is believed that can moderate the relationship between independent variables and dependant variables. Moderating variable was introduced since there are contradicting in term of findings regarding relationship between variables has been studied. For this research, since there is inconsistency between relationship between research model construct, top management attitudes has been used as moderating variable. Furthermore, according to Raganath et al., (2004) top management attitude has been identified as a potential moderator in their supply chain management study.

3.8. RESEARCH GAPS

After reviewing the literature pertaining *Halal*, there are many studies conducted regarding the *Halal* issues. Most of the studies were concerned about *Halal* purchasing, consumers behaviours towards *Halal* products, ingredients in *Halal*, *Halal* trademark and *Halal* logistics. There is no *Halal* issue from source of origin till the packaging process, since it is already confirmed by JAKIM during the certification process. But, there is no confirmation that *Halal* products available in the markets are *Halal* to be consumed in the absence of *Halal* transportation and *Halal* warehousing services in *Halal* manufacturers' business operation. To the best knowledge of the researcher, very little are known about *Halal* supply chain especially in the adoption of *Halal* supply

chain services focusing in the *Halal* transportation and the *Halal* warehousing services. Noticing that, it is very puzzling why *Halal* manufacturers lack the intention to use *Halal* transportation and the *Halal* warehousing services even though the services are designed specifically for their products, this study will try to identify what are the barriers impeding, and also the potential enablers that will influence the *Halal* manufacturers from adopting the *Halal* transportation and the *Halal* warehousing services. Bonne and Verbake (2008) already mentioned that Muslim consumers still lack information on the adoption of *Halal* supply chain. Furthermore, Tieman (2011,2013) clearly mentioned that academic research are clearly needed in this area.

In addition to this, most of the literature in *Halal* focus in certain industry only especially in food. There are very small studies focused on Pharmaceuticals or cosmetics. As mentioned before, *Halal* is not only for food, but already expanded to various industries. Hence, this study aim to fill those gaps by studying the adoption behaviour of *Halal* transportation and *Halal* warehousing services in three industries namely as food, Pharmaceuticals and cosmetics. Hence, this study will provide new literature in *Halal* study.

TOE framework has been used in various areas in technology adoption studies (eg; e-commerce, e-business, RFID, EDI). Although many studies has been done by using TOE framewok as a theory, but none of those studies were associated with the adoption of *Halal* transportation and *Halal* warehousing services. On the other hand, awareness was hardly found to be used as a variable in the TOE framework. This study introduces awareness as one of the variables represented the technology dimension to be studied as barrier or enabler to the adoption of *Halal* transportation and *Halal* warehousing services. On the other hand, as proposed by Raganath et al., (2004), Top management attitude that previously has been used as a variable represented the organization dimension, will be used as a moderating factor in this study. Top management attitude is hypothesized to positively moderate the relationship between perceived benefits and the intention to adopt *Halal* transportation and *Halal* warehousing services. Thus, this research intends to seek and make a significant

contribution to the literature in *Halal* studies and also for technology adoption research adopting the TOE framework as a theory

In order to have a better understanding regarding those barriers and enablers, a quantitative research approach using questionnaires will be used for this research. Since research aim to identify what is the biggest barrier and enablers for *Halal* manufacturers from adopting *Halal* supply chain services, Structural Equation Modelling (SEM) technique will be used for this study. Due to the fact that this research is more on theory development, the complexity of research model and the research also try to predict the relationship, Partial Least Square (PLS) is the most suitable software to be used to analyze the data for this study.(Chin 1998; Chin and Newsted 1999, Urbach and Ahleman, 2010).

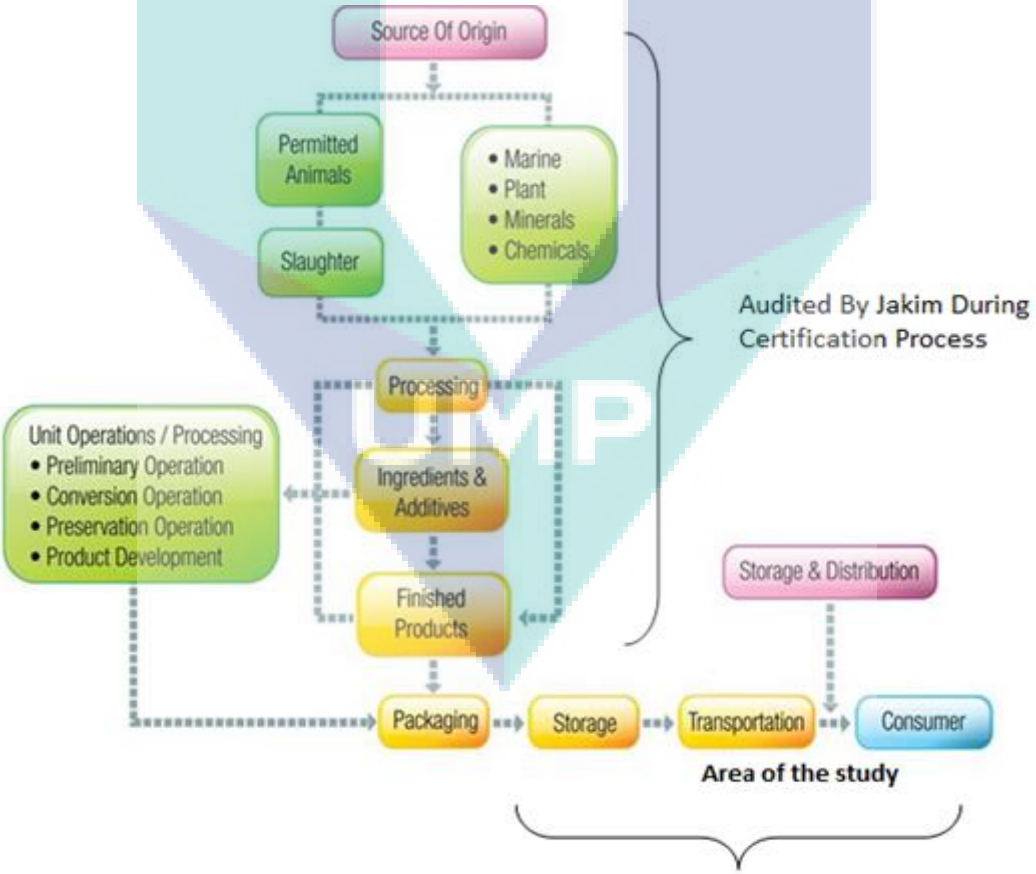

Figure 3.2 Research area
Source : Bahli (2011)

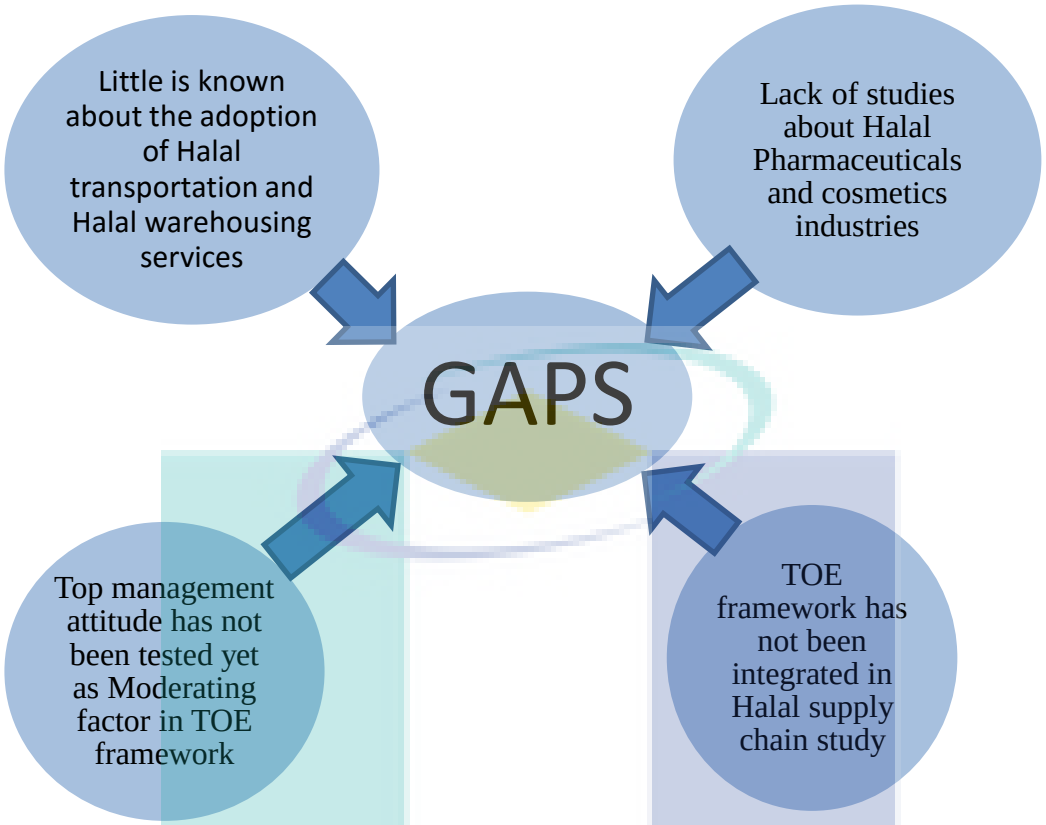

Figure 3.3 Summary of Gaps in the literature

3.9 THEORITICAL DEVELOPMENT AND HYPHOTHESIS DEVELOPMENT

The literature on technology adoption is dominated by studies that have as their unit of analysis the individual, (Brown and Russell, 2007) but is does not mean that for technological adoption, researchers lack of references for the studies that have their unit of analysis is on organizational level. For this reason, theoretical frameworks for studies on organizational adoption have been developed (Looi, 2005; Premkumar and Roberts, 1999; Teo et al., 2004). Most of them are based on Tornatzky and Fleisher (1990) who put factors influencing organizational adoption in three main categories – technological, organizational and environmental. Grounded theory, studied by

Orlikowski already confirmed that technological, organizational and environmental contexts as being an important to adoption decision of new innovation.

Rogers (1995) mention that adoption is a decision to make full use of an innovation whereas rejection is a decision that not to adopt that innovation. Many studies of technology adoption have been investigated based on Roger's Innovation Diffusion Theory (IDT), Marimuthu et al.,(2011). Rogers IDT (1995) proposed five major perceived attributes: relative advantage, compatibility, complexity, trialability and observability as a measurement.

A Theoretical model for this research need to consider various factor that have potentials to act as barriers to *Halal* supply chain services adoption. In order to have a total view, the barriers should be from internal and external factors. Beside IDT, Marimuthu et al.,(2011) stated that many other studies have used the possible determinants of technology adoption proposed by Tornatzky and Fleischer (1990). Tornatsky and Fleischer put together three contexts in the framework which are technology, organization and environment and that is why the framework known as TOE framework. The TOE framework serves as an important theoretical perspective for studying the contextual factors (Tornatzky and Fleischer, (1990). Even though Tornatzky and Fleischer, (1990) already grouped those three factors into components long time ago, the significance of these factors in determining the barriers to adopt *Halal* supply chain services among *Halal* manufacturers is not being studied yet. Liew (2002) conducted a survey on 39 SMEs to investigate the factors that influence e-commerce adoption among Malaysian SMEs and found that the level of adoption is influenced by the extent of the barriers related to organization, technology and infrastructure. Table 3.2 below shows the list of research have been done using TOE framework and the area of studies.

Table 3.2
Researchers, area of studies and determinants used in the TOE framework

Researcher	Area of studies	Determinants
Iacovou et. al (1995)	EDI adoption	• Technology : Perceived benefits. • organizational : readiness, • Environment :external pressure
Kuan and Chau (2001)	EDI adoption	• Technology : Perceived direct benefits, perceived financial cost, • Organization : perceived technical competence, • Environment : perceived industry pressure, perceived government pressure
Thong (1999)	IS adoption	• Technology : relative advantage, compatibility, complexity, • Organization : CEO innovativeness and IS knowledge, business size, employee's IS knowledge, • Environment:environmental characteristics
Low et al., (2011)	Cloud computing	• Technology ; relative advantage, complexity and compatibility • Organization ; Top mgt support, firm size, technology readiness • Environment ; Competitive pressure and trading partner pressure.
Alshamaila and Papagiannidis (2013)	Cloud computing	• Technology : Relative advantage, uncertainty, compatibility, complexity, trialability. • Organization : Size, top management attitude, innovativeness, prior IT experiences. • Environment : Competitive pressure, industry, market scope, supplier effort

Table 3.2 : Continued

Researcher	Area of studies	Determinants
Oliviera et al., (2014)	Cloud computing	• Technology : Relative advantage, complexity, compatibility, technology readiness. • Organization : Top management attitude, Firm size. • Environment : Competitive pressure, Regulatort support
Gangwar et al ., (2015)	Cloud computing	• Technology : Relative advantage, compatibility, complexity. • Organization : Competency, top management attitude. • Environment : Competitive pressure, trading partner support

This study draws from existing theory that commonly used on technology adoption in organization but not yet in *Halal* supply chain services adoption. In order to identify a comprehensive set of factors likely will act as barriers or enablers in *Halal* supply chain services adoption, this study believed that TOE framework is suitable to investigate the barriers and enablers in adoption of *Halal* supply chain services among *Halal* manufacturers in Malaysia. Based on the literature reviews, Figure 3.4 on the next page represents the research framework for this study.

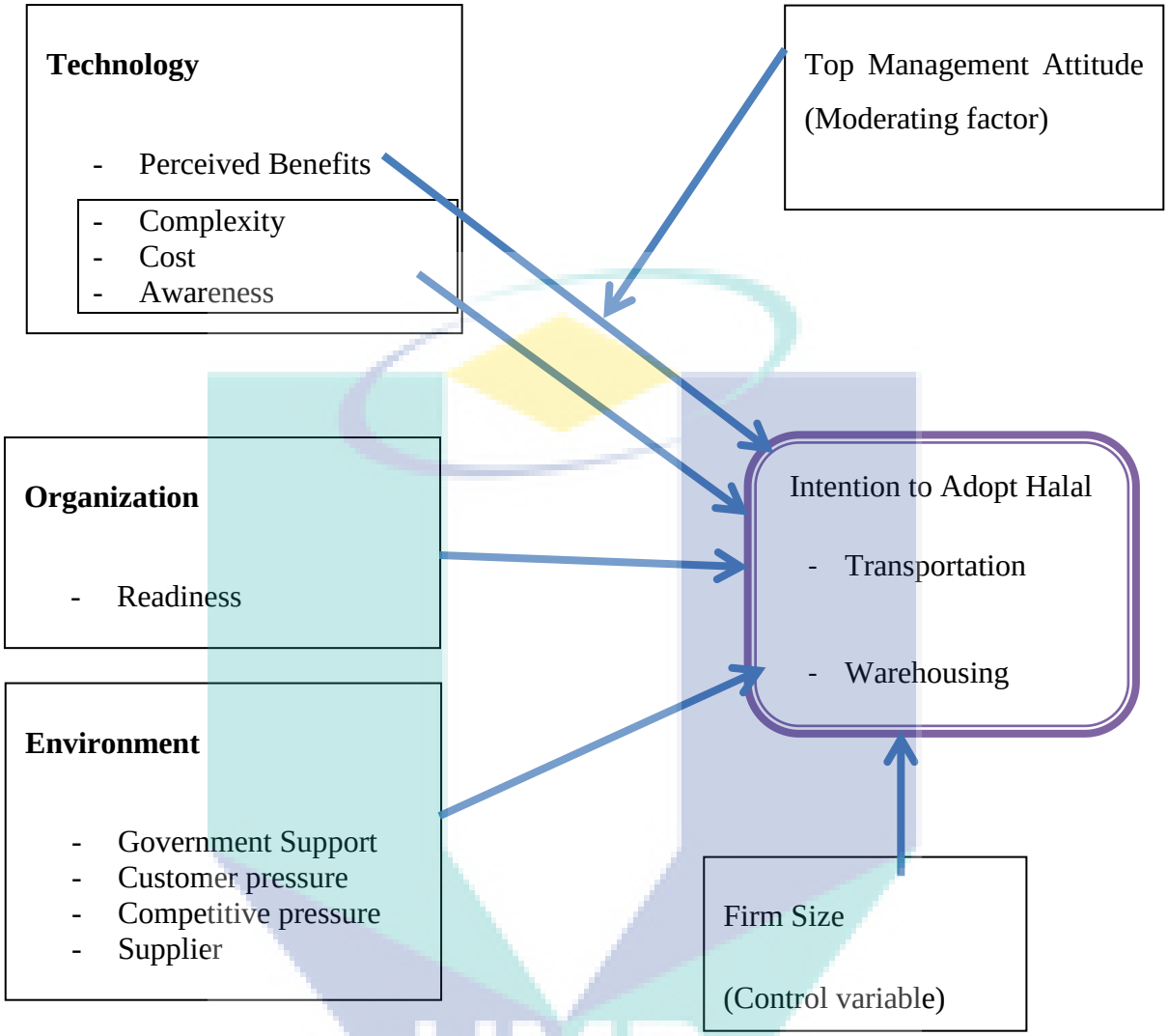

Figure 3.4 : Research framework

3.10 HYPOTHESIS DEVELOPMENT

To examine the research model, the following hypotheses are proposed. Hypothesis is an academic guess that derived of the literature. Since this study is using the SEM-PLS approach, the hypothesis must clearly state the direction of the relationship, either it is positive of negative relationship.

3.11 TECHNOLOGY

As a predictor of technology adoption, the perceived characteristics of technology have been studied more frequently and are generally considered as the most significant factors in explaining the rate of adoption (Kendall et al., 2001). The decision to adopt a technology depends not only on what is available on the market, but also on how such technologies fit with the technologies that a firm already possesses (Tornatzky and Fleischer, 1990; Chau and Tam, 1997;Jeyaraj et al., 2006). Previous studies (e.g. Chong and Bauer, 2000; Jeyaraj et al., 2006) show that these technological factors have been the key feature of several information technology adoption studies (e.g. Iacovou et al., 1995).

3.11.1 Perceived Benefits

Relative advantage results in increased efficiency, economic benefits and enhanced status (Rogers, 2003) . When users recognize that an innovation can offer advantages over existing practices and systems, it is to be expected that the adoption of such an innovation will be positively encouraged (Rogers, 2003). Abundant of empirical studies already validate that perceived benefits or relative advantage of new information and communication technologies lead to its adoption (Chau and Tam,1997; Kannabiran, 2012). Support for the importance of the perceived benefits of innovative technology is abundant in the IT adoption literature (Grandon andPearson, 2004; Venkatesh and Morris, 2000; Zhu et al., 2006) . Research on IS adoption and implementation has identified the importance of expected benefits of IS in post adoption behaviors such as use and diffusion (Cooper and Zmud, 1990). Ramdani et al. (2009) agreed that firms with a greater perceived relative advantage of enterprise systems are predicted to become adopters of these systems. Kim and Garrison (2010) indicated that perceived benefits of RFID have a significant role on it adoption and implementation in South Korea. Lin and Lin (2008)and Zhu et al. (2006) validated expected benefit of e-business as avital factor shaping e-business diffusion. Sophonthummapharn (2009) claimed that perceived benefits as a factor to the adoption of techno relationship innovation. Perceived direct benefits have a significant relationship with the e-market adoption for

SME in Australia (Duan et al., 2012). Ifinedo (2011) confirmed that Internet/E-Business Technology (IEBT's) perceived benefits will lead to greater acceptance of new technologies. Marimuthu et al., (2011) found that perceived benefits is positively related to the adoption of e-business in Malaysia. Perceived Benefits is positively relation to the mobile banking adoption (Jabir and Sohail, 2012). Perceived benefits are positively related to the adoption of cloud computing (Hsu et al, 2014). For XBRL studies, Perceived Benefits could be more salient for internal XBRL adoption than for inter-organizational XBRL adoption (Haseqawa et al., 2004; Hannon, 2005; Choi et al., 2008; Garbellotto, 2009; Gray and Miller, 2009; Grabski et al., 2011; Monterio, 2011) Henderson et al., (2012) also argued that Perceived Benefits is positively related to the adoption of XBRL.

Drawing upon previous literature, Perceived Benefits is the best predictor to predict the benefits of technology innovation. Even Low et al., (2011) and Nkhoma and Dang, (2013) found that the perceived benefits is not a significant factor in adoption of clound computing, researcher still believe that the Perceived Benefits still has a positive relationship to the adoption of *Halal* transportation and *Halal* warehousing services. Though,

H1 : Perceived Benefits has a positive relationship with adoption of *Halal* transportation

H2 : Perceived Benefits has a positive relationship with adoption of *Halal* warehousing

3.11.2 Complexity

The complexity of the technology creates greater uncertainty for successful implementation and therefore increases the risk in the adoption decision (Premkumar and Roberts, 1999). Previous studies have also indicated that complexity will affect IT adoption decision (Chang et al., 2007). Rogers (1995) defined complexity as the degree to which innovation is perceived as difficult to use. Cheung et al., (2000) defined complexity as the extent to which an innovation can be considered relatively difficult to understand and use. They found that complexity negatively influences the adoption of internet usage. Al-Jabri and Sohail, (2012) confirmed that complexity in use is a major factor in adoption of mobile banking. Alam et al.,(2008) found that complexity is

negatively related to the adoption of e-commerce among electronic manufacturing companies in Malaysia. Since complexity will have a stronger negative influence on internal XBRL adoption, it is believed that complexity will have negatively related to the adoption decision. (Henderson et al., 2012). Bahruddin et al. (2011) mentioned that the complexities of the *Halal* supply chain extend much further than the usual concerns regarding unbroken cool chains and the efficient delivery of fresh food produce. Therefore, we hypothesize:

H3: Complexity is negatively related to the adoption of *Halal* transportation.

H4: Complexity is negatively related to the adoption of *Halal* warehousing

3.11.3 Cost

Cost is a common factor with a new technology adoption since new technology requires new tools and equipment. This statement is aligned with Lian et al., (2014) while they mentioned that cost play such an important role for hospitals to adopt cloud computing technology. The innovation literature suggests costs as an inhibitor of technology use (Tornatzky and Klein, 1982). This was agreed by Reyes et al., (2012) who claimed that cost was perceived as a significant barrier for non-implementer and future implementer of RFID.The IS literature also provides such evidence to open systems (Chau and Tam, 1997) and EDI (Premkumar et al.,1997).When an organization makes a decision on whether to adopt a new technology, a cost-benefit analysis is considered as an unavoidable process (Chau and Tam, 1997). According to Tan et al., (2009) cost is an important variable for decision making process in an adoption of new innovation. In green supply chain management study, Alkhidir and Zailani (2009) found that cost is a significant barrier to implement green supply chain. For e-business study, Zhu et al. (2006) also found that cost would significantly inhibit e-business usage by an organization. Ghobakhloo et al., (2011) also confirmed that cost is negatively related to the adoption of e-commerce. Cost also plays such an important role when hospitals decide to adopt cloud computing technology . Costs will also be a critical factor for the adoption decision. (Lian et al, 2014). On top of that, cost has a significant negative relationship on with intention to adopt electronic supply chain management system (Lin, 2014). Wabwoba et al., (2012) found that green information communication

technology implementation is a costly undertaking. Hence making it a barrier to its implementation. Abundant of literatures on technology adoption at the organizational level found that costs inhibit technology adoption (Chau and Jim, 2002; Chau and Tam, 1997; Tornatzky and Klein, 1982). High technological demands and their associated costs may be cost prohibitive for some organizations (Wenninger, 1999), particularly for the smaller organizations. Practitioners should ensure that the benefits to their organizations will outweigh the costs associated with the adoption of the new systems.

This study will try to investigate either cost is a barrier or not for *Halal* manufacturers to adopt *Halal* supply chain services from *Halal* supply chain service providers. Furthermore, Omar and Jaafar (2011) claimed that from the perspective of industry players, the adoption of *Halal* supply chain will increase their cost and can be a problem for the companies. Hence ;

H5: Cost is negatively related to the adoption of *Halal* transportation.

H6: Cost is negatively related to the adoption of *Halal* warehousing

3.11.4 Awareness

Customer's awareness means if customer demands certain products as green products; the company has to change technology and organization for innovative green products. (Lutra et al., 2013). So, it should be the same with *Halal* products. *Halal* products should be *Halal* from the point of origin to the point of consumption. Therefore, *Halal* manufacturers should also include *Halal* transportation and *Halal* warehousing services as part of the process in handling *Halal* products. *Halal* transportation and *Halal* warehousing services are still not widely known among Malaysian *Halal* manufacturers, especially for the manufacturers who are operating outside the Klang valley. It is due to majority of *Halal* service providers are located in this region, even though there are a number of *Halal* manufacturers operating outside the Klang valley. The lack of awareness about *Halal* transportation and *Halal* warehousing services is not only for the *Halal* manufacturers, but also occured among Muslim consumers. Even though *Halal* industry is not new in Malaysia, *Halal* transportation and *Halal* warehousing services are still not well noticed by Muslim

consumers in Malaysia. Therefore, the level of awareness about *Halal* transportation and *Halal* warehousing are still low.

Many studies have reported the significance of awareness in adoption of new technology. According to Ramdani et al., (2009), firms that do not have much information system experience may be unaware of new technologies or unwilling to take a risk to adopt them. (Ramdani et al., 2009). Low awareness has also been one of the reason firm's not adopting XBRL in South Africa (Steenkamp and Nel, 2011). In Malaysia, Alam et al.,(2011) proposed that government agencies should create better awareness of the benefits of e-commerce to encourage the higher rate of adoption among SMEs. Farooq and Qudoos (1999) reported that main cause of non-adaptation of modern livestock practices is unawareness about new livestock technologies, and high prices of inputs. Parallel to that study, Gibbs and Kraemer (2004) reported a lack of awareness of information system benefits to be one of the most significant barriers to information system implementation and expansion. In green supply chain studies, Zhu et al., (2007) mentioned that without environmental awareness, it is difficult to implement green practices. In addition to that, regulatory, competitive, and marketing pressures have led to increased environmental awareness and are the drivers of green supply chain management.(Zhu et al.,2005; Sarkis et al.,2011). Furthermore, Luthra et al.,(2013) claimed that A major barrier of GSCM seen in Indian automobile industry is lack of awareness of customers about the benefits of green products. One of the circumstances that leads to the limited implementation of green ICT might be the lack of awareness (Wabwoba et al., 2012).

The effect of awareness to the adoption or usage of new innovations is not only on the business purposes only. Studies on utilization of electronic journal database have also found the same scenario. Rehman and Ramzy (2004) stated that although libraries have purchased and installed the latest, most technologically advanced computerized information systems and procure expensive resources; these may not be optimally used due to lack of awareness or the lack of ability to use these resources among the users. Okelo and Magara (2008) also agree with this notion of underutilization and stated that the common obstacle in the use of electronic journals in higher learning institutions was

lack of awareness about the resources. Baro et al. (2011) echoed the same sentiment by studied Delta State University and found that electronic scholarly journal databases were underutilized due to lack of awareness of the existing resources as the primary constraint they had. Awareness was also found to have a positive relationship with information technology adoption in 3G mobile usage in India (Velmurugan and Velmurugan, 2014). Based on above literature, researcher hypothesized that ;

H7: Awareness is positively related to the adoption of *Halal* transportation.

H8: Awareness is positively related to the adoption of *Halal* warehousing

3.12 ORGANIZATION

Organizations differ according to their own capabilities (Bareny, 1991).There are three (3) variables will be studied for this section. Organization size will be the control variables, readiness will be the independent variable and the top management attitude will be both; as a independent variable and moderator variable.

3.12.1 Readiness

Previous studies have demonstrated the association between organisational readiness and the level of technology adoption (Chwelos et al., 2001; Kuan and Chau, 2001; Thong, 1999; Venkatesh et al., 2003). Organizational readiness in terms of financial and technological resources has also been shown to be necessary for the use of information technology in hospitality organizations (Buhalis and Main; 1998; Heung 2003). In e-commerce study, Molla and Licker (2005) demonstrated that in initial adoption in developing countries, internal organizational readiness is significantly influential. Ramdani et al., (2009) have found that organizational readiness is a significant determinant of SME adoption of enterprise system. Indeed, organization readiness is a significant factor to the adoption of internet and web technology in Thailand (Khemtong and Roberts, 2008). Organizational readiness was found to be significant in affecting organizations decision to adopt e-commerce in Malaysia (Chong et al., 2009). Organizational readiness has also been found as a significant factor to the intention to adopt e-commerce for SMEs in Malaysia (Alam et al., 2011). Gangwar et al

., (2015) argued that the organizations with higher level of organizational readiness more likely to adopt cloud computing in their business operation. Hence, it is believed that, the higher level of readiness for organization to adopt new innovation, the higher the chances for them to adopt the new innovation. Hence ;

H9: Organizational readiness is positively related to the adoption of *Halal* transportation.

H10: Organizational readiness is positively related to the adoption of *Halal* warehousing.

3.13 ENVIRONMENT

This section will discuss about hypothesis development for environmental factors which consist of government support, customer pressure, competitive pressure and supplier availability.

3.13.1 Government support

In developing countries, it is believed that the role of the government is vital consideration that may affect the decision to adopt new innovations. In this type of countries, the governments often control technology developments and thus can influence e-commerce implementation decisions (Zhai and Liu, 2013). Previous studies have suggested that a government can encourage a country's private sector to adopt e-commerce by providing supporting infrastructure, legal and regulatory framework, and e-commerce use directions (Kuan and Chau, 2001). Government intervention and public administration were both found to be very important for the adoption and implementation of technological innovations (Scupola, 2003; Wang and Cheung, 2004).

Government support through regulation can form an encouraging environment that will make decision makers aware of this technology and consider adopting it in their enterprises (Jie at al., 2013). Chau et al. (2002) investigate the assimilation process of Internet technologies in China and found that Chinese companies have the highest concern for the regulatory environment in which they and their business reside. Chang

et al. (2006, 2007) found that government policies have a positive impact on hospitals trying to adopt new information systems technology. Zhu et al. (2006) investigate the assimilation of e-business and found that governments can encourage e-business legislation by supportive regulations and policies. On top of that, Chong (2008), claimed that government support has a significant relationship with the e commerce implementation. Additional to that, Khemtong and Roberts (2008) agreed that government support is very important for the adoption and implementation of technological innovations. This finding also found by Iacovou et al., (1995) when they mentioned that government intervention and public administration were very important factors to enhance the adoption of electronic data interchange. Tan and Teo (2000) and Scupola also found the same thing with others. In addition to that, government support hs shown to have a positive impact to the innovation use and business practice especially SMEs (Wagner et al., 2003). Sophonthummapharn (2009) found that government support is significant factor towards the adoption of electronic customer relationship. Though;

H11: Government support is positively related to the adoption of *Halal* transportation.

H12: Government support is positively related to the adoption of *Halal* warehousing

3.13.2 Customer pressure

Past studies have already mentioned the important and the positive effect of customer pressure towards the adoption of new technologies among business organizations. Customers also frequently decide how they will interact with firms with which they do business (Greenberg, 2009). Since businesses relies their survival on their customers, this scenario give a huge chances for customer to determine what should be done by the manufacturers. Past studies have also shown that movement towards information system could be a response or reaction from the customer pressure and an emphasis on improving effiency. (Pavlou and El Sawy, 2006). The pressure from customers for electronic business was found to have a significant relationship in e-commerce adoption and use within business (Barua et al., 2004; Oliveira and Martins, 2010),

Customer pressure was found to have a positive influence in environmental planning (Henriques and Sadorsky, 1996). Chan (2005), and Payne and Frow (2005) confirmed that customer value as a key facet in the decision to use internet. Chong (2008), argued that customer pressure has a significant relationship with the e commerce implementation. In Thailand's hotel industry, Khemtong and Roberts, (2008) found that customer pressure positively related to the adoption of web technology. The customer pressure was also found to have a significant relationship in the adoption of technological innovation Sophonthummapharn (2009). Al-Qirim 2005 and Marimuthu et al., 2011 have also found that customer pressure is positively related to the adoption of new technology. In addition, Lin (2014) also found that competitive pressure as a key determinant to the adoption of e-supply chain management system. Though ;

H13: Customer pressure is positively related to the adoption of *Halal* transportation.

H14: Customer pressure is positively related to the adoption of *Halal* warehousing

3.13.3 Competitive pressure

One reason for SMEs to adopt and use e-commerce is the firms' desire and need to stay competitive and innovative as a necessity for their survival (MacKay et al., 2004). Oliveira and Martins, (2010); Wu et al., (2006) believed that it is a good effort to change the rules and landscape of competition. It seems rational to believe that the competitive pressure impacts the adoption of e-commerce applications when SMEs perceive that these technologies may strengthen their competitive position and assist them to achieve superior firm performance (Grandon and Pearson, 2004; Premkumar and Ramamurthy, 1995). Competition in the adopter's industry is generally perceived to positively influence the adoption of information system innovations (Gatignon and Robertson, 1989). All of these effects are critical for companies to maintain their competitive positions (Currie, 2004). Zhu et al. (2006) was found that competitive pressure is positively related to the usage of e-business.

The competitive pressure that firms face within the industry also has an influence on the company's decision to adopt e-commerce (Wagner et al., 2003). Lin

(2006) suggests that competitive pressure (i.e. the pressure resulting from a threat of losing competitive advantage) is a determinant of IS strategies in organizations. Lin and Lin (2008) revealed that competitive pressure is a vital factor that influences e-business diffusion. Sophonthummapharn (2009) claimed that competitive pressure is a factor to the adoption of techno-relationship innovation. One of the Australian firm and two of the Danish firms agreed that competitive pressure is positively related to the adoption of e-commerce (Scupola, 2009). Wang et al. (2010) declared that firms adopting radio frequency identification (RFID) perceive greater competitive pressure than those not adopting this mobile technology. Gangwar et al ., (2015) found that competitive pressure has a positive relationship with the intention to adopt cloud computing among organization. As mentioned on the literature above, we can hypothesize that;

H15: Competitive pressure positively related to the adoption of *Halal* transportation

H16: Competitive pressure positively related to the adoption of *Halal* warehousing.

3.13.4 Supplier availability

The critical role of suppliers in the adoption process seems evident. Suppliers influence may have been particularly important to `jump start' adoption of the innovation in the first few years after the technology was introduced (Santos and peffers, 1998). Some studies however do provide support for the contention that suppliers will play a key role in the usage of internet for purchasing by organizational buyers. Gatignon and Robertson (1989) found that supply side vertical coordination (e.g., providing educational seminars) and supplier incentives (e.g., discounts) were related positively to the adoption of a new technology. Similar results were obtained by Cool et al., (1997), who concluded that supply-related factors were more likely to accelerate the acceptance of a new innovation.

This is in part driven by the fact that part of the literature suggested that organisations are more willing to risk trying new technologies if they feel there is adequate vendor or third-party support for the technology Premkumar and Roberts (1999). They also hypothesized external support from technology vendors to positively influence IT adoption .Supplier support had a direct effect on internet purchase

intent.(Cool et al., 1997). technology vendors EC adoption for Iranian SMEs were found positively affected by support from technology vendors (supplier) and this finding supported by Al-Qirim, 2007; Mirchandi and Motwani, 2001). This is parallel with previous research (William, 1981; Kwon and Zmud, 1987; Gatignon and Robertson, 1989) which demonstrates the availability of supplier to be positively related to adoption. Hence ;

H17: Supplier availability positively related to the adoption of *Halal* transportation

H18: Supplier availability positively related to the adoption of *Halal* warehousing.

3.14 TOP MANAGEMENT ATTITUDE (MODERATING FACTOR)

Numerous literatures have indicated that management support and commitment generally boded well for the acceptance of technological innovations in organizations, including SMEs (e.g. Iacovou et al., 1995; Premkumar and Roberts, 1999; Beatty et al., 2001; Chwelos et al., 2001; Grandon and Pearson, 2004; Al-Qirim, 2007; Ramdani et al., 2009). Therefore, the top management attitudes could be consider as one of an important component in deciding the technology that will be used in the organizations. This is due to the fact that the top management has a decision making power to determine what is best for the organization. Furthermore, the top management also has an influencing power on employees' commitment by supporting what they are believed best for the organization (Lee and Kim, 2007). Lin (2014) mentioned that an intervention from the top management is crucial to ensure adequate budget and resource and cultivation positive environment towards the new technology.

Piotr, (2011) stated that barriers to the adoption are people's negative attitudes such as fear, reluctance, and resistance to changes. Other than that, lack of concern and doubt about usefulness were used as variables by Faisal, (2010) in his study. According to the practitioners, one of the reason why *Halal* manufacturers reluctant to use *Halal* supply chain services is they do not see any urgency to use *Halal* supply chain services since they are Muslims and consumers already believed that their products is confirm *Halal* since they already certified *Halal* by JAKIM. Another barrier in changing the supply chain management style is SMEs doubts that benefits exist outside current

practices Meehan and Muir, (2008). It shows how important attitude as a barrier factor regarding applying a new style of adopting a new way of performing job in daily practices

Since there are inconsistency in findings about Perceived Benefits and the intention to adopt new innovation, therefore, moderating variables could be introduced. Even though most of literatures confirmed that Perceived Benefits has a positive relationship with the intention to adopt new innovations,(Teo et al., 2009; Lee, 2009; Oliveira and martin, 2010; Lin, 2014) however, Low et.al 2011; Nkhoma and Dang, 2013, Lian et al., (2014) found that perceived benefit was not significantly associated to organizational adoption of cloud computing. Furthermore, according to Raganath et al., (2004) top management attitude has been identified as a potential moderator in their supply chain management study. Hence, this study will use the top management attitude as a moderating factor for the relationship between perceived benefits and intention to adopt *Halal* transportation and *Halal* warehousing services. Besides that, it is noticed that the attitude will influence the successful of what people are doing. Once the top managers in any organization acknowledge the relevance of new technology, they will start to play a crucial role in influencing other organizational members to accept it; furthermore, they also commit resources to its adoption (Thong et al., 1996; Premkumar and Roberts, 1999). Conversely, where management cannot see why they need a new technology instead of what already they are having currently, then the support is low or unavailable. Then the technology acceptance tends to be placed on the back-burner in terms of organizational priorities (e.g. Igbaria et al., 1997). Based on the those findings, it is hypothesized;

H19: The positive relationship between Perceived benefits and intention to adopt *Halal* transportation will be stronger when the organization has better top management attitude.

H20: The positive relationship between Perceived benefits and intention to adopt *Halal* warehousing will be stronger when the organization has better top management attitude.

3.15 SUMMARY

This chapter discusses the review of the related literatures, research gaps, theoretical framework and hypotheses developed for this research. From the literature review, research gaps was found, then research framework was developed to guide the study. Since the study has nine (9) independent variables, two (2) dependant variables and a moderating factor, twenty (20) hypotheses were developed. Top management attitude will be treated as a moderating factor to the positive relationship between perceived benefits and the intention to adopt Halal transportation and Halal warehousing services. The research method used to test the hypotheses is discussed in the following chapter.

CHAPTER 4

RESEARCH METHODOLOGY

4.1 INTRODUCTION.

According to Bryman and Bell (2007), research methods are the techniques for data collection which can involve specific instruments such as surveys or structured interviews. It is important for researchers to employ the most suitable method of research methodology in order to fulfil the objectives of the study. Not every method is suitable to every objectives of the study. Every method has its own advantages and disadvantages. Failure to adopt the right methods will lead to failure to answer the research questions. Therefore the knowledge about research methodology is very crucial for the researchers.

Basically, there are two variables used in this study which are independent variable and dependant variable. For this study, there are nine (9) independent variables and two (2) dependant variables which are used to meet the research objectives. On top of that, a moderating variable is also introduced to examine the effect of the independent variable on the dependant variables. This study also includes a control variable since most of the studies in an organizational level used that variable as a control variable. The conceptual framework previously discussed illustrates all the relationship that will be tested in this study. This section will discuss regarding the research design, sampling method, data collection, operationalization of constructs, instrumentation, and the pre-test and pilot test.

4.2 RESEARCH DESIGN

Research design provides a framework for the collection and analysis of data based on research objectives. Sekaran (2003) claimed that research design involves a series of rational decision making choices regarding the purpose of study such as exploratory, descriptive, or hypothesis testing; setting of the study such as location that research could be done; type of investigation, level of researcher interference, time horizon and the unit analysis of the study. In addition to that, researchers have to make a decision regarding the sampling design, data collections methods, how variables going to be measured and what approach to analyze the data for hypothesis testing. Sekaran (2003) also argued that the methods are part of the design and this view is agreed by Bryman and bell (2007). According to De Vaus (2001) the role of research design is to confirm that the evidence from the analysis enables us to answer the research questions as clear as possible.

Based on the conceptual framework presented before, the purpose of this study is to test the hypotheses on the intention to adopt *Halal* transportation and *Halal* warehousing services among Malaysian *Halal* manufacturers. Since the data were collected at a single duration of time, this study employed a cross sectional sample survey field study. There are advantages of employing this method. Firstly, according to Kerlinger (1992), this approach enables us to accumulate a plenty of information from a relatively large sample of data. Secondly, this approach could help us improve the generalization of the study if representative of data could be gathered. (Scandura and William, 2000). Lastly, Dess and Robinson 1984; Slater, 1995) claimed that the information get in sample survey research is often very accurate, due to the instrument is designed specifically to address the research questions, and most of the instruments are adopted and adapted from the past successful studies. In addition to the Sekaran's definition, it is noticeable that, studies that using hypotheses testing commonly try to explain the nature of relationship between independent variables and dependant variables. It is due to hypotheses testing offer an enhanced understanding of the relationship between variables, how much changes in independent variables will make a changes in dependant variables. This is a quantitative research whereby the unit of

analysis is at the organizational level. However, only individuals at the top management level at three (3) Halal industries which are foods, pharmaceuticals and cosmetics are entitle to be the respondents for the study. Data is collected via survey within six (6) months with dual methods; self-administered survey during the Halal festivals and mail. Non-probability sampling technique was used since the list of non-adopters of Halal transportation and Halal warehousing services are unavailable. Based on the theoretical framework, twenty (20) propositions were developed and to be tested to evaluate what factors are the enablers and which factors are the barriers to the adoption of *Halal* transportation and *Halal* warehousing services. The moderating effect of top management attitude will also be evaluated to have a better understanding of the relationship between the variables in the framework. In addition to that, firm size will be treated as a control variable for this study.

For the type of investigation, this study will employ the correlation study to describe the variables in TOE framework to identify the barriers and the enablers towards the adoption of *Halal* transportation and *Halal* warehousing. For the setting factor, this study is conducted in a non-contrived setting. Field of study could be considered as has a minimal interference from the researcher.

As for the horizon of the study, this study will adopt the cross-sectional study. A cross sectional study is also known as one shot study where the data to answer all the research questions is gathered just once for a certain period of time. Since this study is only interested to find the correlation among the variables of study, therefore cross sectional study is the best approach to run this study. Other than cross-sectional study, there is also longitudinal study. According to Cresswell et al., (2003), once the data is collected more than one time, the study is considered a longitudinal study. Longitudinal studies are more suitable when the objective of the research is to describe the pattern and direction of change and stability (De Vaus, 2001), which is not focus on this study. Therefore, longitudinal study is not feasible for this study. Furthermore, longitudinal study needs a longer time compare to cross-sectional study which this study cannot afford to do so.

4.3 INSTRUMENT DEVELOPMENT

To test the research model, the questionnaire has forty-six (46) indicators that form the exogenous and endogenous constructs. The indicators are grouped under thirteen latent constructs. All the items are adopted and from the past studies and has been adapted to ensure it suitability with the current study. The changes are only on the context of studies. The original study is about E-Commerce, RFID, and E-Business, while this study is about Halal transportation and Halal warehousing services. The original item is "The skills necessary to use RFID technology are too complex for our employees", will change to be "The skills required to use Halal supply chain services are too complex for our employees"

The framework (see Figure 3.4) consists of eleven exogenous constructs that form the structure of TOE framework which is consist of perceived benefits, complexity , cost, and awareness (for technology), firm size (as a control variable), top management attitude (as a moderating factor) and readiness (for organization) and government support, customer pressure, competitive pressure and supplier (for environment).

The perceived benefits construct is related to the perceived benefits for *Halal* manufacturers to adopt *Halal* supply chain services. The Perceived Benefits constructs is operationalized by five indicators which are adopted and adapted from Sophonthummapharn, 2009. The items also have been used by other researcher such as Premkumar and Roberts, (1999), Lin and Lin, (2008). The items for perceived benefits is as below ;

1) *Halal* supply chain services is useful to expand our market
2) *Halal* supply chain services will increase our *Halal* image.
3) *Halal* supply chain services will increase customer satisfaction
4) *Halal* supply chain services will increase our profit.
5) *Halal* supply chain services will increase the purity of our products

The second variable for the technological factor is complexity. This variable will seek the respondents' perception about the complexity for *Halal* manufacturers to adopt *Halal* transportation and *Halal* warehousing services. Consist of three items, and the first item has been used by Wang et al., (2010) and another two items are from Premkumar and Roberts (1999). Another items from Wang et al., (2010) and Premkumar and Roberts (1999) have been discarded due to the items are not related to the study.Though, the items measuring the complexity for this study;

1) My company believes that *Halal* supply chain services are complex to use.

2) The skills required to use *Halal* supply chain services are too complex for our employees

3) Integrating *Halal* supply chain services in our current work practices will be very difficult.

Another variable for the technological factor is cost. Once a study is about technology, cost is considered as one of the factor that must be involved since all technology usually involves more cost to be invested in. The items for this variable are also adopted and adapted from Sophonthummapharn, (2009). The same items were also used by Premkumar and Roberts (1999). There are four items used to measure the cost;

1)Extra cost is needed to apply *Halal* supply chain services

2) *Halal* supply chain services adoption cost is higher than its' benefit.

3) The amount of money and time to be invested to adopt *Halal* supply chain services are high

4) The cost of *Halal* supply chain services is quite high for our company.

The last variable representing the technological factor is awareness. This study would like to investigate whether awareness will influence the decision to adopt *Halal* transportation and *Halal* warehousing services. All three items for this construct has been develop base on Al-Qirim, (2007) and Sophonthummapharn, (2009). The items are;

1) Our organization is not aware of availability of *Halal* supply chain services in the market.

2) Our organization have not noticed there are *Halal* manufacturer using *Halal* supply

chain services.

3) Our organization considers that *Halal* supply chain services is not yet applicable to our environment.

The second factor in the TOE framework is the organization. There are three variables representing this construct. The variables are readiness, firm size and the top management attitude. Readiness will act as an independent variable, while firm size will act as a control variable and top management attitude will be as an independent variable and the moderating variable.

There are four indicators used to measure the readiness variable. Two of the indicators are form Khemtong and Roberts (2006) and another two from Sophonthummapharn, (2009). Sophonthummapharn, (2009) himself already has four indicators, but another two has been dropped since it is not suitable for this study. The indicators are ;

1) Our organization gave its staff formal explanation regarding *Halal* supply chain services.

2) The budget was important factor that our organization had to deal with before adopting *Halal* supply chain services.

3) Our organization has the financial resources to adopt *Halal* supply chain services.

4) Our organization has a knowledgeable staff to adopt *Halal* supply chain services.

Since abundant of literature has confirmed that firm size is a significant factor towards the adoption of new technology, hence researchers start to use this variable as a control variable, and this study also will do the same. Firm sizes are divided according to the numbers of full time the workers that the firms have during data collection process. According to SME Corp. Malaysia, the considerations are as follows;

1) Less than 4 full time workers is Micro company

2) 5-50 fulltime workers is a small company

3) 51-150 fulltime workers is a Medium company

4) More than 150, consider as a multinational company.

The last variable for the organizational factor is the top management attitude. This variable will act as a moderating variable. According to Baron and Kenny (1986), moderator variables are typically introduced when there is an unexpectedly weak or inconsistent relation between a predictor and a criterion variable. Since there is inconsistency in the literature for the perceived benefit, hence the researcher decided to use it as moderating factor. Raganath et al., (2004) proposed that, the top management attitude could be a potential moderator in the supply chain management study. Therefore, this study will borrow the idea from Raganath et al., (2004) to see either it will be a moderating factor or not for this study. The items used for this variable are adopted from Khemtong and Roberts (2006). The items are as follows ;

1) Top management considers the *Halal* supply chain services as important.

2) Top Management attitude the adoption of *Halal* supply chain services

3) Top management will allocate resources for adoption of *Halal* supply chain services.

4) Top management effectively communicate its support for adoption of *Halal* supply chain services.

Environmental factor is presented by government support, customer pressure, competitive pressure and supplier. For the government support, the researcher will look at the availability of the government support towards the adoption of *Halal* transportation and *Halal* warehousing services. The original item for the government support is got from Marimuthu et al., (2011) and Lin and Ho, (2009). Though, the items for government support are ;

1) There is adequate incentive provided by govt if our organization adopt *Halal* supply chain services.

2) Government provide adequate training for us to understand the importance of *Halal* supply chain services.

3) There is regulation to enforce us to apply *Halal* supply chain services.

The second variable representing the environmental factor is customer pressure. Since the majority of Malaysians are Muslims, therefore, the study would like to investigate is there any pressure from the customers for *Halal* manufacturers to adopt *Halal* transportation and *Halal* warehousing services. The items for this construct was adopted and adapted from Premkumar and Roberts (1999) and Sophonthummapharn, (2009). The three items for this construct are ;

1) Our customers are pressuring us to adopt *Halal* supply chain services.

2) Customers' requirements indicate that our company need to adopt *Halal* supply chain services.

3) Customers' behaviours indicate that our company need to adopt *Halal* supply chain services.

There are many kind of pressures stated in the literatures beside the customer pressure. The other type of pressure that is commonly used in adoption study at the organization is competitive pressure. It will act as the third variable for environmental factor. The item for this construct originally taken from Marimuthu et al, (2011) and Lin and Lin,(2008). The items was also used by Premkumar and Roberts (1999) and Wang et al.,(2010). This variable will seek an information regarding is there any competitive pressure that will influence the decision by the top management to adopt *Halal* transportation and *Halal* warehousing services. There are four items for this construct. The items are ;

1) We believe that we will lose our customers to our competitors if we do not adopt *Halal* supply chain services.

2) We feel there is a strategic necessity to use *Halal* supply chain services to compete in the market.

3) Our organization has experienced competitive pressure to adopt *Halal* supply chain services

4) Our organization would experience a competitive disadvantage if *Halal* supply chain services is not adopted.

The last variable for the environmental factor is supplier. This study is keen to know the influence of the supplier of *Halal* transportation and *Halal* warehousing availability on the decision to adopt those services among *Halal* manufacturers in Malaysia. The items for this construct were developed based on item by Sophonthummapharn, (2009). There are four items employed to measure this construct. Though, the items for the supplier are as belows ;

1) *Halal* supply chain service provider is available in my area.

2) *Halal* supply chain service providers promote their services to our organization

3) Our organization have many contacts with any of *Halal* supply chain service providers.

4) We believe that our current supply chain activities could match with services offered

As a summary, the next table illustrates the constructs, items, sources, operational definition and number of items used in this study.

Table 4.1
Properties of measurement items

Dimension	Constructs	Operational definition	Source	No. of items
	Personal information	Respondent personal information		
	Organization information	Adopting *Halal* transportation, *Halal* warehousing or not, Firm size, age of business, business type, Having own transport/warehouse, No. of *Halal* products, industry		
Technology	Perceived Benefits	Perceived benefit to adopt *Halal* transportation and *Halal* warehousing services	Sophonthummapharn, 2009.	5
	Complexity	Complexity to adopt *Halal* transportation and *Halal* warehousing services	Wang et al. 2010, Premkumar and Roberts, 1999	3

Table 4.1: Continued

Dimension	Constructs	Operational definition	Source	No. of items
	Cost	The cost to adopt *Halal* transportation and *Halal* warehousing services	Sophonthummapharn, 2009	4
	Awareness	Organization awareness regarding *Halal* transportation and *Halal* warehousing services	Al_Qirim, 2005 and Sophonthummapharn, 2009.	3
Organization	Readiness	Readiness of organizations to adopt *Halal* transportation and *Halal* warehousing services	Khemtong and Roberts, (2006) Sophonthummapharn, (2009)	4
	Top management attitudes	Attitude of decision maker towards to adopt *Halal* transportation and *Halal* warehousing services	Khemtong and Roberts, (2006) Sophonthummapharn, (2009)	4
	Firm size	According to the number of full time workers		1

Table 4.1: Continued

Dimension	Constructs	Operational definition	Source	No. of items
Environment	Government support	Availability of government support for *Halal* manufacturers to adopt *Halal* transportation and *Halal* warehousing services	Marimuthu et al.(2011), Lin and Ho, (2009)	3
	Customer pressure	Customer pressure availability as a barrier in adopting *Halal* transportation and *Halal* warehousing services	Premkumar and Roberts, (1999), Sophonthummapharn, 2009	3
	Competitive pressure	Competitive pressure availability as a barrier in adopting *Halal* transportation and *Halal* warehousing services	Premkumar and Roberts, (1999); Lin and Lin (2008), Marimuthu et al. 2011, , Wang et al., (2010)	4
	Supplier	Suppliers availability in adopting *Halal* transportation and *Halal* warehousing services	Sophonthummapharn, (2009)	4

Table 4.1 : Continued

Dimension	Constructs	Operational definition	Source	No. of items
Halal supply chain adoption	*Halal* transportation adoption	Intention to adopt in *Halal* transportation services	Chen et al., (2011)	3
	Halal warehouse adoption	Intention to adopt in *Halal* warehouse services	Chen et al., (2011)	3

Since this study used a single source approach, common method variance (CMV) could be a serious issue for this study. Chang et al (2011) claimed that the CMV will create a false internal consistency, that is, an apparent correlation among variables generated by the common source. According to Podsakoff et al., (2003), common method biases could arise if the study uses the same respondents to answer the independent variable and dependant variable, a common measurement context, a common item context or characteristics of the items themselves. Therefore it is very crucial this issue should be solved before the data is analyzed. Podsakoff et al (2003) have outlined various techniques to remedy those issues, either before the data collection process and the post data collection process. The techniques are ;

1) Using different sources to answer the criterion and predictor variables.

2) Employ a number of procedural remedies in designing and administering the questionnaire, mixing the order of the questions, using different scale endpoints and format for predictor and criterion measures.

3) Complicated specifications of regression.

4) Using statistical remedies to detect and control for any possible common method variance problem.

Therefore, to overcome common method variance issue from occurred for this study, as a pre-data collection process, this study was used a different scale to measure independent variable and dependant variable. All variables for independent variable was measured with 5 point Likert scale (1 for, strongly disagree, and 5 for strongly agree). For the dependant variables, this study employed 7 point likert scale, (1 for strongly disagree, and 7 for strongly agree). Another approach that was taken based of the action proposed by them is jumble-up the predictor and criterion variables. Though, hopefully, the CMV is not a serious issue in this study. On the statistical part, to avoid the CMV, it will be explained in the analysis section in the next chapter.

4.4 QUESTIONAIRE

According to McCelland (1994), data collection using questionnaire has been recognized as an effective means of accumulating data from large samples. In addition

to that, it could be considered as the most common method applied in data collection (Clarke, 1999). Therefore, this study also used questionnaire as a toll for data collection. Sekaran, (2003) argued that questionnaire as a reformulated written set of questions to which respondents write their answers usually, within rather closely defined alternatives.

The questionnaire has four pages. The first page is a letter from researcher using university's mark explaining the purpose of data collection. Since there is no list of *Halal* manufacturers who are already adopting *Halal* transportation and *Halal* warehousing services, the questionnaire starts with the filtering questions, to find out whether they are already adopting those services. If the respondent claimed that they have already adopted both of them, the respondents are not qualified to be a respondent for this study. If the respondents claimed that, their company adopted only one of those services, the respondent is still valid to be a sample for this study, but only the part that their companies is not adopting yet.

After the filtering questions, the next section is about the respondents' personal information, organization information, and the last part is the Likert from 1-5 for independent variables, and 1-7 for dependant variables. It was anticipated that, 15-20 minutes are required for respondent to complete the questionnaire.

4.5 PRE-TEST

Before the data collection process from the survey, pre-testing the questionnaire is a vital step to be taken to ensure the items are capable to gather real information that are required to answer the research questions. It is an extremely useful tool which allows researchers to identify potential problems with the survey items or data collection protocols prior running the actual survey since it is conducted with one to one session with the respondent. According to Kumar et al. (2013), the purpose of pre-testing the questionnaire is to determine ;

a) Wording of the questions are correct to convey the same meaning to all the respondents.

b) Whether the questions have been placed in the right sequence.

c) Whether the questions are clearly understood by all classes of respondents.

d) Whether additional questions are needed or whether some questions or variable need to be eliminated

e) Whether the instructions to interviewers are clear and adequate.

4.5.1 Pre-Test Report

Pre-test was done during the *Halal* fest 2012 which was conducted at Putra World Trade Centre (PWTC) on the 10 of October. The instrument was thoroughly discuss with three respondents from different industries, different firm size, different race and gender. The purpose of the pre-test is to ensure the clarity of statements and comprehension of the construct measurement for the real respondents when the real data is going to be collected. Therefore, the sample of the pre-test was chosen from various characteristics since the real respondents also will have those characteristics. Table 4.2 demonstrate the characteristics of the respondents from the pre-test.

Table 4.2
Characteristics for the Pre-test respondents

Firm Size	**Multi National**	**Medium**	**Small**
Gender	Male	Male	Female
Race	Chinese	Malay	Malay
Industry	Food	Pharmaceuticals	Cosmetics
Position	Manager	Executive	CEO/Owner

In general, two respondents from Multinational and medium company completely answered the items within 20 minutes. Both of them could understand the context and the words used in the items. Based on this, the researcher assumed that, both of them do not any problems to understand and answer the items. In contrast, the last respondent possesses low qualification, and had difficulty to understand writing in English. Therefore, she needed longer time to complete the questionnaire. The researcher had to explain in Malay to ensure she understand the meaning of the sentences.

Interestingly, from this test, researcher found that, all of the respondents are not aware of the availability of *Halal* transportation and *Halal* warehousing services which can accommodate their requirement to use all *Halal* services for their products. Since they are not aware of those services, they cannot answer the items for compatibility variable. Due to this, they are still not adopting it yet, hence, they claimed that they cannot give their views on whether those services will be compatible to their business practices. Therefore, the researcher decided to dismiss the compatibility and replace it with the awareness. Appendix 1 demonstrates the results of the pre-test.

4.6 SAMPLING FRAME

The target respondents are the owner, director or senior managers who are considered as a top management of *Halal* manufacturers in Malaysia. The focus of this research is on consumer goods which are consist of three (3) *Halal* industries; foods, pharmaceuticals and cosmetics. These industries have been selected due to majority of the *Halal* manufacturers are from this industries. Data was to be collected from a population of *Halal* manufacturers that was taken from the HDC's website. According to the list there are 2,401 companies which are already awarded with *Halal* certificate. Since the list includes both local and international companies, and ranges from hotel and restaurant, food, beverage, pharmaceuticals, cosmetics and other *Halal* companies, the first step is to filter the list. The filtering process must be conducted in order to get the real population for *Halal* companies that are operated locally from those three industries. Among them, 1691 are from Food manufacturers, 195 from Pharmaceutical and 73 are from cosmetics industry. Therefore, even though the original list of Halal manufacturers included 2401 companies, but, after the filtering process, there are only a total of 1959 manufacturers which are entitled to be the population of the study. It is believed that the numbers is not only going to stop at that level. The number is believed to increase along with time since the applications for *Halal* certificate keep on growing day by day since manufacturers in Malaysia nowadays realized the importance of being a *Halal* manufacturer. At present, according to the HDC's website, there are 4142 companies which are already awarded with *Halal* certificate by JAKIM.

4.7 DATA COLLECTION PROCESS

Data collection could be executed in several ways. This study employed two approaches of data collection techniques, which are personally administered and via mail. Sekaran (2003) mentioned that, there are advantages and disadvantages of every method of the way the data is collected. For personally administered questionnaires, whereby the questionnaires were handed to the respondents, researcher could create a rapport with the respondent. Thus, it could motivate the respondent to answer the questions listed in the questionnaires. Furthermore, during this session, any doubt could be clarified at the moment it occurred. Beside it was the cheaper way to collect the data, it also will lead to the better rate of response rate.

Another approach that was used to collect the data for this study was through mail. It is suitable if the respondents are in the wide geographical area and it is not possible for researcher to reach them personally. Another advantages for this approach is, the respondents could take their own time to fill up the questionnaires, but most of the time, the response rate was quite low and need the researcher's effort to remind them about the questionnaires. Furthermore, research trend showed that it was very difficult to get a response if the data collection was via mail, so, to avoid lack of respondents for this study, researcher decided to use multi approaches to collect the data.

Since the population was not that big, researcher has tried to gather as much data as possible. The population for each category was also unequal, whereby *Halal* manufacturers from food industry were higher compared to Pharmaceuticals and cosmetics industries. Therefore, all manufacturers from both industries (Pharmaceuticals and Cosmetics) have been selected to become respondents for this study. In literature, data collection via mail has a low rate of return compared to other methods. For Malaysia, rate of return is around 10% - 20%. Therefore, data collection via Mail also was also adopted as a method for this study in order to increase the number of respondents.

There were three events that gathered *Halal* manufacturers and *Halal* industry players at the same place. The events were;

1) Penang International *Halal* Expo (PIHEC).

   Organized by Penang state government under its *Halal* facilitation agency in Penang, annually held early of the year (January or February) with below two hundreds participants either local of international.

2) Malaysian International *Halal* festival (MIHAS)

   Hosted and organized by Ministry of International Trade & Industry (MITI) and Malaysia External Trade Development Corporation (MATRADE) in Kuala Lumpur, annually held on April, with 400-500 participants every year either local or international *Halal* companies.

3) *Halal* Festival (Halfest)

   An expo Hosted by HDC, with Majlis Amanah Rakyat (MARA) as co-organizer with special cooperation with JAKIM in Kuala Lumpur, aimed to stimulate local *Halal* industry player before they go abroad. Halfest is the largest *Halal* expo in Malaysia with a nearly 600 exhibitors every year where majority of them are local manufacturers.

Data was collected during those two festivals that were held in Kuala Lumpur. These events were selected to conduct the data collection process since; both events had larger participants compared to the event that was held in Penang. Since both events clearly stated that, only *Halal* certified companies entitled to join those events, this conducted that both events were the most suitable places to collect the data for this study.

For data collection process at MIHAS 2013, which was held at Kuala Lumpur Convention centre (KLCC) on 13th – 16th April, 2013, there were five enumerators appointed to help the data collection process. It was due to the fact that the event was handled at six different Halls and the participants for this event were more than five hundred companies. The enumerators were selected by the researcher and they were second year female students studying Bachelor of Transportation program from Universiti Teknologi Mara, Puncak Alam, Selangor. All the enumerators were

researcher's ex-students during their diploma program. A thorough briefing with the enumerators to explain the questionnaires was held to ensure that they understand the contexts of study as a preparation if there were any questions asked to them during the data collection process. Since all of the enumerators already have a diploma in Logistic and Supply Chain, there was no problem for them to understand the items and the context of the study. Method of how to approach the potential respondents were briefed to ensure that the willingness of potential respondents to participate in this study. A ball pen with Universiti Malaysia Pahang logo was given as a gift to the respondents who managed to complete and return the questionnaires to the enumerators.

Even though there was a list of *Halal* manufacturers that are available, the actual number of *Halal* manufacturers who are already adopting *Halal* transportation and *Halal* warehousing services are still unknown. Since the study is looking at the intention to adopt, the respondents must be the Halal manufacturers who have not yet adopted the services. Therefore, a filter question was very crucial for this study to confirm that only the companies who are still not adopting those services are valid to be a respondent. After confirming that the potential respondents were still not adopting those services, the enumerators then gave them the questionnaires.

Enumerators were divided according to the hall to ensure there was no overlapping. A drop-off and collect method was applied in this research. Then, the completed surveys were collected by the representative after the respondents finished (Hair et al., 2003; Zikmund 2003). The advantage of this method is that it allows respondents to complete the questionnaire at their own time and convenience. Thus, respondents can take time to think and answer the questions and look for further information when necessary (Aaker and Day 1990; Emory and Cooper 1991). Furthermore, the purpose of the manufacturers to join the event is to sell and promote their products. Hence, there were respondents who were busy entertaining their clients. Therefore, to avoid them from forgetting to fill up the questionnaires, there were respondents who asked the enumerators to wait until they finished filling up the questionnaires. Some of them requested the enumerators to collect the questionnaires later. There were also respondents who were quite busy, but were still willing to participate to this study. They asked the enumerators to read for them, and they

informed the score for the items. This method is believed to help to stimulate interest of the respondents in completing the questionnaire through interaction between the representative and respondents (Hair et al., 2003). The process of distributing and collecting was held from morning until evening, from the first day until the last day of the event.

Even though there were more than five hundreds companies attended MIHAS 2013, not all of them were qualified to be a respondent for this study. This was due to the fact that not all of the exhibitors are *Halal* manufacturers. Exhibitors were from different *Halal* background such as service companies such as logistics providers, banking services, *Halal* bodies such as JAKIM and HDC, and many more. Therefore, self-administered approach was used to ensure the data could be collected as much as possible and to ensure only the valid companies could become respondents for this study. To ensure that there is no data overlapping in future, after the questionnaires were collected, the enumerators were asked to write the company's name at the questionnaires after they collected the questionnaires. This is also to ensure that, particular companies will be approached for the next data collection efforts. Before leaving the respondents booth, enumerators confirmed that the respondents answered all the items in the questionnaire. This precaution approach was done to avoid a missing data during the analysis stage later on. Since there was small number of population especially for pharmaceuticals and cosmetics industries, the companies that were already approached but not responded, or the answers cannot be used due to poor data quality, will be re-approach on the next data collection processes.

Out of the 150 questionnaires that were distributed, only 128 can be recollected. Another 22 respondents were reluctant to respond since the personnel who were qualified to answer the questionnaire was too busy entertaining their clients or did not attend the event. Out of 128 questionnaires retrieved, only 90 of them can be used as a data for this study. Another 38 respondents had to be discarded due to poor data quality such as a lot of missing values or the respondents responded in a straight line, or respondents who answered the questionnaires were not valid respondents. Since this study was limited to the top management level, the respondents who were not from this

category were not considered as a valid respondent and the questionnaires had to be rejected. The table 4.3 demonstrate the details about the data that has been collected during the MIHAS 2013.

Table 4.3
Number of respondents according to the industry for MIHAS

Industry	Approached	Responded	Useable
Food	100	90	68
Pharmaceuticals	33	27	11
Cosmetics	17	16	11
Total	150	133	90

Since the model of the study is quite complex, with nine independent variables, one moderating factor and one control variable, 90 respondents surely were good enough for this model. It was another six months before another *Halal* festival was conducted in Kuala Lumpur. On top of that, not all of *Halal* manufacturers have had a chance to join these events since the events only provided a limited number of space. Furthermore, it was not a free event. The exhibitors still need to pay the fee for the booths that were provided for them. Another reason was, due to geographical factor, it was quite impractical for SMEs from Perlis or Sabah and Sarawak to join this event. So, not all of *Halal* manufacturers had an equal chance to be a respondent for this study. As additional information, majority of the SMEs who joined this event were co-sponsored by state development, or by the SME Corporation. Thus, mail survey was used to add up the number of respondents for this study and to give an equal chance for every *Halal* manufacturer to be a respondent for this study.

There are 1959 *Halal* certified manufacturers for the Food, Pharmaceuticals and cosmetics industries. From more than 500 companies attended the MIHAS 2013, 150 Halal manufacturers were approached during the MIHAS 2013. It was noted from the past years records, 700 companies attended the Halfest, that was held in October every year. The combination of Halal companies attended MIHAS and Halfest just around 1300, and on top of that not all of them were Halal manufacturers. Though, to increase the numbers of respondents, researcher decided to mail 500 questionnaires to the Halal manufacturers who have not attended the exhibitions. Due to the high cost of mailing

the questionnaires, it was quite impossible to mail to all of the potential respondents. Though, it is believed that by adding another 500 potential respondents, sample from Pharmaceuticals and Cosmetics industry could be increased, since not all of them have an equal chance to attend the Halal festival due to several factors that have been explained before. The addresses of Halal manufacturers were available on the list provided at HDC's website, which made the process much easier. The total of *Halal* cosmetics companies are seventy three (73), Eleven (11) of them were responded during the data collection at MIHAS 2013. Since the number of *Halal* cosmetics manufacturers is small, another 62 *Halal* cosmetics manufacturers were selected to receive the mail. For *Halal* Pharmaceuticals, from a hundred and ninety five (195) companies, eleven (11) of them already completed the questionnaires during the MIHAS 2013. Half of the balance, (92 companies) were selected to receive the questionnaires via mail. Another 346 companies represented *Halal* food industry. The questionnaires were mailed on the 25th of April 2013. A cover letter explaining the study objectives and stamped return envelope were enclosed. Every envelope had a unique code to identify who they are. It was executed to ensure that there was no overlapping of data from the same respondent since another data was collected at Halfest later on. The codes are

i) F1-F346 for food industry,

ii) P1 – P92 for pharmaceuticals industry

iii) C1 – C62 for cosmetics industry.

Since the coding was established, once the respondents mailed back the questionnaires, it was very easy to identify which firm and from which industries the questionnaires belong to. This can confirm that, the companies that have already completed the questionnaires will not be approached again in the future. There was no reminder or follow up letter except for the letter was sent to them. Out of the 500 questionnaire mailed, only 70 completed and useable questionnaires were returned. All respondents were from the top level of management as required. The researcher started to receive the questionnaires within 35 days to 90 days. The table 4.4 indicate the summary for mail survey.

Table 4.4 :
Number of respondents according to the industry for Mail

Industry	Sent	Completely Returned	Rate of Return
Food	346	48	14%
Pharmaceuticals	92	8	1%
Cosmetics	62	14	23%
Total	500	70	14%

After two phases of data collection process, this study already has a total of 160 respondents. Even though the number of respondents were more than hundreds, but due to the model complexity and moderator variable present in the research framework, it was much better to have a bigger data to test the hypothesis. Large samples generally tend to produce more reliable solutions (Hair et al.,2006) and provide with a better effect size. Hence, the researcher decided to collect another data during the Halfest, 2013. Since the number of exhibitors for Halfest was larger than MIHAS, and it was more on local *Halal* industries players, to cope with the higher numbers of potential respondents, researcher recruited another three enumerators to collect the data during that exhibition. The enumerators were also from the same batch and course from the previous enumerators. A two-hour thorough briefing was held with enumerators to ensure they understand what the data collection was about. There was also a sharing session among the enumerators about what will happen during the real data collection process and what they should do if anything happened during the process.

Halfest 2013 was held on the 2nd – 6th October at Mines Exhibition Centre, Seri Kembangan Selangor, from 10 am to 9 pm. Based on the experience during MIHAS, data would not be collected on the last day of the exhibition. This is because on the last day, there were a huge number of visitors attending the event and the exhibitors were also extremely busy entertaining or promoting their products. This scenario made it quite impossible for exhibitors to participate in this study. So, the data collection process was only conducted on the 2nd to the 5th of October.

During the briefing session with the enumerators, the enumerators were given the list of companies that has been a respondent for this study, hence, should not be approached by them. Since the list of *Halal* manufacturers that are already adopting *Halal* transportation and *Halal* warehousing services were not available, they must

identify which companies should be selected to become a respondent for the study. Therefore self-administered survey was applied for this data collection. A drop-off and collect method had been re-applied in this data collection process. After confirming the approached companies which do not adopt *Halal* transportation and *Halal* warehousing services, enumerators dropped the questionnaires and collected at time that was pleasant to the respondents. To re-ensure there was no overlapping of data, again, the enumerators were told to write the companies name and industry during the retrieval of the questionnaires. Hence, this action ensured that the data from those particular companies was not be keyed in twice for this study.

A total of 245 questionnaires were distributed by eight enumerators for those four days. Out of 245 questionnaires distributed, 233 questionnaires were collected. Out of 233, only 184 set of questionnaires can be used as a data to be analysed. Another 49 questionnaires had to be discarded due several reasons such as poor data quality and invalid respondents. Another 15 questionnaires cannot be retrieved due to the exhibitors were too busy or the right person did not attend the exhibition. Table 4.5 below illustrated the results of the data collection for Halfest 2013.

Table 4.5
Number of respondents according to the industry for Halfest

Industry	Approached	Responded	Useable
Food	164	156	133
Pharmaceuticals	47	45	21
Cosmetics	34	32	30
Total	**245**	**233**	**184**

Table 4.5 above demonstrated the number of *Halal* manufacturers that was approached during Halfest 2013. Due the increase in numbers of enumerators, the number of data collected also increased. Furthermore, five out of eight enumerators already experienced the data collection process during MIHAS 2013. Therefore the number of respondents could be approached also increased compared to the respondents for MIHAS. As expected, the number of respondents for food industry dominated

compared to other industries. Unfortunately, the number of useable data for pharmaceuticals industry was lower than respondent for cosmetics industry even though the number of companies approached was higher for pharmaceuticals industry compared to cosmetics industry.

4.8 SAMPLE SIZE

Overall, there are 344 data that could be used from three series of data collection to be a sample size for the study. Table 4.6 demonstrates the total respondents according to data collection process and industries.

Table 4.6
Total of respondents according to the industry

Data \ Industry	Food	Pharmaceuticals	Cosmetics	Total
MIHAS	133	21	30	184
Mail	48	8	14	70
HALFEST	68	11	11	90
Total	249	40	55	344

As expected, respondents from food industry would be the majority since the population of *Halal* manufacturers fall within this category. Interestingly, *Halal* cosmetics had a bigger representative compared to the *Halal* Pharmaceuticals eventhough the total number of *Halal* pharmaceuticals are bigger than *Halal* cosmetics.

Another common sample size consideration is 10 times rules by Barclay et al., (1995). According to them, sample must be 10 times the largest number of structural paths directed at a particular construct in the structural model, which 11 for this study. Hence, based on that, 110 samples size are required to test the model for this study. Hair et al., (1998) claimed that 100 is the minimum sample size if SEM is applied to test the hypotheses. Another method that commonly applied while adopting SEM is determining the sample size based on power of analysis by Green (1991). According to Green (1991), The sample size for this technique is according the number of predictors with three effect sizes, small, medium and large. It is common practice to use the

medium effect size to determine a good number of respondents for the study. According to the Green (1991) table, if the number of predictor is equal to 15, with the medium effect size, the study needs to have at least 138 respondents.

Another method to confirm the adequacy of sample size is using a prospective priori analysis. The prospective power analysis which is also known as a priori power analysis is able to estimate sufficient sample sizes to achieve adequate power for the study. In order to assess the adequacy of sample size of large complex models, the priori power analysis should be conducted on the portion of the model with the largest number of predictors (Chin and Newsted, 1999). With 15 predictors, at medium effect size (0.15), 0.05 confidence level, with 80% power as proposed by Gefen et al., (2011), the priori power analysis with G Power software has indicate that the number of adequate respondents for the study are 139. (Refer appendix 2). Furthermore, literature also suggests that statistical power calculation are required to determine sample size adequacy (Marcoulides and Saunders, 2006). If all of above methods are being considered, with 344 data collected, it can be considered that the sample size is not a problem for this study.

4.9 STATISTICAL TOOLS AND DATA ANALYSIS APPROACHES

This study employs three statistical softwares to run the analysis for this study. Statistical Package for Social Science (SPSS) version 22 has been used to analyse the data at the preliminary stage. Smart Partial Least Squares (PLS) to test the hypothesis and G-Power to test the power of analysis. According to Zikmund (2003), this software is widely used by researchers to analyse the data. Besides using for demographics analysis, this software also been used to test the common method bias.

Once completing the profile of the respondents analysis, for the purpose of reliability, validity, hypotheses testing, effect size and predictive relevance, structural estimation modelling (SEM) with PLS has been applied to run the analysis. Since this study has two endogenous variables, to test the relationship simultaneously, SEM is the best approach that should be applied. According to Hair et al., (2014), SEM is a second generation multivariate data analysis technique. Multivariate data analysis involves the

application of statistical methods that simultaneously analyse multiple variables representing measurements for various categories such as events, activities, situation and so forth. SEM can be used to either explore or confirm the theories. SEM is used to measure relationship between latent variables. When mentioning about SEM, there two types of SEM which are;

a) Covariance Based SEM (CB SEM), mostly using AMOS.
b) Variance Based SEM (VB SEM), mostly use partial Least Square (PLS)

Each approach has its own requirements to be fulfilled to ensure those approach are suitable with the research objectives and research framework. According to Hair et al., (2014) CB-SEM is more suitable if;

a) The goal is to test the theory confirmation or comparison of alternatives theories.
b) Error terms require additional specification, such as covariation.
c) The structural model has non-recursive relationships
d) The research requires a global goodness of fit.

Hair et al., (2014) also proposed to use SEM-PLS if;

a) The goal is predicting key target constructs or identifying key driver constructs.
b) Formatively measured are part of the structural model
c) The structural model is complex with many constructs and many indicators. The model with seven constructs already can be assumed as a complex model.
d) The sample size is small and the data are not required to be normally distributed.

In addition to Hair et al., (2014),Barclay et al., (1995) argued that Covariance-based SEM is best used for theory testing and development. Conversely, variance based SEM is suitable for causal predictive analysis especially in the condition of high complexity and low theoretical information (Barclay et al., 1995). Since the research objectives are an exploratory study, though PLS- SEM is a suitable approach (Peng and Lai, 2012). One of the objective of the study is to rank which variables are having the most predictive power of the exogenous on the endogenous, though, this scenario makes the PLS a potentially appropriate analysis tool (Peng and Lai, 2012). For the complexity issue, Hair et al., (2014), claimed that 7 constructs also could be considered as a complex model. But for this study, there are eleven exogenous and two endogenous to be tested. Hence, it is clear that the PLS-SEM is the most suitable software to be applied on this study. Furthermore, (Peng and Lai,

2012) proposed that researcher should consider PLS when the research model is extremely complex and could could lead to estimation problems in CB-SEM.

Since the study is on exploratory mode and theory development, has eleven endogenous constructs, which can be considered as a complex model, testing for predictive purposes to find which variable has more power on the model, variance Based SEM, with PLS software is the best tool to test the relationship between variables in the research model.

For the SPSS, beside the descriptive analysis, missing value analysis using Expected Maximization (EM) was also run by this software. Chi Square test will be run to confirm either the data is missing at random or not. Analysis of Variance (Anova) test will be performed to test the differences among variables.

There are many tests that will be run using the PLS software. Firstly to test the discriminant and convergent validity. After confirming the validity has been met to further analysis, hypothesis testing will be run using bootstrapping procedure. Blindfolding procedure will be used to test the effect size analysis. The last software will be used to the study, is G-power software to determine the power of analysis of the study. There are two types of power analysis which is priori and post-test power analysis. The details of the analysis will be explained on the next chapter.

4.10 SUMMARY

This chapter detailed the methods used in this research, including the research design, instrument development, pre-test, data collection processes and the justification of software used in this study. Data analyses and results will be discussed in the next chapter.

CHAPTER 5

ANALYSIS AND FINDINGS

5.1 INTRODUCTION

This chapter explains the analysis conducted and presents the empirical results to test the hypothesis developed earlier. Consist of twelve (12) main sections, from the introduction, preliminary data analysis until summary of the analysis. For the preliminary data analysis, since data was collected by dual methods and three times, Anova test must be run before the data could be combined. Since the data collected via mail has a missing value less than 5%., Missing value analysis also has to been run to ensure the data is missing completely at random (MCAR).

After finishing the process of preliminary data analysis, demographics analysis will demonstrate the profile of the respondents. This study will adopt the two-steps analytical procedure proposed by Anderson and Gerbing (1988). Hair et al., (2006) argue that the two –steps approach is better than one step approach because it confirms that good constructs measures are represented in the valid structural model. Step one is a measurement model which involves the assessment of measurement model which has the convergent and discriminant validity. After confirming those validities, step two proceeds with the structural model which hypothesis will be tested. The bootstrapping procedure with 500 resamples follows the procedure mentioned by Chin (1998) to determine the significant level of loadings, weight and path coefficients. Following that, since the study used a single source data, therefore, common method variance should also be confirmed as not a problem for this study. Even though the procedural approach to reduce the common method variance has been taken earlier, statistical confirmation is still necessary to confirm that common method variance is not a problem for this study.

Section seven reports the results of structural model to test the hypothesis of the study. After reporting the results for hypothesis testing, it would not be complete without reporting the effect size analysis. Hair et al., (2014) claimed that the effect size analysis must be reported since PLS-SEM is used for prediction. By reporting the effect size analysis, the researcher could identify the most important variables among variables studied. The last analysis using PLS-SEM is the using blindfolding procedure for assessing the predictive relevance (Q^2 value) of the path model. Before closing with the chapter summary, G power analysis is used to describe the power of the analysis for the research framework.

5.2. PRELIMINARY DATA ANALYSIS

Since Smart PLS 2 cannot be run if there is a missing value in the data, preliminary data analysis was conducted to ensure there is no missing value in the data file.

5.2.1 Missing Value Analysis

Since there is a missing value for the data that was collected via mail, the missing value must be treated before running further analysis. According to Cohen and Cohen (1983), missing data up to 10 percent is not large and unlikely to be problematic to interpret the result of the studies. Furthermore, lately, simulation studies found that up to 25 percent of missing data is acceptable provided that the data is not missing in any systematic pattern. In these circumstances, Full Information Maximum Likelihood (FIML) estimation or the Expectation Maximisation (EM) algorithm contained within the missing values analysis in SPSS may be used to impute missing values. The other method can be used is Expectation Maximization (EM). The EM method is an iterative processing which all other variables relevant to the construct of interest are used to predict the values of the missing variables. According to Monte Carlo experiments Graham et al.,(1997), the EM method of data imputation was far more consistent and accurate in predicting parameter estimates than methods such as list-wise deletion, which was highly variable, and mean substitution, which consistently underestimated

values. Under most circumstances EM and FIML generate identical parameter estimates. The EM analysis in SPSS also generates Little's MCAR (Missing Completely At Random) χ^2 statistic and if this statistic is not significant, the missing data may be assumed to be missing at random.

For this study EM is adopted to solve the missing value problem. Result for MCAR test with Chi-Square : 577.344, df : 588 and sig : 0.615. This indicates that the data collected via mail is missing completely at random and EM is the possible choice to run the missing value imputation.

5.2.2 Anova

Small number of respondent is a common issue if the study is looking at the organizational level. Peng and Lai (2012) mentioned about the difficulty of obtaining large data in an operation management or supply chain studies since it looks at the phenomenon at the organizational level. To overcome those issues, this study ran the data collection at the times and using dual methods; self-administered survey at MIHAS 2013 and Halfest 2013, and via mail. Since the data was collected at different time, to ensure there are no differences among the data, a one way Anova test has been conducted. Table 5.1 illustrates the details of the test.

The result for one way Anova test shows that there are mix results for the differences among the data that was collected by those methods. From twelve (12) tested variables, four (4) of them which are cost, readiness, intention to adopt *Halal* transportation and intention to adopt *Halal* warehousing variables were found there are no statistical differences among them, and another eight (8) which are awareness, complexity, competitive pressures, customer pressures, government support, perceived benefits, supplier and top management attitude were found there are statistical differences among them. Therefore, at this point, the data from MIHAS, mail and Halfest still could not be merged as one set of data to be tested in this study. Table 5.2 below shows the differences between the groups of data.

Table 5.1 :
Analysis of variances

		df	Mean Square	F	Sig.
Awareness	Between Groups	2	4.974	4.883	.008
	Within Groups	341	1.019		
	Total	343			
Complexity	Between Groups	2	12.728	11.154	.000
	Within Groups	341	1.141		
	Total	343			
Comp_Press	Between Groups	2	18.925	18.454	.000
	Within Groups	341	1.026		
	Total	343			
Cost	Between Groups	2	2.141	1.671	.190
	Within Groups	341	1.282		
	Total	343			
Cust_Press	Between Groups	2	14.499	13.517	.000
	Within Groups	341	1.073		
	Total	343			
Govt_Support	Between Groups	2	4.524	4.221	.015
	Within Groups	341	1.072		
	Total	343			
Int_Transport	Between Groups	2	.883	.475	.622
	Within Groups	341	1.858		
	Total	343			
Int_Warehouse	Between Groups	2	.424	.242	.785
	Within Groups	341	1.750		
	Total	343			

Table 5.1 continue

		df	Mean Square	F	Sig.
Perc_Benefit	Between Groups	2	10.640	11.534	.000
	Within Groups	341	.923		
	Total	343			
Readiness	Between Groups	2	2.032	3.056	.048
	Within Groups	341	.665		
	Total	343			
Supplier	Between Groups	2	17.126	14.118	.000
	Within Groups	341	1.213		
	Total	343			
TMA	Between Groups	2	6.385	7.004	.001
	Within Groups	341	.912		
	Total	343			

Table 5.2 :
Multiple comparison

Dependent Variable		**Data**		**Mean Difference**	**Std. Error**	**Sig.**
Awareness	Tukey HSD	Mihas	Mail	-.312	.161	.130
			Halfest	-.40382*	.130	**.006**
		Mail	Mihas	.312	.161	.130
			Halfest	-.092	.142	.792
		Halfest	Mihas	.40382*	.130	.006
			Mail	.092	.142	.792

Table 5.2 : Continued

Dependant Variable Category	Data	Mean Difference	Std. Error	sig		
Complexity	Tukey HSD	Mihas	Mail	.169	.170	.583
			Halfest	.60709*	.137	.000
		Mail	Mihas	-.169	.170	.583
			Halfest	.43830*	.150	.010
		Halfest	Mihas	-.60709*	.137	.000
			Mail	-.43830*	.150	.010
Comp_Press	Tukey HSD	Mihas	Mail	.008	.161	.999
			Halfest	.66866*	.130	.000
		Mail	Mihas	-.008	.161	.999
			Halfest	.66033*	.142	.000
		Halfest	Mihas	-.66866*	.130	.000
			Mail	-.66033*	.142	.000
Cost	Tukey HSD	Mihas	Mail	.185	.180	.563
			Halfest	.266	.146	.162
		Mail	Mihas	-.185	.180	.563
			Halfest	.082	.159	.865
		Halfest	Mihas	-.266	.146	.162
			Mail	-.082	.159	.865
Cust_Press	Tukey HSD	Mihas	Mail	-.66402*	.165	.000
			Halfest	-.65926*	.133	.000
		Mail	Mihas	.66402*	.165	.000
			Halfest	.005	.145	.999
		Halfest	Mihas	.65926*	.133	.000
			Mail	-.005	.145	.999
Govt_Support	Tukey HSD	Mihas	Mail	-.068	.165	.910
			Halfest	-.35169*	.133	**.023**
		Mail	Mihas	.068	.165	.910

Table 5.2 Continued.

			Halfest	-.283	.145	.127
		Halfest	Mihas	.35169*	.133	.023
			Mail	.283	.145	.127
Int_Transport	**Tukey**	**Mihas**	**Mail**	**-.115**	**.217**	**.856**
	HSD		Halfest	-.171	.175	.593
		Mail	Mihas	.115	.217	.856

*. The mean difference is significant at the 0.05 level.

Among eight (8) variables that were to have significant differences among them, all data that collected from Halfest was significantly different compared to the data that was collected during Mihas. While comparing the data from Halfest to mail data, only six (6) of them were statistically significant. Since it is important to the analysis to have a bigger data, though, effect size analysis using Eta squared has to be done to confirm either the significant differences among those data has a small, medium or large effect sizes. Effect size analysis can be explored to see whether the impact of a particular independent latent variable on a dependent latent variable has substantive impact (Chin, 2010). Eta squared is one of the common techniques to determine the effect size. Eta squared represents the proportion of variance of the dependent variable that is explained by the independent variable (Pallant, 2001).

To look at the effect size analysis, measurement developed by Cohen (1988) which proposed that 0.02, 0.15 and 0.35 respectively represent small, medium and large effect sizes will be referred to. According to the table 5.3, all of the variables that are statistically significant only have a small effect size. Therefore, since the effect sizes were small, differences may occur by chance. Therefore, the data from MIHAS, via mail and Halfest still could be merged as one set of data to test the hypothesis developed in this study.

Table 5.3 :
Effect size analysis

Measures of Association			
	Eta	Eta Squared	Effect size
Awareness * Data collected	.167	.028	Small
Complexity * Data collected	.248	.061	Small
Comp_Press * Data collected	.313	.098	Small
Cust_Press * Data collected	.271	.073	Small
Govt_Support * Data collected	.155	.024	Small
Perc_Benefit * Data collected	.252	.063	Small
Supplier * Data collected	.277	.076	Small
TMA * Data collected	.199	.039	Small

5.3 COMMON METHOD VARIANCE

Common method variance refers to variance attributable to measurement method rather than to the construct or constructs purportedly represented by the measures. (Campbell and Fiske,1959; Podsakoff et al., 2003). It is the amount of spurious correlation between variables that is created by using the same method, usually in a survey while trying to measure each variable for the study. Since it will lead to a problem for the study by inflating the result, therefore, common method variance should be address before the data can be analyzed to the next level. If CMV is a problem for the study, it will reflect the validity of study. According to Podsakoff et al., (2003), method biases are a problem because they are one of the main sources of measurement error. Bagozzi and Yi, (1991); Nunnally, (1978) and Spector, (1987) claimed that the measurement error threatens the validity of the conclusions about the relationships between measures and is widely recognized to have both a random and a systematic component.

According to Podsakoff et al., (2003), common method variance needs to be examined when data are collected via self-reported questionnaire and, in particular both the predictor and criterion variables are obtained from the same person. On top of that,

Podsakoff and Todor (1985) already mentioned that invariably, when self-reported measures obtained from the same sample are utilized in research, concern over same-source bias or general method variance arise. As discussed by Podsakoff et al. (2003), method biases can be at least partially controlled either procedurally or statistically using a variety of techniques. For the procedural remedy, it was explained in the research methodology which is before the data was collected. Although there are so many actions that could be utilized, this study applied two applicable actions which are;

a) Use different scale end points for the predictor and criterion measures.
b) Counter balance the order of the measurement of predictor and criterion variables.

Although the procedural remedy was taken by carefully design the study's procedures, it can only minimize and not totally eliminate the common method variance problem. (Podsakoff et al., 2003). If procedural control needs to be taken prior to the data collection, statistical remedies is done after the data is gathered. To ensure that common method variance will not affect the study's results, literature also suggested the use of one of four statistical remedies that are available. The four statistical remedies that were mentioned by Podsakoff et al., (2003) are;

1) Harman's single-factor test.

   The most commonly used technique that has been used by researchers to address the issue of common method variance. (Podsakoff et al., 2003). This technique will load all variables used in the study into an exploratory analysis (Anderson & Bateman, 1997; Aulakh and Gentuck, 2000; Greene and Organ, 1973) and examine the unrotated factor solution to determine the number of factors that are necessary to account for the variance in the variables. Common method variance is a problem when;

   i) A single factor emerges from the factor analysis, or
   ii) One general factor will account for the majority of the covariance among the measures. (Podsakoff et al., 2003).

2) Partial correlation method.

This method has been proposed by Podsakoff and Organ (1986). It can be executed by adding the first principal component as the control variable on all dependent variables. If the addition of this factor does not has significant variance change in any of the dependent variables, this suggest that no substantial common method bias.

3) Lindell and whitney (2001) marker variable

Another partial correlation technique that has been proposed is the use of marker variable to control for common method biases. According to Lindell and Whitney (2001), if a variable can be identified on theoretical grounds that should not be related to at least one other variable include in the study, then it can be used as a marker variable in that any observed relationships between it and any other variables can be assumed to be due to common method variance. If the correlation between any of the principal constructs and this marker variable is substantial ($r > 0.3$), then this would be indication of a common method bias.

4) Correlation matrix.

The last technique has been proposed by Podsakoff et al., (2003) is the correlation matrix. This technique will be focused at the principal constructs inter-relation using the correlation matrix. According to Bagozzi et al., (1991), if any of the correlations are substantially large, ($r > 0.9$), that is an indication of a common method bias is a problem for the study.

Table 5.4 :
Total variance explained according to variables

Component	**Initial Eigenvalues**			**Extraction Sums of Squared Loadings**		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.7	38.8	38.8	4.7	38.8	38.8
2	1.7	14.0	52.7	1.7	14.0	52.7
3	1.4	11.7	64.5	1.4	11.7	64.5
4	0.9	7.1	71.6	0.9	7.1	71.6

Table 5.4 Continued.

5	0.7	5.6	77.2	0.7	5.6	77.2
6	0.6	5.1	82.3	0.6	5.1	82.3
7	0.5	4.2	86.5	0.5	4.2	86.5
8	0.5	4.1	90.6	0.5	4.1	90.6
9	0.4	3.4	94.0	0.4	3.4	94.0
10	0.3	2.9	96.9	0.3	2.9	96.9
11	0.3	2.3	99.2	0.3	2.3	99.2
12	0.10	0.79	100	0.1	0.8	100

Since this study employs a single source data, there is a probability for common method problem to arise in this study. As proposed by Podsakoff et al., (2003), Harman's single-factor test is most widely used in the behavioral research; this study will also do the same. Table 5.4 above shows that the unrotated factor analysis indicates the first factor explained only 38.8% of the total variance explained. Podsakoff and Organ (1986), Podsakoff et al., (2003) mentioned that common method variance is problematic if a single latent factor would carry the majority of the explained variance. Those scenarios did not occur for this study as the first factor only cover 38.8% from the total of variance explained. Hence, it is evident that common method bias is not a problem for this study.

5.4. PROFILE OF COMPANIES

The descriptive analysis of the research instrument revealed the characteristics of the sample with regard to intention to adopt *Halal* transportation and *Halal* warehousing services according to the industry, firm size, organization characteristics, demographics and the variables that could act as barriers or enablers to the adoption. The next section will describe the profile of the companies according to their industries and the overall companies involved in this study. Table 5.5 below has the details.

Table 5.5
Companies profile according to industry

		Type of industry						Total		χ^2	
		Foods		Pharmaceuticals		Cosmetics					
		n	%	n	%	n	%	n	%	χ^2	p
Established in the industry	< 3 years	54	21.9	9	21.4	5	9.1	68	19.8	22.04	0.001
	3.1 - 6 years	74	30	16	38.1	21	38.2	111	32.3		
	6.1- 9 years	27	10.9	4	9.5	17	30.9	48	14		
	> 9 years	92	37.2	13	31	12	21.8	117	34		
Has own t'sport	Yes	192	77.7	29	69	39	70.9	260	75.6	2.242	0.326
	No	55	22.3	13	31	16	29.1	84	24.4		
Numbers of *Halal* Products	1-2	31	12.6	8	19	2	3.6	41	11.9	6.605	0.359
	3-4	51	20.6	7	16.7	11	20	69	20.1		
	5-6	41	16.6	5	11.9	11	20	57	16.6		
	> 7	124	50.2	22	52.4	31	56.4	177	51.5		
Firm Size	Micro	41	16.6	8	19	9	16.4	58	16.9	0.501	0.998
	Small	159	64.4	26	61.9	35	63.6	220	64		
	Medium	19	7.7	4	9.5	5	9.1	28	8.1		
	Multi	28	11.3	4	9.5	6	10.9	38	11		
Total		**247**	**100**	**42**	**100**	**55**	**100**	**344**	**100**		

5.4.1 Profile of Food Companies

There are 247 companies from *Halal* food industry involved in this study. This represents 71.8% of the total respondent for the study. Among the food companies respondents, the majority of them which consist of 37.2% have been established more than 9 years in the industry, 30% already established between 3.1- 6 years, 21.9% established within 3 years and the last group that established within 6.1-9 years consist of 10.9 of the respondent in *Halal* food companies. 192 companies (77.7%) and 176 (71.3%) of them claimed that they have their own transport and warehouse respectively to carry and store their goods until delivered to their destinations. 124 companies (52.4%) are producing more than 7 products, 51 or 20.6% are producing 3-4 products

and 41 companies or 16.6% are manufacturing 5-6 products to the *Halal* goods consumers. Interestingly, there are 31 companies or 12.6% of *Halal* food companies which only have not more than two products but still can survive in this business. Lastly, most of *Halal* foods companies are small. This category represents the 64.4% of the respondents for *Halal* food companies. Micro size companies with 16.6%, multinational companies, 11.3% and the least of them are from the medium size company that consist of 7.7% from the *Halal* food respondents for this study.

5.4.2. Profile of Halal Pharmaceuticals Companies

A total of 42 companies from the *Halal* pharmaceuticals companies were willing to be the respondents for this study. This represents 12.2% of the total respondents for the study. Among the respondents from pharmaceuticals companies, the majority of them which consist of 38.1% which are already established within 3.1-6 years in the industry, 13% which are already established for more than 9 years, 9% of them were established within 3 years and the last group that established within 6.1-9 years consist of 9.5% of the respondent in *Halal* food companies. 29 companies (69%) of them claimed that they have their own transport to deliver their products, whereby 30 (71.4%) of them also claimed that they have their own warehouse to stored their goods until delivered to their destinations. 22 companies (52.4%) are producing more than 7 products, 8 or 19% are producing not more than 2products, 7 companies or 16.7% are manufacturing 3-4 products to the *Halal* goods consumers and 5 of them (11.9%) are producing 5-6 products to the *Halal* market . Lastly, most of *Halal* pharmaceuticals companies which are involved in this study are small. This category represents the 63.6% of the respondents for *Halal* pharmaceuticals companies. Micro size companies with 16.4%, multinational companies, 10.9% and the least of them are from the medium size company that consist of 9.1% from the *Halal* pharmaceuticals respondents for this study.

5.4.3 Profile Of Cosmetics Companies

Among the three industries involved in this study, *Halal* cosmetics company has the smallest number of population, but for this study, the number of *Halal* cosmetics companies are larger than *Halal* pharmaceuticals respondents. From the total of 72 companies listed by JAKIM as *Halal* cosmetics companies, the study managed to get 55 of them, which represent 74% of the *Halal* cosmetic population. The Respondent from *Halal* cosmetics represents 15.9% of the total respondent for the study. As respondents from *Halal* pharmaceuticals, the majority *Halal* cosmetics companies established in the industry in 3.1-6 years (38.2%). 30.8% were already established between 6.1-9 years, 21.8% of them already exist for more than 9 years and 9.1% of them only joined the industry for less than three years. From those 55 companies, 70.9% or 39 companies claimed that they have their own transport to handle their own *Halal* products, and 63.6% or 35 of them also claimed that they also have their own warehouse. Equal to the respondents from other *Halal* industries, the majority of the companies in *Halal* cosmetics have more than seven *Halal* products that produced from their companies (56.4%). For the companies who have 3-4 products and 5-6 products, each category has 20% representatives in this study, and for the company who has not more than 2 products, they have 3.6% representatives for the study. On the last characteristics, most of *Halal* cosmetics companies are small. This category represents the 63.6% of the respondents for *Halal* cosmetics companies. Micro size companies with 16.4%, multinational companies, 10.9% and the least of them are from the medium size company that consist of 9.1% from the *Halal* food respondents for this study.

5.4.4 Profile Of Overall Companies

Table 5.5 summarizes the profiling of the companies that took part in this study. As expected, since the majority of the population were from the *Halal* food manufacturers, the majority of the respondents were from this category. Even though the numbers of *Halal* Pharmaceuticals companies are higher than *Halal* cosmetics, but the numbers of *Halal* Pharmaceuticals companies that were willing to join this study are lesser than companies from *Halal* cosmetics. In total, 71.8% of the companies are from

Halal food industry, 12.2% from the Pharmaceuticals and 15.9% are from the cosmetics industry.

The majority (34%) of the firms were established more than nine years in the market. This is similar with the companies from foods industry, but for the Pharmaceuticals and cosmetics industries, most of them were established between 3.1-6 years, and this category consist of 32.3% of the companies involved in this study. For other categories, 19.8% were established less than three years and the 14% were established within 6.1-9 years.

In term of owning own transportation and warehouse, more than three quarter (75.6%) of them claimed that they already have their own transport and 70.1% of them also have their own Warehouse to deliver their products to their destinations and to store their finished products.

More than half (51.5%) of the companies are manufacturing more than seven *Halal* products to be consumed by *Halal* consumers. This situation is represented by the characteristics for all *Halal* industries whereby 50.2% (Foods), 52.4% (Pharmaceuticals) and 56.4% (Cosmetics) are producing more than seven products to the *Halal* market. 20.1% of all companies are producing 3-4 products, 16.6% are manufacturing 5-6 products and only 11.9% of them are producing not more than two products.

In term of size, 64% of them are from small organizations Companies from each category of industry also have the same characteristics whereby the majority of companies in respective industry also fall under this size. 64.4% (Foods), 61.9% (Pharmaceuticals) and 63.6% (Cosmetics). Interestingly, micro size organization represents the second largest portion for this study (16.9%), and the third is from the multinational (11%) and the least of them are from the medium size organization (8.1%).

To conclude whether the samples are different across the industries, Chi square ($\chi^{2)}$ analysis has been conducted. From 5 variables regarding the company's characteristics, only one variable shows that that might be a different between data collected across the industry. For the duration that firm's has been established in the industry, with χ^2 =, 22.04, df = 6, p = 0.001, it is clearly indicating that there is a difference in terms of the firm's size among the industry.

The χ^2 analysis has shown that there is no significant differences for other factors of the characteristics of the companies. Even though in terms of frequency of companies which have their own transportation (260, yes, 84, no) and warehouse (241, yes, 103, no) it shows that there are differences, but the differences were not statistically different. With the χ^2 =, 2.242, df =4, p = 0.326 for having own transportation and χ^2 = 1.288, df =4, p = 0.525, the results shows that there were no statistical difference for the data across the industries. This is also the same case for the numbers of *Halal* products they produced and the size of the firm across the industries. χ^2= 6.605, df =6, p = 0.359 and χ^2 = 0.501, df =6, p = 0.998 respectively for the numbers of *Halal* products and the firm sizes, even in term of frequency shows that there were differences among them, but there is not enough evidence to conclude that there were statistically differences among them for this data set.

5.5 PROFILE OF RESPONDENTS

Since the top management attitude is treated as a moderating factor of the study, therefore, not everybody could be a respondent for the study. To ensure the validity of the information collected, the study restricted and ensured that the respondent must hold a higher level position at the company. Experience in the industries is also important factor to be considered along demographics factors, gender, religion and race are also important factors to be revealed for this study. Next to this, all those elements will be explained according to the industries and overall of the respondents.

Table 5.6:
Respondent profile according to industry

		Foods		Pharma ceuticals		Cosmetics		Total	
		N	%	n	%	n	%	n	%
Position in the company	CEO/Owner	35	14.2	4	9.5	11	20.0	50	14.5
	Manager	81	32.8	15	37.5	14	25.5	110	32
	Executive	106	42.9	19	45.2	24	43.6	149	43.4
	Supervisor	25	9.5	4	9.5	6	10.9	35	10.1
Experience	1-4 years	171	69.2	27	64.3	36	65.5	234	68
	5-8 years	51	20.6	9	21.4	12	21.8	72	20.9
	9-12 years	14	5.7	5	11.9	5	9.1	24	7
	13 years above	11	4.5	1	2.4	2	3.6	14	4.1
Gender	Male	119	48.2	22	52.4	25	45.5	166	48.3
	Female	128	51.8	20	47.6	30	54.5	178	51.7
Religion	Islam	215	87.1	34	81	52	94.5	301	87.5
	Buddha	20	8.1	7	16.7	2	3.6	29	8.4
	Hindu	2	0.8	1	2.4	-	-	3	0.9
	Cristian	7	2.8	-	-	1	1.8	8	2.3
	Others	3	1.2	-	-	-	-	3	0.9
Race	Malay	208	84.2	33	78.6	48	87.3	289	84
	Chinese	31	12.6	7	16.7	2	3.6	40	11.6
	Tamil	2	0.8	1	2.4	0	0	3	0.9
	Bumiputra	5	2	1	2.4	2	3.6	8	2.3
	Others	1	0.4	0	0	3	5.5	4	1.2.
	Total	**247**	**100**	**42**	**100**	**55**	**100**	**344**	**100**

5.5.1 Respondents Profile For Halal Foods Companies

The only person who is qualified to answer the items in the study are Chief Executive Officer (CEO) or the owner of the companies (for SME), Manager, Executive and the lowest position could be considered is at the supervisory level. The majority of the respondents are from the group of executives (42.9%). The second largest group of respondent are from managerial level (32.8%). Then the CEO or owner of the companies (14.2%) and the smallest group is from the supervisory level.

In term of the experience, majority of them (69.2%) possessed experience between 1-4 years in the industry. 5-8 years experience (20.6%) become the second

dominant group of the respondents. With 5.7% of the respondents for *Halal* food companies, belonging to 9-12 years of experience top management level, this group is the third largest group and the smallest group (4.5%) is from the people who have more than 13 years of experience in *Halal* industry.

For the demographic factors, female respondents (51.8%) were slightly higher than male respondents (48.2%). Most of them are Muslims (87%). Buddhists (8.1%) and other religions only represent a small portion of them. As expected, Malay (84.2%) was the majority race of the respondents against other races. Chinese is the second position with 12.6% of the *Halal* food respondents. The other details are displayed at the table 5.6.

5.5.2 Respondents Profile For Halal Pharmaceuticals Companies

As mentioned before, there are 42 *Halal* Pharmaceuticals companies involved in this study. For them, 45.2% were responded by people at the executive level, which act as a majority for this group, 37.5% represented by managers, 14.2% were represented by both categories; CEO or owner and person at the supervisory level. For the experience factor, similar with the respondents from *Halal* food industry whereby the majority of the respondents (64.3%) are from the least experienced group (1-4 years). 21.4% of them have experience within 5-8 years, 11.9% 9-12 years whereby only 2.4% of them have more than 13 years of experience in *Halal* industry.

Opposite to *Halal* foods respondents, the majority of the respondents for *Halal* Pharmaceuticals industry are male. But, male respondents (52.4) are only just slightly higher than female respondents (47.6%). Similar to the *Halal* food respondents, most of the respondents are Muslims (81%), and Malay (78.6%). Buddhists (16.7%) and Chinese (16.7%) were at the second position for both religion and race respectively. Other religions and races only have a small portion of sample for this industry.

5.5.3 Respondents Profile For Halal Cosmetics

Respondents from *Halal* cosmetics indicated the same trend as *Halal* foods and *Halal* pharmaceuticals respondents. The majority of the respondents (43.6%) were from the group of executive level, manager at the second position (25.5%), CEO or owner (20%) and the last group also from the supervisory level (10.9%). Also similar to other *Halal* industries that were involved in this study, 65.5% of the respondents are still fresh in the industries, since they only have experience within 1-4 years in *Halal* industries. 21.8% of them have 5-8 years of experience, 9.1% of them have experience within 9-12 years and only 3.6% from the respondents have more 13 years of experience in this industry.

For demographics elements, since this is regarding the cosmetics, surely female will have higher respondents compared to male. But interestingly, there is only a small difference among them where female respondents represented the 54.5% of the respondents, whereby male is 45.5% of the respondents. In terms of religion and race, as expected Muslims (94.5%) and Malay (87.3%), are dominating this industry. Other races and religions only have a very small portion as a sample for this study. The details can be seen in the Table 5.6.

5.5.4 Summary Of The Respondents Profile

Since there is not much difference in each category of respondents, overall respondents were also similar to the characteristics of the respondents for each category of industries. The majority of respondents are at the executive level (43.3%), have experience within 1-4 years (68%), female respondents (51.7%) are higher than male respondents, Muslim (87.5%) and Malay (84%) are totally dominant respondents for this study. The sample characteristics are as expected since *Halal* is related to the Muslim and the majority of the Muslim in this country is Malay. Therefore, the respondents for this study Muslim and Malay have a dominant figure compared to the others.

5.6 NORMALITY TEST

PLS-SEM is a non-parametric statistical method. Therefore, it does not require the data to be normally distributed. (Hair et al., 2014). Even though the software is still workable for the non-normal data, but it does not mean that the data could be extremely non-normal. The extremely non-normal data could be problematic in the standard error value since an extremely non-normal data inflate standard errors that obtain from the bootstrapping procedure. If this happens, it may slim the chances of the relationship to be significant (Hair et al., 2011, Henseler et al., 2009). Therefore, ensuring that the data is not extremely non-normal is a pertinent requirement that must be fulfilled before looking for further analysis.

There are few methods that are commonly used to test the normality of the data. The Kolmogorov-Smirnov test and Shapiro-Wilks test are developed to test the normality of the data. Due to some limitations, Hair et al., (2010) proposed to look at the skewness and Kurtosis in assessing to what extent the data deviate from the normality rather than those tests. Skewness assesses the extent to which variable's distribution is symmetrical. If the distribution of responses stretches either towards left or right, then it can be considered as skewed. On the other hand, Kurtosis is a measure of whether the distribution is too peaked. If the distribution is too peaked, it is indicating that most of the responses are in the center. According to the rule of thumb, variable is reasonably close to normal if its skewness and kurtosis have values between -1.0 and + 1.0.According to the table 21 , there are two values for skewness that exceed the cut off value to be considered that the data is normal (Perceived benefits – 1.433, and customer pressure, -1.01). On the other hand, there are four variables that have a value that beyond the category the data to be considered as normal. The variables are Perceived benefits; 1.319; Cost -1.202; Competitive pressure, -1.272, and supplier -1.198. Since the values are only slightly above the cut off value to be a normal data, it is indicate that this data is not highly skew and kurtosis. Though is can be considered that this data is match with the requirement for PLS-SEM since PLS-SEM is a non-parametric

statistical method which does not require the data to be normal but not highly non-normal data. Table 5.7 has the details.

Table 5.7
Normality test

	Minimum	Maximum	Skewness	Kurtosis
Independent Variables				
Perceived Benefits	1	5	- 1.433	1.319
Complexity	1	5	0.768	- 0.809
Cost	1	5	0.522	- 1.202
Awareness	1	5	- 0.753	- 0.420
Readiness	1	5	- 0.766	0.339
Government Support	1	5	- 0.308	- 0.927
Customer Pressure	1	5	- 1.010	0.013
Competitive Pressure	1	5	- 0.040	- 1.272
Supplier	1	5	- 0.312	- 1.198
Dependant Variables				
Intention Transport	1	7	-0.242	-0.465
Intention Warehouse	1	7	-0.444	-0.577
Moderating Factor				
Top Management Attitude	1	5	-0.538	-0.577

5.7 ASSESEMENT OF THE MEASUREMENT MODEL

The two-step analytical procedure proposed by Anderson and Gerbing (1988) was adopted to test the hypothesis generated. The first step is to evaluate the measurement model which has the convergent validity and discriminant validity

5.7.1 Convergence Validity

Once the data is confirmed suitable to be applied with the PLS SEM, it is a common approached to confirm the validity and reliability of the item used in the study. Without confirming that the measures are representing the constructs of interest, it is useless to use them to test the theoretical model in the study. If the measures are shown adequate validity and reliability, thus, we can proceed to the next step; to test the hypothesis of the study.

Convergent validity is the test to measure the degree to which multiple items measures the same concepts are in agreement. According to Campbell and Fiske (1959), convergent validity refers to all items measuring a construct actually loading on a single construct. Henseler et al., (2009), claimed that, convergent validity implies that "a set of indicators represents one and the same underlying construct, which can be demonstrated through their unidimensionality". Hair et al., (2010) mentioned that convergent validity was carried out through a within-factor analysis in order to get a more in-depth judgement of the dimensionality of the construct under study. Hence, convergent validity is confirmed when all items measuring a construct all fall into one factor as mentioned in the theory. Hair et al (2013) proposed to use the score of factor loadings, composite reliability (CR) and the average variance extracted (AVEs) to evaluate the convergent validity.

According to Roldan and Sanchez (2012) individual item reliability is evaluated by analyzing the standardized loading or simple correlation of the indicators with their respective latent variable. Previously, it is a common practice for researchers to use Cronbach's Alpha (CA) to evaluate the internal consistency or reliability of the item measuring the constructs. But after Composite reliability (CR) has been developed by Werts et al (1974), that have the same task as CA, the situation changed. Chin (1998) claimed that CR is more suitable for PLS since it does not assume that all indicators are equally weigh as considered by SPSS and CA analysis. Therefore, this study also will apply CR instead of CA.

The last item to measure the convergent validity is Average Variance Explained (AVE). AVE quantifies the amount of variance that a construct captures from its manifest variables or indicators relative to the amount due to measurement error (Roldan and Sanchez, 2012). It indicates how much variance can be explained by the items used in the respective constructs. Bagozzi and Yi (1988) mentioned that, the AVE must be greater than 0.5.

Table 5.8
Results of measurement Model

Model construct	Measurement Item	Loadings	Composite Reliability	AVE
Awareness	**Aware1**	0.855	0.893	0.736
	Aware2	0.847		
	Aware3	0.870		
Competitive	**Compe1**	0.833	0.844	0.576
Pressure	**Compe2**	0.725		
	Compe3	0.718		
	Compe4	0.755		
Complexity	**Compl1**	0.916	0.933	0.823
	Compl2	0.916		
	Compl3	0.888		
Cost	**Cost1**	0.860	0.932	0.774
	Cost2	0.885		
	Cost3	0.890		
	Cost4	0.885		
Customer	**Custx1**	0.895	0.915	0.782
Pressure	**Custx2**	0.890		
	Custx3	0.869		
Firm Size	**Firm_size**	1.000	1.000	1.000
Government	**Gs1**	0.819	0.879	0.708
Support	**Gs2**	0.791		
	Gs3	0.910		

Intention	**Int_T1**	0.891	0.933	0.824
Transport	**Int_T2**	0.922		
	Int_T3	0.910		

Table 5.8 Continued

Model construct	Measurement Item	Loadings	Composite Reliability	AVE
Intention	**Int_W1**	0.911	0.931	0.817
Warehouse	**Int_W2**	0.914		
	Int_W3	0.887		
Perceiced	**Pb1**	0.856	0.944	0.771
Benefits	**Pb2**	0.878		
	Pb3	0.895		
	Pb4	0.875		
	Pb5	0.886		
Readiness	**Ready1**	0.823	0.852	0.592
	Ready2	0.736		
	Ready3	0.682		
	Ready4	0.828		
Supplier	**Supp1**	0.827	0.916	0.732
	Supp2	0.880		
	Supp3	0.861		
	Supp4	0.852		
Top	**Tma1**	0.752	0.869	0.690
Management	**Tma2**	0.900		
Support	**Tma3**	0.834		

Table 5.8 above demonstrates the results of measurement model. The measurement model consists of relationship among the latent variables and the item indicators underlying each latent variable. As mentioned before, to confirm convergent

validity, factor loadings, CR and AVEs must meet the cut-off values. Hair et al (2013) proposed that, to access convergent validity, loading should higher than 0.5 and CR is greater than 0.7. For AVE, Barclay et al., (1995) claimed that, it should be more than 0.5. As shown in the table 5.8 the loadings for all items were in range of 0.718 – 0.922, and all of them met the criteria set by Hair et al., (2013). The CR values are also exceeding the 0.7 cut off value and the AVEs are also greater than 0.5 as required by Barclay et al., (1995). Thus, it shows that all the constructs which have been used are all valid measures of their respective constructs according to their parameter estimates and statistical significance (Chow and Chan, 2008).

5.7.2 Discriminant Validity

After confirming the convergent validity is not a problem for the study, it is also important to show that these indicators are distinguishable from the indicators of other constructs. Therefore, the next step is to establish the discriminant validity. Discriminant validity indicates the extent to which a given construct differs from other constructs. Technically, it requires that each latent construct account for more of the variance in its own indicators than it shares with another construct. According to by Campbell and Fiske (1959), "one cannot define without implying distinctions, and the verification of these distinctions is an important part of the validation process." This is called discriminant validity.There are two methods to assess discriminant validity in PLS.

i) Fornell and Larcker (1981) criterion.

There are two types of indicators which are formative and reflective. For this study, all constructs are in reflective form. For constructs with reflective indicators, Fornell and Larcker (1981) have suggested examining whether the square root of the average variance extracted (AVE) for each construct is greater than the correlation between the constructs. This test should be performed for one pair of constructs at a time, by averaging the squared multiple correlations (or averaging its squared completely standardized item loadings) for each of the two construct's indicators (separately), and then comparing the square root of the AVE values to the intercorrelation between

the two constructs of interest. If the two constructs are distinct, then the square root of the average squared multiple correlation for each of them should be higher than the intercorrelation

ii) Examining the cross loadings of indicators.

It can be done by comparing an indicator's outer loading on the associated construct and it should be higher than all of its loading on the other constructs.

According to the table 5.9 and table 5.10 on the next page, it clearly indicated that discriminant validity is not a problem for this study. As depicted in the table 5.9 and 5.10 the correlation for each construct are lower than then square root of AVE. Thus the requirements that set by Fornell and Larcker (1981) has been met in this condition.

Referring to the next table, specifically researcher can say that each items load higher on their own construct than the other constructs thus confirming the second criterion of discriminant validity. As a whole, the measurement model demonstrated adequate convergent validity and discriminant validity to bring this study to the next level, to the the structural relationship among variables in the research model.

Table 5.9:
Discriminant validity of the constructs

	Awareness	Comp. Press	Complexity	Cost	Cust. Press	Firm Size	Govt. Support	Int. T' port	Int. W house	Per. Ben	Readiness	Supplier	TMA
Awareness	**0.858**												
Comp. Press	0.260	**0.759**											
Complexity	-0.503	-0.006	**0.907**										
Cost	-0.481	-0.197	0.569	**0.88**									
Cust. Press	0.501	0.219	-0.512	-0.475	**0.884**								
Firm Size	0.000	0.094	0.026	-0.050	-0.044	**SIM**							
Govt. Support	-0.058	-0.087	0.127	0.027	0.002	0.017	**0.842**						
Int. Transport	0.623	0.397	-0.606	-0.636	0.644	-0.017	-0.076	**0.908**					
Int. Warehouse	0.628	0.397	-0.613	-0.628	0.672	0.011	-0.120	0.897	**0.904**				
Per.Ben	0.523	0.336	-0.535	-0.485	0.497	-0.014	-0.120	0.630	0.655	**0.878**			
Readiness	0.163	0.099	-0.024	-0.063	0.264	0.032	0.458	0.136	0.149	0.164	**0.77**		
Supplier	-0.127	0.188	0.226	0.152	-0.087	0.078	0.162	-0.228	-0.194	-0.037	0.184	**0.855**	
TMA	0.129	0.161	-0.055	-0.106	0.119	0.001	0.071	0.110	0.141	0.100	0.101	0.104	**0.831**

Note: Diagonals (in bold) represent the square root of the AVE and the off diagonals represent the correlation

Table 5.10
Loadings and cross loadings

	Awareness	Comp. Press	Complexity	Cost	Cust. Press	FS	Govt. Support	Int. Transport	Int. Warehouse	Per. Ben	Readiness	Supplier	TMA
Aware1	**0.855**	0.245	-0.454	-0.408	0.410	0.023	-0.052	0.517	0.509	0.438	0.108	-0.085	0.106
Aware2	**0.847**	0.199	-0.419	-0.370	0.384	-0.010	-0.096	0.496	0.492	0.428	0.132	-0.107	0.104
Aware3	**0.870**	0.225	-0.424	-0.452	0.487	-0.012	-0.011	0.582	0.605	0.476	0.174	-0.131	0.121
Compe1	0.320	**0.833**	-0.168	-0.301	0.352	0.055	-0.013	0.466	0.460	0.383	0.202	-0.004	0.179
Compe2	0.054	**0.725**	0.194	0.042	-0.062	0.144	-0.188	0.127	0.135	0.094	-0.100	0.321	0.094
Compe3	0.088	**0.718**	0.171	0.012	-0.005	0.105	-0.036	0.146	0.158	0.160	0.041	0.318	0.101
Compe4	0.119	**0.755**	0.115	-0.069	0.037	0.046	-0.144	0.195	0.194	0.172	-0.073	0.260	0.040
Compl1	-0.457	-0.021	**0.916**	0.536	-0.469	0.020	0.108	-0.558	-0.578	-0.488	-0.031	0.198	-0.028
Compl2	-0.477	-0.034	**0.916**	0.501	-0.480	-0.008	0.124	-0.585	-0.593	-0.489	-0.046	0.202	-0.057
Compl3	-0.433	0.046	**0.888**	0.513	-0.442	0.066	0.115	-0.500	-0.489	-0.479	0.016	0.217	-0.068
Cost1	-0.413	-0.131	0.529	**0.860**	-0.403	-0.024	0.005	-0.532	-0.533	-0.427	-0.087	0.130	-0.096
Cost2	-0.428	-0.158	0.513	**0.885**	-0.431	-0.020	0.041	-0.581	-0.565	-0.445	-0.051	0.135	-0.045
Cost3	-0.418	-0.211	0.475	**0.890**	-0.408	-0.089	0.014	-0.557	-0.534	-0.396	-0.064	0.119	-0.082
Cost4	-0.433	-0.194	0.486	**0.885**	-0.428	-0.043	0.034	-0.568	-0.578	-0.437	-0.021	0.152	-0.149
Custx1	0.431	0.189	-0.451	-0.411	**0.895**	-0.062	0.025	0.566	0.591	0.445	0.208	-0.073	0.116
Custx2	0.432	0.183	-0.479	-0.445	**0.890**	-0.027	-0.025	0.581	0.599	0.462	0.204	-0.082	0.119
Custx3	0.467	0.210	-0.429	-0.403	**0.869**	-0.027	0.004	0.561	0.594	0.413	0.290	-0.074	0.081
Firm_size	0.000	0.094	0.026	-0.050	-0.044	**1**	0.017	-0.017	0.011	-0.014	0.032	0.078	0.001

Table 5.10 : Continued

	Awareness	Comp. Press	Complexity	Cost	Cust. Press	FS	Govt. Support	Int. Transport	Int. Warehouse	Per. Ben	Readiness	Supplier	TMA
Gs1	-0.023	-0.011	0.082	0.001	0.002	-0.023	**0.819**	-0.023	-0.100	-0.098	0.361	0.093	0.020
Gs2	0.028	0.013	0.065	-0.061	0.060	-0.026	**0.791**	0.021	-0.060	-0.051	0.426	0.085	0.060
Gs3	-0.087	-0.136	0.138	0.058	-0.014	0.047	**0.910**	-0.112	-0.117	-0.121	0.409	0.183	0.087
Int_T1	0.543	0.356	-0.521	-0.570	0.575	-0.006	-0.092	**0.891**	0.797	0.572	0.136	-0.177	0.081
Int_T2	0.569	0.331	-0.572	-0.599	0.599	-0.039	-0.055	**0.922**	0.825	0.577	0.103	-0.272	0.123
Int_T3	0.584	0.395	-0.557	-0.562	0.579	0.000	-0.060	**0.910**	0.821	0.566	0.132	-0.169	0.094
Int_W1	0.551	0.365	-0.549	-0.593	0.629	-0.002	-0.120	0.824	**0.911**	0.590	0.115	-0.145	0.145
Int_W2	0.594	0.378	-0.551	-0.605	0.616	0.039	-0.139	0.815	**0.914**	0.593	0.108	-0.175	0.131
Int_W3	0.559	0.332	-0.564	-0.503	0.577	-0.008	-0.063	0.795	**0.887**	0.593	0.185	-0.208	0.106
Pb1	0.437	0.280	-0.509	-0.452	0.456	-0.020	-0.103	0.530	0.548	**0.856**	0.086	-0.044	0.044
Pb2	0.458	0.275	-0.489	-0.419	0.452	-0.044	-0.072	0.536	0.552	**0.878**	0.177	-0.015	0.090
Pb3	0.488	0.310	-0.479	-0.417	0.438	0.003	-0.115	0.560	0.582	**0.895**	0.096	-0.013	0.084
Pb4	0.427	0.311	-0.466	-0.444	0.414	-0.006	-0.116	0.551	0.577	**0.875**	0.178	0.022	0.123
Pb5	0.484	0.301	-0.415	-0.399	0.426	0.001	-0.119	0.587	0.613	**0.886**	0.181	-0.107	0.095
Ready1	0.116	0.100	-0.022	-0.027	0.217	0.042	0.359	0.120	0.131	0.158	**0.823**	0.144	0.014
Ready2	0.105	-0.008	0.001	-0.009	0.214	-0.045	0.307	0.096	0.093	0.121	**0.736**	0.142	0.119
Ready3	0.064	0.057	0.001	-0.061	0.152	-0.008	0.389	0.095	0.074	0.088	**0.682**	0.094	0.048
Ready4	0.196	0.129	-0.044	-0.092	0.223	0.081	0.368	0.106	0.147	0.128	**0.828**	0.175	0.133

Table 5.10 : Continued

	Awareness	Comp. Press	Complexity	Cost	Cust. Press	FS	Govt. Support	Int. Transport	Int. Warehouse	Per. Ben	Readiness	Supplier	TMA
Supp1	-0.144	0.127	0.166	0.119	-0.109	0.054	0.133	-0.186	-0.155	-0.044	0.169	**0.827**	-0.009
Supp2	-0.156	0.160	0.197	0.126	-0.087	0.066	0.152	-0.231	-0.209	-0.066	0.114	**0.880**	0.111
Supp3	-0.063	0.143	0.199	0.125	-0.061	0.093	0.146	-0.191	-0.145	-0.005	0.194	**0.861**	0.149
Supp4	-0.051	0.225	0.215	0.157	-0.030	0.052	0.120	-0.157	-0.143	0.004	0.167	**0.852**	0.102
Tma1	0.069	0.168	-0.007	-0.078	0.065	0.033	0.043	0.036	0.070	0.064	0.061	0.140	**0.752**
Tma2	0.135	0.155	-0.069	-0.084	0.122	0.000	0.065	0.125	0.151	0.087	0.092	0.064	**0.900**
Tma3	0.097	0.089	-0.039	-0.105	0.092	-0.016	0.063	0.080	0.103	0.094	0.091	0.094	**0.834**

Note: Bold values are loadings for items which are above the recommended value of 0.5

5.8 HYPOTHESIS TESTING

After confirming validity and reliability is not a problem for the study, the next step is to test the structural model of the study. Chin (1988) proposed that once established the appropriateness of the measure, then evidence supporting the theoretical model can be executed. Path analysis was used to test 20 hypothesis generated from the research model. In terms of significance, Chin (1988), suggested to use bootstrapping procedure while using PLS. The bootstrap approach represents a nonparametric approach for estimating the precision of the PLS estimates. (Chin, 2010). Bootstrapping procedure with 500 resamples as proposed by Chin (1988) was used since the sample for this study is 344. Even though other literatures also suggested other number such 1000 (Chin, 1988) 5000 (Hair et al, 2013), but according to Peng and Lai (2012) increasing the number of bootstrapping samples does not increase the amount of information in the original data, but only could reduce the effect of random sampling errors that may arise from the bootstrap procedure. Figure 5.1 and 5.2 and table 5.11 present the results. The structural model also known as an inner model in PLS-SEM describes the relationship between the latent variables that were hypothesized in the research model. Chin (1988) also claimed that a major emphasis in PLS analysis is on variance explained as well as establishing the significance of all path estimates. The R^2 or the variance explained of the endogenous constructs and the significance of all path estimates will establish the goodness of the theoretical model (Chin, 2010). It determines the percentage of the response variable variation that is explained by a linear model. The R^2 value ranges from 0 to 1 with the higher levels indicating higher levels of predictive accuracy (Hair et al., 2013). Increase in number of variable used in the model usually will increase the R^2 value. The R^2 for the main model for *Halal* transportation is 0.714, and 0.728 for the *Halal* warehousing indicating that 71.4% and 72.8% of the variance in the extent of collaboration can be explained by variables in this study including the control variable. Table 5.11 below and figure 5.1 display the results for bootstrapping procedure to test the hypothesis for the research.

H 1 : Perceived Benefits has a positive relationship to the adoption of *Halal* transportation

The first hypothesis for this study is regarding perceived benefits and intention to adopt *Halal* transportation services. With the beta value showing a positive relationship, (β = 0.153, t-value, 3.567), thus we can conclude that perceived benefits has a positive relationship with the intention to adopt *Halal* transportation services significance at 0.01 and H1 was supported.

H 2 : Perceived Benefits has a positive relationship to the adoption of *Halal* warehousing

As the first hypothesis, the beta value for the second hypothesis also indicated a positive relation between exogenous and endogenous variable. With (β = 0.178, t-value 3.944), we can claimed that perceived benefits has a positive relationship to the intention to adopt *Halal* warehousing services significance at 0.01, thus H2 was supported.

This study has found that perceived benefits have a positive relationship with the intention to adopt for both *Halal* services. It also indicates that the higher the perceived benefits that will be gained by them, the intention to adopt *Halal* transportation and *Halal* warehousing services will also increase. This finding is aligned with Ghobakhloo et al., (2011) who found that perceived benefits have a positive relationship with the intention to adopt e-commerce. This finding also confirmed the result from Marimuthu et al., (2011) who also found that perceived benefits have a positive relationship with the intention to adopt E-business among SMEs in Malaysia. Lin and Lin (2008) also found the same result in their E-business study in Taiwan. In information system literature, many researchers also found the same relationship between perceived benefits and the intention to adopt new innovation. Grandon and Pearson, (2004), Venkatesh and Morris, (2000) and Zhu et al, (2006), all of them claimed that perceived benefits have a positive relationship with the adoption of new technology in information technology studies.

H 3: Complexity is negatively related to the adoption *Halal* transportation services.

The second factor representing the technological factor is complexity. The study found that complexity has a negative relationship with the intention to adopt *Halal* transportation (β, -0.175, t-value 4.105) significance at 0.01. Thus, H3 was supported.

H 4: Complexity is negatively related to the adoption *Halal* warehousing services.

As same as the third hypothesis, the fourth hypothesis also showed the same result. H4 was supported at the significant level 0.01, (β, -0.166, t-value, 4.184), for the intention to adopt *Halal* warehousing services. Therefore we can confirm that cost has a negative relationship with intention to adopt *Halal* transportation services.

This study, for H3 and H4, which is the intention to adopt *Halal* transportation and *Halal* warehousing services respectively, found that complexity is negatively associated with the intention to adopt *Halal* transportation and *Halal* warehousing services, which supported the H3 and H4. These findings are supported by Chang et al., (2007), where they found that complexity is negatively related to the adoption of information technology innovation. Cheung et al., (2000) also claimed that complexity negatively influences the adoption of internet usage. In mobile banking study, Al-Jabri and Sohail, (2012) confirmed that complexity is one of the major factor that impeded the adoption of those service. In Malaysian context, complexity is negatively related to the adoption of e-commerce among electronic manufacturing companies (Alam et al., 2008). Similar to the findings gained by Henderson et al.,(2012), they also confirmed that complexity has a negative influence on the adoption of XBRL. Besides these industries, study on RFID has also shown similar results regarding the complexity against the adoption. Brown and Russell (2007) and Wang et al., (2010) found that the complexity of RFID was negatively related to the adoption in this industry. Beside those studies, Rogers (1995) argue that the complexity of new innovation will negatively influence the adoption rate. Rogers (2003) confirmed that complexity will act as a barrier to the technology adoption.

H 5: Cost is negatively related to the adoption of *Halal* transportation.

The third variable in the technological factor is cost. With (β, -0.205, t-value 5.406) thus indicated that cost has a negative relationship with the intention to adopt *Halal* transportation, significance at 0.01. Therefore, we can confirmed that H5 was supported.

H 6: Cost is negatively related to the adoption of *Halal* warehousing

Similar to the H5, H6 also shows the same result. With (β, -0.182, t-value 4.413), though, we can confirmed that cost has a negative relationship with the intention to adopt *Halal* warehousing services significance at 0.01. Thus, we can conclude that H6 was supported.

As expected, cost was found to be negatively related to the intention to adopt Halal transportation and Halal warehousing. These findings were supported by various studies from different kind of technology adoption study. In Halal, Tieman (2013) reports that the consequences of *Halal* integrity issues in the supply chain have arguably become more costly than before for brand owners and retail chains to repair (Waarden and Dalen, 2010; Zakaria and Abdul-Talib, 2010; New Straits Times, 2005), though it is nothing to be surprised if the study was found that it is negatively related to the intention to adopt Halal transportation and Halal warehousing services. The findings are aligned with most of the findings in the literature. The literature in technology innovation mentioned costs as an inhibitor of technology use (Tornatzky and Klein, 1982). While studying the adoption of open systems, Chau and Tam, (1997) and Premkumar et al., (1997) found that cost was negatively related to the subject matter. Alkhidir and Zailani (2009) found that cost is a significant barrier to implement green supply chain. Not only for that area, Zhu et al.(2006) also found that cost would significantly inhibit e-business usage by an organizations, while Ghobakhloo et al., (2011) also confirmed that cost is negatively related to the adoption of e-commerce.

H 7: Awareness is positively related to the adoption of *Halal* transportation.

The last variable for technological factor is awareness, also significant at 0.01 with β = 0.159, t-value =3.608, for intention to adopt *Halal* transportation. Thus H7 was supported.

H 8: Awareness is positively related to the adoption of *Halal* warehousing.

Same as the H7, awareness has been found as positively related to the intention to adopt *Halal* warehousing services. With β = 0.149, t-value 3.731, this variable is significance at 0.01. Therefore, H8 was also supported.

The findings of this study is similar to the findings by Farooq and Qudoos (1999), which they claimed that the main cause of non-adaptation of modern livestock practices is unawareness about new livestock technologies. Gibbs and Kraemer (2004) reported that, lack of awareness of information system benefits to be one of the most significant barriers to information system implementation and expansion. In green supply chain studies, Zhu et al., (2007) mentioned that without environmental awareness, it is difficult to implement green practices. The findings are also similar to findings by Luthra et al.,(2013) in green supply chain management(GSCM). According to them, a major barrier of GSCM in Indian automobile industry is lack of awareness of customers about the benefits of green products. In addition to this, the circumstances that lead to the limited implementation of green ICT might be the lack of awareness (Wabwoba et al., 2012). It is the same story for a study on utilization of electronic journal database by Rehman and Ramzy (2008). Based on their study, they claimed that, although libraries had purchased and installed the latest, most technologically advanced computerized information systems and procure expensive resources, these may not be optimally used due to lack of awareness among the users. Okelo and Magara (2008) also agree with this notion of underutilization and stated that the common obstacle in the use of electronic journals in higher learning institutions was lack of awareness about the resources. Baro et al. (2011) echoed the same sentiment by studied Delta State University and found that electronic scholarly journal databases were underutilized due to lack of awareness of the existing resources as the primary constraint they had.

H 9: Organizational readiness is positively related to the adoption of *Halal* transportation.

Organizational readiness that represent the organizational factor was found as not significance for intention to adopt *Halal* transportation with β= 0.000, t-value = 0.007. Thus, H9 was not supported.

H 10: Organizational readiness is positively related to the adoption of *Halal* warehousing

Similar to H9, H10 was also found not supported. With β = 0.025, t-value 0.7. Thus, we can conclude that H10 was also not supported.

In this study, organizational readiness has been measured by the financial and human resource capability to adopt the *Halal* transportation and *Halal* warehousing services. Interestingly, the finding on this study is contradicted with the literature presented earlier. This study has found that organizational readiness is not a significant factor towards the intention to adopt *Halal* transportation and *Halal* warehousing services. This finding is similar to Grandon and Person (2004), where they found that organization readiness was not a significant factor in the adoption of E-commerce. The result also similar to Duan et al., (2012) where they found that organization readiness is not a significant factor to the adoption of e-market in Australian SMEs study. The further details will be discussed in the last chapter

H 11: Government support is positively related to the adoption of *Halal* transportation.

There are four (4) variables representing the environmental factors for this study. The first factor is the government support. Table H3 above indicate the overall result for environmental factors. With β = 0.028, t-value 0.770, clearly indicate that government support has no relationship to the intention to adopt *Halal* transportation. Hence, H 11 was not supported.

H 12: Government support is positively related to the adoption of *Halal* warehousing.

As same as the result for the H 11, with the β = - 0.039, t-value 0.820, therefore we can conclude that the government support also has no relationship with the intention to adopt *Halal* warehousing services. Though, H 12 also was not supported.

Most of the literature on government support was found that it has a positive relationship with the intention to adopt a new technology. But, for this study, the result shows that, it was contradictory to the literatures. For H11 and H12, the government support was found to be not significant factor to the adoption of *Halal* transportation and *Halal* warehousing services. These findings are similar to the study conducted regarding the e-business adoption among SMEs in Malaysia. Marimuthu et al., (2011) found that, in the Malaysian context, government support was not a significant factor to the intention to adopt e-business. The findings are also similar with the study about the adoption of e-commerce in Tourism sector in Malaysia. Salwani et al., (2009) also found that the government support is not a significant factor to the adoption of e-commerce among companies in tourism sector. Though, it is not only on Halal, but also from other sectors, studies found that government support as not a significant factor to the intention of new technology adoption.

H 13: Customer pressure is positively related to the adoption of *Halal* transportation.

The second factor for environmental factors is the customer pressure. The relationship is significance at 0.01, with β = 0.234, t-value 5.474, that is above the cut off value to declare the hypothesis is supported. Thus, we can claim that, there is a positive relationship between customer pressure and intention to adopt *Halal* transportation services. H 13 was supported.

H 14: Customer pressure is positively related to the adoption of *Halal* warehousing

Similar to the H 13, H 14 also found there is a significant relationship between the customer pressure and the intention to adopt *Halal* warehousing services at 0.01. (β = 0.272, t-value 6.397). Thus we could claim that H 14 is supported.

As mentioned in the literatures, customer pressure is always significantly associated with the intention to adopt new technologies. This study also obtained the same results. Similar to Pavlou and El Sawy, (2006), where they also found that customer pressures has a significant relationship in an adoption of a new information system since customers are pressuring for a better efficiency. In e-business adoption studies, Barua et al., (2004); Oliveira and Martins, (2010) also found that customer pressure have a significant relationship to the adoption decision. Chong (2008), also found the same result for e-commerce adoption study. Chan (2005), and Payne and Frow (2005) confirmed that customer value as a key facet in the decision to use internet. The same results were found in Thailand tourism industry. Khemtong and Roberts, (2008) found that customer pressure positively related to the adoption of web technology. To verify the findings in Thailand, Sophonthummapharn (2009) also found that the customer pressure has a significant relationship in the adoption of technological innovation. Al-Qirim (2005) and Marimuthu et al., (2011) also found that customer pressure is positively related to the adoption of new technology. It is not only for business purposes; customer pressure also was found to have a positive influence in environmental planning (Henriques and Sadorsky, 1996).

H 15: Competitive pressure positively related to the adoption of *Halal* transportation.

The third element in the environmental factor is the competitive pressure. According to the results of the analysis, the relationship between competitive pressure and intention to adopt *Halal* transportation was significant at 0.01with the β = 0.248, t-value 6.28. It is clearly indicate that competitive pressure has a positive relationship with the intention to adopt for *Halal* transportation services. Though, H 15 was supported.

A lot studies have already found that competitive pressure is significantly associated to the intention to adopt new technology. This study also found the same results and confirmed that competitive pressure has a positive relationship with the intention to adopt *Halal* transportation and *Halal* warehousing services. Similar to the EDI adoption study conducted by Iacovou et al., (1995), Premkumar et al., (1997); Chwelos, (2001) and Zhu et al., (2002), also got the same results. These findings also supported the other findings in other area of study. In e-business, Lin and Lin (2008) also found that competitive pressure as a significant factor to the adoption of e-business. Sophonthummapharn (2009) claimed that competitive pressure as a factor to the adoption of new technologies. In e-commerce, Scupola (2009) agreed that competitive pressure is positively related to the adoption of e-commerce, while Wang et al., (2010) declared that competitive pressure is significantly associated with the intention to adopt RFID. Low et al., (2011) also verified that competitive pressure has a positive relation to the adoption of e-business.

H 16: Competitive pressure positively related to the adoption of *Halal* warehousing

The study also found that competitive pressure has a positive relationship with the intention to adopt *Halal* warehousing services. The relationship is significant at 0.01,($\beta = 0.215$, t-value 5.548), hence H 16 was supported.

H 17: Supplier positively related to the adoption of *Halal* transportation.

The last element in the environmental is the supplier availability. The hypothesis is developed based on the literatures and it has been proposed that supplier availability will have a positive relationship with the intention to adopt *Halal* transportation services. Even the t-value (5.140) should be significant at 0.01, but since the beta value is - 0.160, this indicates that there is a negative relationship between supplier availability and the intention to adopt *Halal* transportation services. Therefore, H 17 was not supported.

H 18: Supplier positively related to the adoption of *Halal* warehousing.

Similar to the H 17, H 18 has a same condition. Having a good t-value (4.220) to be considered as significant at 0.01, but due to the β = - 0.122, whereby hypothesis developed at the positive side, therefore H 18 was not supported.

For the last variable representing the environmental factor is supplier availability. Interestingly, even past study indicate that supplier availability significantly associated with the intention to adopt new innovation, but for this study supplier availability is not only insignificant to the adoption, but also has a negatively significant relationship with the intention to adopt *Halal* transportation and *Halal* warehousing services. These findings contradicted to Cool et al., (1997) who confirmed that suppliers are likely to accelerate then acceptance of innovation. The findings of this study also contradict to the findings by Al-Qirim,(2007), and Mirchandi and Motwani, (2001) on e-commerce adoption studies. It also contradicts the results from the study from Kwan and Zmud (1987) on information system adoption and Gatignon and Robertson, (1989) on technology diffusion studies.

5.8.1 Moderating Effect

After completing the testing for the direct effect, next to be tested are the moderating effect of top management attitude for the perceived benefits and the intention to adopt *Halal* transportation and *Halal* warehousing services.

H19: The positive relationship between Perceived benefits and intention to adopt *Halal* transportation will be stronger when the organization has better top management attitude.

Table 5.11 indicates the overall results for hypothesis testing and the results for moderating effect of top management attitudes towards relationship between perceived benefits and the intention to adopt *Halal* transportation and *Halal* warehousing services. For H 19, with the β = -0.097, t-value, 1.500, thus indicate that the study failed to find any relationship between those variables. Hence, there is no moderating effect of top

management attitude on the positive relationship between perceived benefits and the intention to adopt *Halal* transportation services. H 19 was not supported.

H20: The positive relationship between Perceived benefits and intention to adopt *Halal* warehousing will be stronger when the organization has better top management attitude.

There is a slight different for the result for H 19 and H 20, where for the t values (1.668) for H 20, indicates there is a moderating effect of top management attitudes on the positive relationship between perceived benefits and the intention to adopt *Halal* warehousing services. Even though the t-value was above the cut off value to be significant at 0.01, but, since the beta value (- 0.101) indicating there is a negative relationship among them, therefore, H 20 also was not supported.

Table 5.11 :
Path coefficient and hypothesis testing

Hypothesis		beta	Se	T Value	Decision
H1	**Per.Ben -> Int. Transport**	0.154	0.043	3.567**	Supported
H2	**Per.Ben -> Int. Warehouse**	0.178	0.045	3.944**	Supported
H3	**Complexity -> Int. Transport**	-0.175	0.042	4.105**	Supported
H4	**Complexity -> Int. Warehouse**	-0.166	0.040	4.184**	Supported
H5	**Cost -> Int. Transport**	-0.206	0.041	5.046**	Supported
H6	**Cost -> Int. Warehouse**	-0.181	0.041	4.413**	Supported
H7	**Awareness -> Int. Transport**	0.157	0.044	3.608**	Supported
H8	**Awareness -> Int. Warehouse**	0.147	0.039	3.731**	Supported
H9	**Readiness -> Int. Transport**	0.000	0.040	0.0070	Not Supported

Table 5.11 Continued

Hypothesis		beta	Se	T Value	Decision
H10	**Readiness -> Int. Warehouse**	0.025	0.036	0.700	Not Supported
H11	**Govt. Support -> Int. Transport**	0.028	0.037	0.770	Not Supported
H12	**Govt. Support -> Int. Warehouse**	-0.039	0.047	0.820	Not Supported
H13	**Cust. Press -> Int. Transport**	0.234	0.043	5.474**	Supported
H14	**Cust. Press -> Int. Warehouse**	0.272	0.043	6.397**	Supported
H15	**Comp. Press -> Int. Transport**	0.248	0.039	6.280**	Supported
H16	**Comp. Press -> Int. Warehouse**	0.215	0.039	5.548**	Supported
H17	**Supplier -> Int. Transport**	-0.160	0.031	5.140	Not Supported
H18	**Supplier -> Int. Warehouse**	-0.122	0.029	4.220	Not Supported
H19	**Per.Ben*TMA->Int. Transport**	-0.097	0.065	1.500	Not Supported
H 20	**Per.Ben * TMA -> Int. Warehouse**	-0.101	0.060	1.668	Not Supported
	TMA -> Int. Transport	-0.010	0.035	0.283	Not Supported
	TMA -> Int. Warehouse	0.022	0.033	0.651	Not Supported
	FS -> Int. Transport	-0.021	0.029	0.737	Not Supported
	FS -> Int. Warehouse	0.010	0.026	0.389	Not Supported

** P < 0.01

5.8.2 Summary Of The Hypothesis Testing For The Main Research Model

Table 5.11 shows the summary of the hypothesis testing results. From 18 hypotheses developed in the main model, only 12 hypotheses were supported. The hypotheses are H1 – H8, and H13- H16. The unsupported hypotheses were H9, H 10, H11, H12, H17 and H18. Interestingly, for H17 and H18, these hypotheses have a t-values above the cut off value to be indicated as supported hypothesis, but, since the hypotheses were developed to be significant at the positive side, whereby, the beta values for both hypotheses shows the relationship to be significant at the negative side. Therefore, those hypotheses were not supported

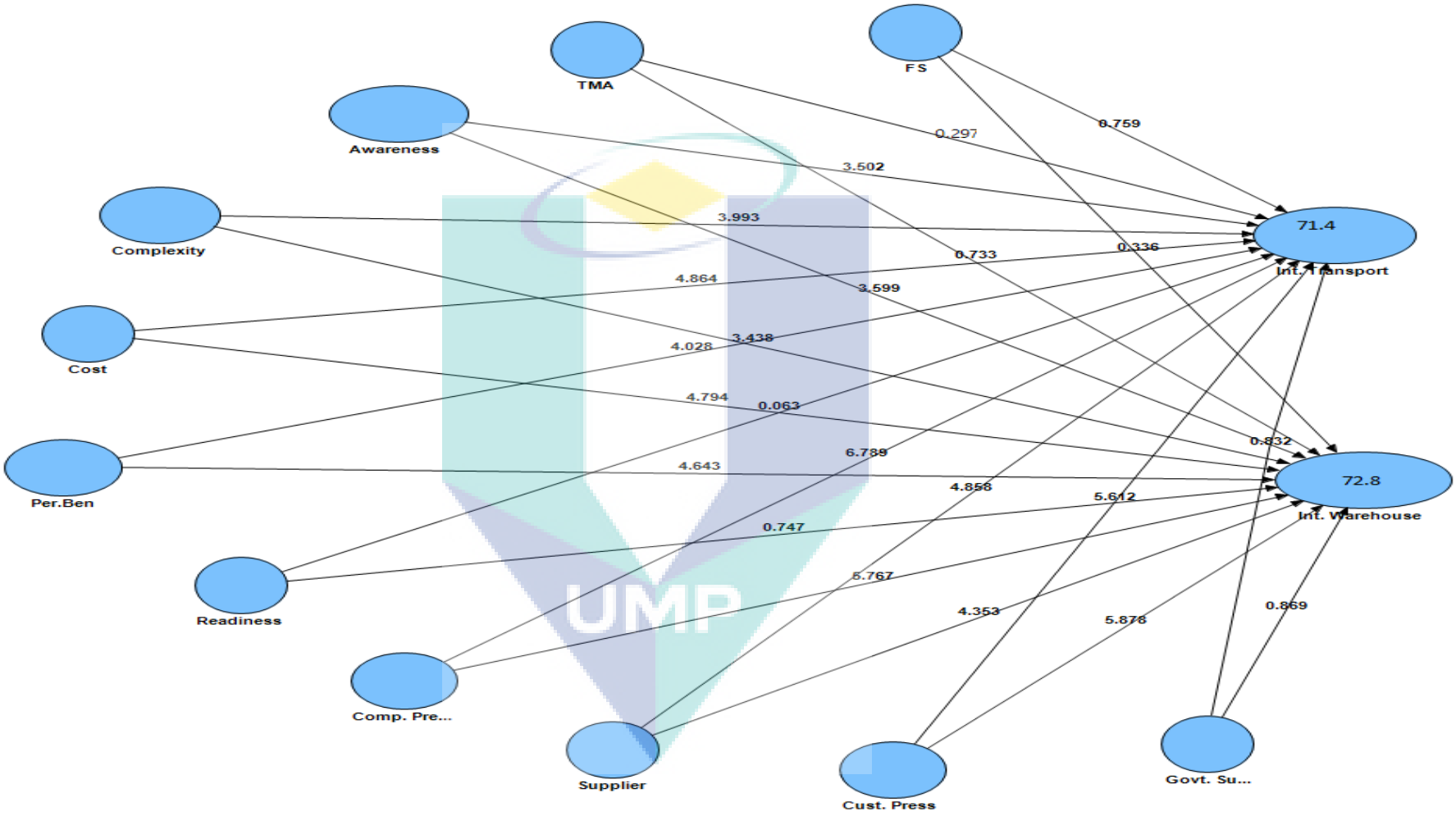

Figure 5.1 Structural model for the research model

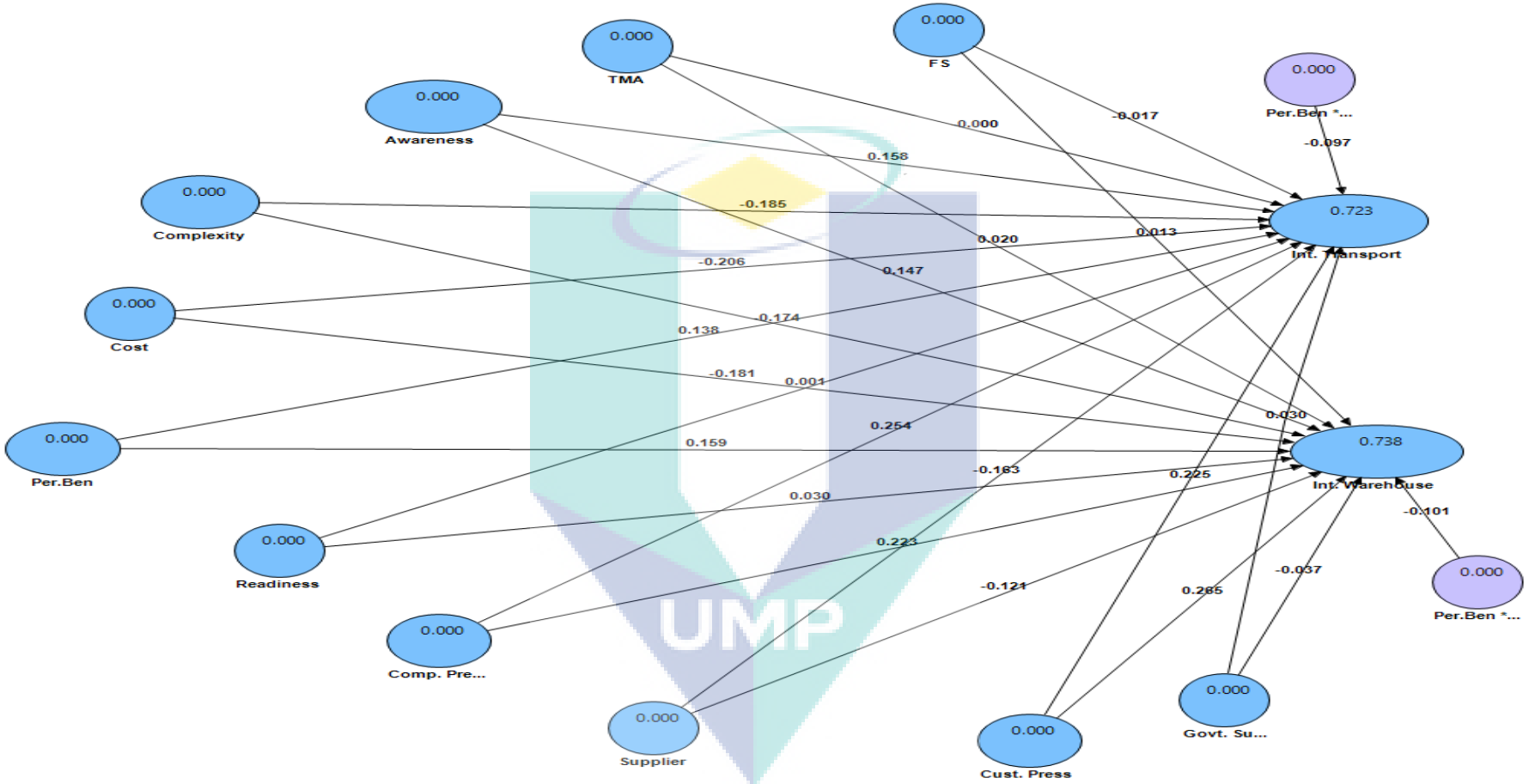

Figure 5.2 Structural model with Moderating effect

Earlier in the study, it was mentioned that firm size as a control variable due to other studies also did the same. For this study, in both situations, firm size is not a significant factor to the intention to adopt *Halal* transportation and *Halal* warehousing services. Table 5.11 shows the overall results for path coefficient and hypothesis testing and Figure 5.1 and 5.2 were the illustration.

5.9 EFFECT SIZE (f^2) PREDICTIVE RELEVANCE (Q^2, q^2 EFFECT SIZE)

After looking at the significance of the relationships between constructs in the research model, recently, the study is not done at this point. Hair et al (2014) argued that, after verifying the relationships are significant, the researcher should consider the relevance of significant relationships. Are the sizes of the structural coefficients meaningful? Most of the studies just rely on the significance of the effect and tend to skip these steps. Though the findings reported may appear to have a significant effect towards the subject that has been studied, but, it may be too small to catch managerial attention. The change in the R^2 value when a specified exogenous constructs is omitted from the model can be used to evaluate whether the specific omitted construct has a substantive impact on the endogenous constructs. (Hair et al, 2013). Change in R^2 can be explored to see whether the impact of a particular independent latent variable on a dependent latent variable has substantive impact (Chin, 2010). This is known as an effect size (f^2) analysis. Effect size assesses the magnitude or strength of relationship between the latent variables. It is important since the effect size helps researchers to assess the overall contribution of a research study. Chin et al., (1996) have clearly pointed out that researcher should not only indicate whether the relationship between variables is significant or not, but also report the effect size between these variables. Effect size analysis is measured by the guideline provided by Cohen (1988) which 0.02, 0.15 and 0.35, respectively represent small, medium and large effect of the exogenous latent variable.

According to table 5.12, there is a difference for the effect size analysis results for the intention to adopt *Halal* transportation and *Halal* warehousing services. Even though for both endogenous latent variables indicate that all exogenous latent variables

has an effect size, but, for both endogenous latent variables, they have a different exogenous latent variable that have a bigger effect sizes. For the intention to adopt *Halal* transportation, competitive pressure has a medium effect size (0.161), and other variables only have a small effect size. For the intention to adopt *Halal* warehousing services, customer pressure, with a medium effect size (0.155), is the biggest effect size, whereby other variables only has a small effect size. This indicate that, for the intention to adopt *Halal* transportation, competitive pressure is the most important variable, and for the intention to adopt *Halal* warehousing services, customer pressure is the most important variable to be focused by the service providers if they want to enhance the numbers of adopters for their services.

Another method of looking at the magnitude of the R^2 as a criterion of predictive relevance, predictive sample reuse technique as developed by Stone (1974) and Geisser (1975) can also be utilized. Geisser (1975) claimed that this approach represents as of cross validation and functioning fitting with the perspective that the prediction of observables or potential observables is of much greater than the estimation of what are often artificial constructs-parameter. Wold (1982) also supported this technique by arguing that the sample reuse technique is fitting the soft modelling approach of PLS like hand in glove. Furthermore, one of the purpose of using PLS SEM is for prediction, therefore Hair et al (2013) proposed that researchers must report the predictive relevance of the model. Predictive relevance or the Stone-Geisser's value (Q^2) represents a measure of how well-observed values are reconstructed by the model and its parameter.

To test the Q^2, the blindfolding technique was applied to get cross-validated redundancy measures for each endogenous construct. By applying the blindfold procedure, two forms of Q^2 can be obtained which fit different form of prediction. Chin (2010) claimed that a cross validated communility Q^2 is obtained if prediction of the data points is made by underlying latent variable score. On the other hand, a cross validated redundancy Q^2 is obtained if prediction is made by those latent variables that predict block in question. Chin (2010) also proposed to use the second cross validated which is cross validated redundancy measure to examine the predictive relevance of the

theoretical or structural model. Chin, (2010); Fornell and Cha, (1994); and Hair et al, (2013) claimed that if the $Q^2 > 0$ implies the model has predictive relevance and if the $Q^2 < 0$ indicates that the model has a lack of predictive relevance. Before running the blindfolding procedure, one of the requirements is to set the omission distance (D). The number of the observation used in the model estimation divided by D, must not be an integer. The D value must also be in range of 5-10 (Chin, 1998).

Table 5.12
Effect size analysis and predictive relevance

Transportation						
Construct	R2	f2	Decision	Q2	q2	Decision
Full Model	71.4			0.572		
Perceived Benefit	70.1	0.046	Small	0.560	0.028	Small
Complexity	69.9	0.052	Small	0.562	0.023	Small
Cost	68.9	0.087	Small	0.560	0.028	Small
Awareness	69.9	0.052	Small	0.560	0.028	Small
Customer pressure	68.2	0.112	Small	0.549	0.054	Small
Competitive pressure	66.8	0.161	Medium	0.542	0.07	Small
Warehouse						
Construct	R^2	f^2	Decision	Q^2	q^2	Decision
Full Model	72.9			0.580		
Perceived Benefit	71.2	0.063	Small	0.566	0.033	Small
Complexity	71.6	0.048	Small	0.570	0.024	None
Cost	71.0	0.07	Small	0.571	0.021	Small
Awareness	71.6	0.048	Small	0.570	0.024	Small
Customer pressure	68.7	0.155	Medium	0.547	0.079	Small
Competitive pressure	69.4	0.129	Small	0.558	0.052	Small

D = 6

For this study, D of 6 was used since the number of observation is 344. As Q^2 for this study was 0.580, which is met the requirement set by Fornell and Cha (1994), and Hair et al., (2013), the cross-validated redundancy measures show that the structural model for this study has predictive relevance.

If the R^2 has a f^2, Q^2 has a q^2. Similar to the f^2, q^2 is the effect size of the Q^2. Equal to the f^2, q^2 also has been measured by the guideline provided by Cohen (1988) which 0.02, 0.15 and 0.35, respectively represent small, medium and large effect of the exogenous latent variable.

For the first endogenous construct, which is intention to adopt *Halal* transportation services, q^2 indicates that all variables which are perceived benefits, complexity, cost, awareness, customer pressure and competitive pressure have a small effect size. But, for the intention to adopt *Halal* warehousing services, the results have a bit of difference. Only five of them have a small q^2, and one of them does not have an effect size and the variable that has no q^2 was complexity.

5.10 POWER OF ANALYSIS (G POWER)

If a priori power analysis will determine the sample size required according to the number of predictors, effect size and confidence level, a post hoc power analysis will calculate the power of analysis for the study. According to Faul et al., (2007), G power is a stand alone power analysis program for statistical test which is commonly used in the social, behavioural, and bio-medical sciences. Power (1-β) can be defined as the probability of obtaining a statistically significant result (H1), that is, successfully rejecting the H0 (Cohen 1988). It is also known as a retrospective analysis. In developing and testing complex models using PLS path modelling, power analysis is important to validate the implications of sample sizes. (Akter et all., 2011). This statistical power is the ability of a test to detect an effect, if the effect actually exists (High, 2000). It depends on three classes parameters; the significance level α of the test; the size of the sample used for the test and an effect size parameter H1 and thus indexing the degree of deviation from H0 in the underlying population (Faul et al., 2007). According to Cohen (1998), the post hoc power analysis will make sense after a research has already been conducted since the test is looking for the power of analysis based on the actual sample size and the lowest effect size among the variables of the study to determine what the power was in the study. According to Ellis (2010), most researchers assess the power of their tests using $\pi = 0.80$ as a standard for adequacy.

To test the power of analysis for the *Halal* transportation and *Halal* warehousing services adoption, using number of predictors (11), observe R^2 (71.4) and (72.8) for *Halal* transportation and *Halal* warehousing respectively, probability at 0.05, total samples of 344, G-Power analysis shows that the power of analysis for this model was at 1.0. (Refer appendix 3 and 4). Thus indicating that, both of the models, an intention to adopt *Halal* transportation and *Halal* warehousing services have an adequate power to predict the relationship that existed in the study.

5.11 SUMMARY

In this chapter, the demographic profile of the companies and respondents were presented. But before that, data screening and the missing value imputation has been executed since PLS SEM cannot be run if there is a missing value in the data. Since the data was collected through series of time, Anova test was performed to ensure that there is no difference among the data and that it can be merged to be a group of data to be analysed. Next to that, a series of validities have been performed to confirm that the hypothesis testing could be run. From 20 hypotheses developed earlier, only 14 of them were supported. All variables representing the technological factor which are perceived benefits, complexity, cost, and awareness, (H1-H8) were found significance to the intention to adopt *Halal* transportation and *Halal* warehousing services.

For organizational factor which is represented by the organizational readiness (H9-H10) were not supported. The environmental factor which are represented by four variables, which are government support, customer pressure, competitive pressure and supplier; only two of them were supported. Customer pressure and competitive pressure (H13-H16) were found as supported, whereas government support (H11-H12) and supplier (H17-H18) were found as not supported. Even top management attitude that predicted earlier to have a moderating on the relationship between perceived benefits and intention to adopt *Halal* transportation and *Halal* warehousing services also was found as not supported.

CHAPTER 6

DISCUSSION, CONTRIBUTION, CONCLUSION AND FUTURE RESEARCH

TOE Framework was developed by Tornatzky and Fleisher (1990) due to some limitations in other technological adoption theories existed before. It is a semi-soft theory that consists of three main contexts known as Technology, Organization and Environment. There are no fix variables that must be applied by any researcher to use this theory. Any variables that can be justified as related to the technological factor, organizational and environmental factor can be used as a variable for the study. According to Tornatzky and Fleisher (1990), decisions to adopt technology innovations are determined by what is existing and innovations that will fit with the existing technology landscape. For this study, nine (9) variables which are four representing the technological factor, one (1) representing the organizational factor and four (4) variables representing the environmental factor were used to study the barriers and the enablers to the adoption of *Halal* transportation and *Halal* warehousing services among Malaysian certified *Halal* manufacturers. The next part for this section will elaborate and discuss the findings of the study according to the variables representing the TOE framework, with the top management attitude as a moderating factor and firm size as a control variable. The discussion will start with the findings on technological factors, followed by the organizational factor and ending with the environmental factors. After the discussion, this chapter will continue with the contribution of the study, conclusion and the suggestion for future research.

6.1 TECHNOLOGY

6.1.1 Perceived Benefits

H1 and H2 of the study refer to the perceived benefits for the organization to adopt *Halal* transportation and *Halal* warehousing services. According to Tornatzky and Klein (1982), Brown and Russell (2007), perceived benefits of a technological innovation encompass the expected advantages for the organization and the extent to which it is perceived as better than old ones. For this study, perceived benefits is defined as an expected advantage that the organization will obtain if they adopt the *Halal* transportation and *Halal* warehousing services. Organizations will try to adopt new technologies when there is a perceived need for using the technologies to overcome a perceived performance gap or exploit a business opportunity (Duan et al., 2012). Hence, not only in the studies mentioned above, perceived benefits also have been found to have a positive relationship with the adoption of new technology in other industries. In information system study, Cooper and Zmud, 1990, Ramdani et al., 2009 found that perceived benefits also have a positive relationship to the adoption of new technology in information system. On the other hand, Kim and Garrison (2010) also found the same relationship in the RFID study. Perceived Benfits also have a positif relationship with the adoption of E-market for SMEs in Australia (Duan et al., 2012). In XBRL studies, Haseqawa et al., (2004); Hannon, (2005); Choi et al., (2008); Garbellotto, (2009); Gray and Miller, (2009); Grabski et al., (2011); Monterio, (2011), Henderson et al., (2012) also argued that Perceived Benefits is positively related to the adoption of XBRL. Lastly, the results for H1 and H2 are also similar to results for cloud computing, whereby Hsu et al., (2014) found that perceived benefits have a positive relationship with the intention to adopt cloud computing.

It is believed that, by adopting *Halal* transportation and *Halal* warehousing services, the *Halal* quality of their products are guaranteed. Once the *Halal* quality is confirmed, it should increase their customer's confidence to use and reuse the products in the future. The message could be delivered by several methods by both of them. *Halal* service providers should aggressively promote their services by explaning the benefits that *Halal* manufacturers could get by adopting their services. It could be done

by distributing fliers, visiting *Halal* manufacturers booths to promote their services, organizing a talk session especially during the MIHAS and Halfest since the majority of the exhibitors for those events are non-adopters for *Halal* transportation and *Halal* warehousing services. The government agencies should help to convey the message that *Halal* manufacturers will obtain more benefits if they change from traditional services to the *Halal* services.

Hence, if the Malaysian government is really keen to promote Malaysia as *Halal* hub in this region, all the government agencies must encourage the *Halal* manufacturers to extend *Halal* supply chain services in their business operation. In this case, government agents such as the *Halal* Development Corporation (HDC) or JAKIM should conduct more sessions or talks regarding the importance and benefits of adopting *Halal* warehousing services. During an event like MIHAS and *Halal* festival which are conducted annually, not only *Halal* service providers, but they also should held a talk session or dialogue session with *Halal* manufacturers to encourage and convince *Halal* manufacturers to adopt *Halal* services. The government should not only rely on the providers themselves. If actions are taken from the government body, the perspectives will be different compared to if actions were taken by the *Halal* service providers. Since the government has a certain power, actions taken or the words from the government usually will have a bigger impact compared to actions taken by service providers.

For a long term approach to encourage the adoption of *Halal* transportation and *Halal* warehousing services, higher learning institutions, either under the government or private sector, should include the knowledge about *Halal* in their syllabus. Since these institutions will provide manpower for the logistic industry in the future, educating them at the earlier stage will generate industry players who are aware of the importance of adopting *Halal* transportation and *Halal* warehousing services towards being *Halal* from farm to fork. At present, Universiti Teknologi Malaysia (UiTM), Universiti Kuala Lumpur (UniKL) and Malaysian polytechnics are the pioneer institutions to offer logistic and supply chain courses to their students. A group of well-educated human resource that are able to improve and apply *Halal* knowledge in the industry are required in order to support the *Halal* industry to move up the value chain beyond

production processes and products.(Tieman, 2007d). Hence, a quality education system provided by the higher institutions is a good support to enhance the adoption of *Halal* transportation and *Halal* warehousing services in the Malaysian *Halal* industry. According to Talib and Hamid (2014), lack of graduates from logistics related qualifications make manpower on this industry are mixed from various disciplines of studies. Daud (2009) proposed that the collaboration among governments, higher learning institutions, and logistics industry professionals in designing programs and curriculum are crucial for Halal industry future needs. This effort could produce impressive results if players in *Halal* industry could provide vocational and continuous on job training to enhance the knowledge to the students and workers to ensure efficiency and productivity of the potential workforce (Tieman, 2007a).

6.1.2 Complexity

Complexity of supply chain commonly has a bad effect on both parties, either manufacturers or logistic providers. Complexity in *Halal* transportation and *Halal* warehousing services could arise due to variety of sources such as technical difficulty and also knowledge difficulty. Moreover, *Halal* supply chain which consists of *Halal* transportation, *Halal* warehousing and other services, are presumed to be complex activities which can result in it becoming a barrier for *Halal* manufacturers to adopt those services. The complexity of the technology creates greater uncertainty for successful implementation and therefore increases the risk in the adoption decision (Premkumar and Roberts, 1999).

Complexity has been found to have a negative influence to the adoption of *Halal* transportation and *Halal* warehousing services for this study. In other words, complexity is a barrier to the adoption of *Halal* transportation and *Halal* warehousing services. The *Halal* transportation and the *Halal* warehousing is claimed to be complex by many parties since the tight requirements to ensure it is confirmed as *Halal*. Due its complexity, the number of certified *Halal* service providers is still low in Malaysia. *Halal* integrity issues arise due to the complexity of its supply chain (Lam and Alhashimi, 2008). *Halal* as a concept cannot be fully encapsulated within the construct of product, *Halal* reaches much further into the disciplines of management of the

company, organisational behavior, culture anthropology and sociology (Wilson and Liu,2010; Zakaria and Abdul-Talib, 2010).

The complexity in *Halal* transportation and *Halal* warehousing services are derive from its' tight requirements. According to Tieman (2011), by adopting *Halal* transportation and *Halal* warehousing services, non-*Halal* products would not become *Halal* products, but *Halal* products could be non-*Halal* if there are ;

a) Direct contact with Haram products (Cross contamination)
b) Risk (mixing with non-*Halal* in same load carrier,)
c) Perception (no physical segregation)

Tools used in every *Halal* activity must be *Halal* tools, and cannot be mixed with the tools which have been used for non *Halal* goods. For both *Halal* activities, *Halal* goods cannot be mixed in any stages, with non-*Halal* products. *Halal* products cannot be transported or stored, or put in the same cartoon, or even sharing pallet, carrier or sharing rack with the non-*Halal* products. Besides that, unbroken cool chain is also a must in *Halal* transportation and *Halal* warehousing services. (Bahruddin et al., 2011) and these requirements will make it more complex if transporter or warehouse service providers also have non-*Halal* products to be taken care of for their customers. Due to many factors, *Halal* supply chain management becomes complex (Tieman and Van Nistelrooy (2014).

As mentioned by Tieman (2011), most of the *Halal* certified companies in Malaysia are non-Muslims. Even though they have received their *Halal* certification, since *Halal* is Arabic words and is commonly associated with Islamic, most of the manufacturers do not really understand the real *Halal* concept. They believed that as long as their products do not mix with *najs* and non-*Halal* goods such as pork and alcoholic beverages, the products will remain *Halal* in whatever condition. Due to their lack of understanding about *Halal*, they believed that as long as their products are already stamped with *Halal* mark, it is enough to convince Muslim consumers to use their products. For them as long they have obtained the *Halal* certification, their products are already *Halal* to be consumed. Even though researchers in this area have

already spend a lot of time and energy as an effort to ease the understanding by trying to reduce the complexity of *Halal* transportation and *Halal* warehousing services (Tieman, 2007a), but it is believed that it still a quite complicated for the non-Muslims to understand *Halal*'s concept unless they really learn in a proper manner.

Therefore, to enhance the adoption rate, every parties involved in this matter should play their role to increase the understanding and reduce the complexity without jeopardising the *Halal* credential. New technologies have to be user-friendly and easy to use in order to increase the adoption rate (Parisot, 1995; Sahin, 2006). To reduce this complexity, all parties involved must play their role. As *Halal* manufacturers, they already have their own *Halal* committee. Therefore, this *Halal* committee could share their knowledge about *Halal* transportation and *Halal* warehousing services to their members in the organization. For *Halal* service providers, they should provide a better explanation about their services to their potential clients. By sharing this kind of knowledge, it does not only reduce the complexity, but also increase the chances for *Halal* manufacturers to adopt their services.

Beside both parties playing their roles, government agencies such as SIRIM, JAKIM, HDC also could play their role by conducting a session to *Halal* manufacturers, especially during the audit process during their *Halal* certification application. If all parties involve could play their parts sincerely, it is not impossible that in the future, there will be is no complexity in *Halal* transportation and *Halal* warehousing services.

6.1.3 Cost

The third variable representing the technological factor is cost. H5 and H6 refer to the cost that is negatively related to the intention to adopt *Halal* transportation and *Halal* warehousing services. For this research setting, cost is referring to any expenses to be borne by *Halal* manufacturers on adopting *Halal* transportation and *Halal* warehousing services as an effort to maintain *Halal*ness of their *Halal* products. This study found that cost is negatively related to the intention to adopt *Halal* transportation and *Halal* warehousing services, thus H5 and H6 were supported. Reyes et al. (2011)

determined that costs, lack of understanding and technical barriers on new technology were perceived by non-implementing hospitals.

Cost is not only a concern for the commercial purposes, but also for the government sector. It can be seen in medical sector, when (Lian et al, 2014) claimed that hospitals decide to adopt cloud computing technology based on how much cost they need to bear to adopt it. On top of that, cost has a significant negative relationship on with intention to adopt electronic supply chain management system (Lin, 2014). Wabwoba et al., (2012) found that green information communication technology implementation is a costly undertaking. Hence, making it a barrier to its implementation. Abundant of literatures on technology adoption at the organizational level found that costs inhibit technology adoption (Chau and Jim, 2002). Though, we can confirm that the findings from this study were consistent with the findings from other studies in various area of research.

Halal transportation and *Halal* warehousing services are a new approach of handling *Halal* products, and were uniquely designed to meet the requirements of *Halal* manufacturers to maintain *Halal* integrity of the *Halal* products. Since these services are only devoted for *Halal* manufacturers, it also needs special tools, equipment and procedures according to Syariah requirements. The concept of *Halal* supply chain services is separating between *Halal* and non *Halal* goods to avoid contamination and maintain its *Halal* integrity. Due to that matter, all equipment used in *Halal* supply chain activities cannot be used in other non *Halal* supply chain activities. Since it is specialized equipment, and the limitation in terms of capability to be used in other products, it may lead to higher cost for both *Halal* manufacturers and *Halal* supply chain service providers. In order to make profit, one of its methods is to reduce the operation cost, and the adoption of *Halal* transportation and *Halal* warehousing services is likely to increase cost for *Halal* manufacturers. Usually a new method could reduce cost to obtain competitive advantages. (Kekre et al., 1995)

Organizations will ensure that the benefits to their organizations will outweigh the costs associated with the adoption of *Halal* transportation and *Halal* warehousing services

Even though the *Halal* manufacturers believed that the adoption of these services will give some benefits to them, but cost incurred to get the benefits should not be ignored. Organization is keen to have benefits of adopting new innovation more than it cost. (Premkumar and Roberts, 1999). Potential adopters typically evaluate the benefits they may gain from the adoption of new technology against the perceived costs delivered (Doolin and Troshani, 2007; Oliver and Whymark, 2005; Premkumar et al., 1994). Higher cost surely will reduce their profits. All cost for the technology adoption is not ended at the early stages of adoption, but it will be beared as long they use the technology. Training manpowers, maintaining the facilities and equipment, administrative and implementation cost must be beared by the *Halal* manufacturers if they are keen to switch it from the conventional supply chain activities. Therefore, this study found that cost is a barrier for *Halal* manufacturers to adopt *Halal* transportation and *Halal* warehousing services, especially for small and medium size organizations. According to our respondent's profile, 89% of them are from micro, small and medium size of organizations. Are these organizations willing to bear the switching cost to adopt *Halal* transportation and *Halal* warehousing services?

6.1.4 Awareness

H7 and H8 for the study refer to the awareness towards the adoption of *Halal* transportation and *Halal* warehousing services. This study found that awareness has a positive relationship to the adoption of these services. Thus, H7 and H8 were supported. It means that increasing in awareness of *Halal* transportation and *Halal* warehousing services, will lead to higher chance it will be adopted. There is a slim chance for the *Halal* manufacturers to adopt these services if they are unaware of their existence in the market. Furthermore, it is noted that *Halal* transportation and *Halal* warehousing services is still new in the market. Low awareness of XBRL in Australia is argued as one of the factor that lowers the adoption rate (Troshani and Doolin (2007). Steenkamp and Nel (2012) found that slow adoption of XBRL was due to lack of awareness among potential users. On the other hand, firms that do not have much information system experience may be unaware of new technologies or unwilling to take a risk to adopt them. (Ramdani et al., 2009).

The findings for this variable are consistent with other studies which are based on different areas of studies. This indicated that, awareness has a significant relationship with the intention to adopt the new innovation, whatever industry they are. This useful information should not be ignored by many parties involved in *Halal* industry. It is not that Halal manufacturers do not want to adopt it, but they are not aware of the existence of these services in the industry. During the data collection process during MIHAS and Halfest, the majority of respondents were shocked while answering the questionnaires. They repeatedly asked for confirmation " Are these services available in the market"? "Where can we get these services"?. These types of questions conveyed that the awareness of *Halal* transportation and *Halal* warehousing services is a problem that leads to low adoption of these services among Malaysian *Halal* manufacturers.

According to Zhu et al., (2013), both developed and developing countries promote the GSCM practice among manufacturers by creating awareness of environmental protection and institutionalizing pressure on them to further embark on implementation of GSCM. If this approach was successful in these countries to promote the GSCM adoption, this approach should be followed to gain the same results as GSCM adoption among manufacturers. To ensure this effort will be successful, government and *Halal* service providers should take aggressive action to increase the awareness among the *Halal* manufacturers. To create institutionalize pressures, it will need awareness and understanding of their employees regarding the *Halal* transportation and *Halal* warehousing services. Hence, through awareness campaign and flier distributions about the *Halal* transportation and *Halal* warehousing services, this will produce curiosity among workers which will then lead them to find more information about these services. Lutra et al., (2013) proposed that the government should take initiatives to make the customers aware about green products and how they are helpful to them. Study in e-business adoption, in order to increase the rate of its' adoption it is important to create an adequate level of awareness concerning the support and incentives provided by the government and the SMEs need to be educated about the e-business technology. (Keoy et al., 2009; Kyobe, 2009). As an addition to that, Lutra et al.,(2013) claimed special advertisements and welfare programs by government departments should be made to increase the level of awareness of customers. Once they

are aware about *Halal* transportation and *Halal* warehousing services, they will start to propose or pressure the employer to adopt *Halal* transportation and *Halal* warehousing services for the sake of Muslim consumers. Not to forget, also as an effort to gain competitive advantage for the companies themselves. As addition to that regulatory, competitive, and marketing pressures have led to increased environmental awareness and are the drivers of green supply chain management.(Zhu et al.,2005;Sarkis et al.,2011). Furthermore, Reyes and Jaska (2007) believed that with the increase of awareness, RFID will someday be applied in almost all industries. The author also believed it will be same with the *Halal* transportation and *Halal* warehousing services adoption.

It is more meaningful if the government agencies like JAKIM, HDC or UiTM themselves promotes Halal manufacturers to adopt Halal transportation and Halal warehousing services. Promotion and talk could be done during the Halal training session, Halfest or Halal seminar during the MIHAS that conducted annually, which they have a large numbers of Halal manufacturers. This will lead to the awareness of the services among Halal manufacturers. If Halal service providers themselves promoting their services, may be the Halal manufacturers assume that the providers just want to promote their business purely for profit making. But, once it is proposed by the trusted government agencies, the acceptance rate should be higher compared to if it is done by Halal service providers themselves.

6.2 ORGANIZATION

6.2.1 Readiness

Literatures in technology adoption studies have demonstrated the association between organisational readiness and the level of technology adoption (Chwelos et al., 2001; Kuan and Chau, 2001; Thong, 1999; Venkatesh et al., 2003). Organizational readiness in terms of financial and technological resources has also shown to be necessary for the use of information technology in hospitality organizations (Buhalis and Maain; 1998; Heung 2003). In e-commerce study, Molla and Licker (2005)

demonstrated that in initial adoption in developing countries, internal organizational readiness is significantly influential. Ramdani et al., (2009) have found that organizational readiness is a significant determinant of SME adoption of enterprise system. Indeed, organization readiness is a significant factor to the adoption of internet and web technology in Thailand (Khemtong and Robers, 2008).

Motivated firms to adopt new technologies must have technical ability, available resources and willing trading partners before new technologies adoption is possible. (Chwelos et al., 2001). In this case, even the intention to adopt *Halal* transportation and *Halal* warehousing services are high (M= 4.58 and 4.51, from 7 points likert scale) for *Halal* transportation and *Halal* warehousing respectively, but it shows that the *Halal* manufacturers in Malaysia is still not ready to adopt it yet. According to Othman et al., (2004) even though *Halal* manufacturers in Malaysia have a fundamental knowledge and understanding of *Halal* concept, they are still not ready to commit themselves to *Halal* at a higher level. The study also shows that one of the factor that lead to unreadiness to the adoption of *Halal* transportation and *Halal* warehousing services is financial. Majority of the respondents claimed that the top level management did not provide any financial support to adopt the services and to train their employees to have a better understanding about *Halal*.

The factor that leads to the unreadiness of *Halal* manufacturers to adopt *Halal* transportation and *Halal* warehousing services to their business operation is their level of the understanding about *Halal* concept as a whole. Since the majority of the *Halal* manufacturers companies are owned by non-Muslims, for them, *Halal* is about not using materials that related to alcohol, pork, dog and any products that declared as najs by Shariah. The real understanding about *Halal* concept is a problem for them. Omar and Jaafar (2011) argued that, *Halal* industry players cannot see why they should adopt *Halal* supply chain services which consist of *Halal* transportation and *Halal* warehousing services. That shows that, even they have fundamental knowledge about *Halal* (Othman et al., 2004), since they cannot understand the reason behind the adoption decision, they are not ready to spend or allocate certain budgets to ensure that their employees related to this products will understand. Since all *Halal* manufacturers companies have their own *Halal* committee, this committee should play their role to

enhance the understanding about *Halal* to their decision makers. Once their top level can foresee the importance of *Halal* transportation and *Halal* warehousing services to their products, then, the adoption of these services should not be a problem anymore. This view supported by Zailani et al., (2011) by mentioning that the capability of *Halal* manufacturers to meet the *Halal* requirements could be a source of competitive advantages for *Halal* industry players.

In addition to that, as represented in Table 5.5, 200 from 344 (81%) of the respondents were from small (64.4%) and micro (16.6%) size companies. As noted in technology adoption study, the bigger the company's size, they should be more ready to accept and adopt new approaches in their business operation. Findings found that the mean score for readiness is quite high (3.62, SD, 0.82). However, low scores for SD show that there is less variation on the data , hence, readiness is not significant for this study.

6.3 Environment

6.3.1 Government support

Previous studies have found that government support is significantly associated with the intention to adopt new innovation. Chong (2008), confirmed that government support is positively associated with the e-commerce implementation. Khemtong and Roberts (2008) found that government support is very important for the adoption and implementation of technological innovations. Sophonthummapharn (2009), mentioned that the government support is significant factor towards the adoption of electronic customer relationship. On top of that, Zhai and Liu (2013) claimed that the governments often control technology developments and thus can influence e-commerce implementation decisions Therefore, they recommended that in order to enhance the adoption of e-business among Malaysian SMEs, the government should continuously promote e-business to increase the awareness of the services among SMEs.

For this study, researcher believed that, there is a lot of government support for *Halal* industry. HDC is the biggest support provided by the government to enhance *Halal* industry in Malaysia. Universiti Teknologi MARA (UiTM) is constantly organizing various workshops and seminars about *Halal*. JAKIM and many other agencies in Malaysia provide various types of supports for *Halal* manufacturers and *Halal* service providers. Unfortunately, *Halal* manufacturers never treat all of that as a government support for them. May be the *Halal* manufacturers believed that all of that were support services from those agencies, without notifying that all of them are from the government agencies, or been supported by the government. Since the *Halal* manufacturers failed to see it was a government support, therefore, this study found that the government support were not significantly significant to the adoption of *Halal* transportation and *Halal* warehousing services.

Incentive will have an effect to the adoption decision. One of the factor derived logistics providers to become *Halal* service providers is an interesting incentives provide by the government through Malaysian Investment Development Authority (MIDA). Although MIDA provide many incentives for logistic providers to be as *Halal* service providers, but there is no incentives provided to the *Halal* manufacturers to adopt the services or who are adopting *Halal* services. Cool et al., (1997) highlight the importance of incentives in encouraging online purchasing among organizational buyers. Therefore, since there is no incentive for them, there is no motivation for them to change their traditional supply chain system to *Halal* supply chain system. If the government offers an incentive for those who are adopting *Halal* services, it is believed that the numbers of *Halal* manufacturers using *Halal* transportation and *Halal* warehousing services will tremendously increase.

Government has the power to enforce certain rule to be followed by industry players by introducing new policies. Zhu and Kraemer (2005) claimed that by developments of laws, policies and strategic directions by the government, it will enhance the adoption of e-commerce. At present, the government of Malaysia has already developed few standards for *Halal* that lead this country to become a leader in *Halal* industry (MS 1500, foods; MS 2424:2012, Pharmaceuticals, MS 2200: 2008,

Cosmetics). Even though there are many standards introduced to become *Halal* manufacturer according to the industry, but all of the standards failed to enforce the adoption of *Halal* transportation and *Halal* warehousing services. This is due to the fact that all the standards merely ask for the separation of goods between *Halal* and non-*Halal* in every stage of activities without notifying that, all *Halal* certified manufacturers must adopt *Halal* transportation and *Halal* warehousing services in their business operation. Hence, without this kind of regulation, therefore there is no urgency for *Halal* manufacturers to use *Halal* transportation and *Halal* warehousing services to handle their products. Based on XBRL research in South Africa, the major reason for the companies for not adopting this software is because it is not yet a mandatory (Steenkamp and Nel, 2011). It is similar to the RFID adoption. Yazici (2014) argued that lack of regulatory requirements as a barrier to the adoption of RFID in Hospital. It is going to be the same for the adoption of *Halal* transportation and *Halal* warehousing. *Halal* transportation and *Halal* warehousing service providers cannot hope without any effort, but at the same time expect that the adoption process will become manufacturer driven. According to Tieman and Nistelrooy (2014), the adoption process will require pressure from the government through regulations and policies to make *Halal* transportation and *Halal* warehousing a regulatory requirement for *Halal* certification of all *Halal* manufacturers. Besides this, through regulations, the government should also continuously promote e-business, spread the awareness and benefits of e-business and provide adequate training to enhance the adoption of e-business (Keoy et al., 2009; Kyobe, 2009). This effort should also be followed by the government if they are really keen to enhance the adoption rate of *Halal* transportation and *Halal* warehousing services. If the government of Malaysia is really serious to become a *Halal* hub in this region, it is important to ensure a high rate of adoption for *Halal* services especially in the supply chain activities among *Halal* manufacturers in this country. By doing so, the world population will have no doubt about the quality of *Halal* products from this region.

6.3.2 Customer Pressure

The Second variable representing the environmental factor is the customer pressure, which is also variable for H13 and H14. Customer pressure was found to have a positive relationship with the intention to adopt *Halal* transportation and *Halal* warehousing services. These findings were supported by various areas of studies. At present, due to the increase in purchasing power of Muslim consumers, now they are not only looking for *Halal* certification products, but also asks for *Halal* process (Bonne and Verbeke, 2008) and *Halal* supply chain activities (Omar and Jaafar, 2011). On top of that, Tieman (2007a) have mentioned that, from the customer point of view, the *Halal* supply chain which consist of *Halal* transportation and *Halal* warehousing is a critical success factor in ensuring the *Halal* integrity for *Halal* products. Maybe in the early stage of *Halal* awareness, *Halal* integrity exists only based on trust. The seller will be fully responsible to ALLAH to ensure that their *Halal* products are *Halal* to be consumed (Tieman, 2011). In Malaysian context, since the majority of the *Halal* companies is owned by the non-Muslims (Tieman, 2013), therefore to alleviate the doubts among Muslim consumers, the adoption of *Halal* transportation and *Halal* warehousing services is not an option anymore, but as a something that must be executed in order to maintain the integrity of the *Halal* products (Tieman, 2011).

60.4% from almost 30 million population in Malaysia are Muslims, therefore *Halal* manufactures should not ignore the power pressure from this group. Since *Halal* is not only ensure the safety, hygiene, cleanliness but also focus on well-being of the consumer who consumed *Halal* products, *Halal* products are not only for Muslims only. Non-Muslim Dutch consumers have shown interest in *Halal* food where total demands were estimated to reach about US3 billion annually (HDC, 2012). Although there is no statistics showing how much non-Muslim in Malaysia spend on *Halal* products, but, it is believed that due to the quality of *Halal* products, non-Muslims in Malaysia also spent millions of ringgit per year to purchase *Halal* products, either for foods, pharmaceuticals or cosmetics.

Though it is believe that, if customers keep on pressuring the *Halal* manufacturers to adopt *Halal* transportation and *Halal* warehousing services on their business operation, in near future, most of all *Halal* manufacturers in Malaysia will adopt these services since they know that the customer is always right. The pressure will be stronger if Non-Government Organizations (NGOs) such as Consumer Association of Penang (CAP) could declare or make a statement representing the Muslim community that they need Halal manufacturers to adopt Halal supply chain services especially on Halal transportation and Halal warehousing services to ensure that Halal products is really Halal at the point of consumption.

6.3.3 Competitive pressure

This study has defined competitive pressure as a pressure resulting from a threat of losing competitive advantage forcing firms to adopt and diffuse the *Halal* transportation and *Halal* warehousing services.

The findings of this study proved that the higher the competitive pressure, the higher the intention to adopt *Halal* transportation and *Halal* warehousing services. Besides helping Muslim consumers to enjoy *Halal* products, the main purpose of the business organization to enter in the business world is to create profit. To survive in the stiff *Halal* market due to the increase in numbers of *Halal* manufacturers in Malaysia or in the world *Halal* market nowadays, *Halal* manufacturers must be at least at the same level with their competitors. But if the organization is leading their competitors, it will put them at a better position.

The adoption of *Halal* transportation and *Halal* warehousing services, which will increase the confidence level of their customers towards *Halal* credential, is one of a tool to win the race between their rivalries. If potential clients believed that their competitors who are adopting the *Halal* services are better compared to the *Halal* products who are not using it, to avoid losing their clients, it is believed that the *Halal* manufacturers who are not yet adopting *Halal* services will start to do so. Hence the effort to encourage majority of Halal manufacturers to adopt Halal transportation and

Halal warehousing services could be successful if the main player in Halal manufacturers start to adopt the services. Since competitive pressure is believed to be able to increase the adoption rate, JAKIM or other government agencies could organize a discussion with main player in Halal industry in order to accelerate the adoption rate of Halal services among Halal manufacturers in Malaysia.

6.3.4 Supplier availability

This study indicates the negative effect of the supplier availability to the adoption of *Halal* transportation and *Halal* warehousing services. In other words, supplier availability is a barrier to the adoption of those services. It contradicts with the many studies stated in the literature before. These negative results were due to the fact that majority of the respondents (53.5%) are located outside of Selangor and Kuala Lumpur. Until now, there are only nine (9) *Halal* transportation and *Halal* warehousing service providers that has been certified as *Halal* by JAKIM or HDC and all of them located in Kuala Lumpur or Selangor. The *Halal* service providers are as follow;

1) Kontena Nasional Berhad
2) MISC Integrated logistics Sdn bhd
3) Biforst Logistics Sdn Bhd
4) GC Logistics Sdn Bhd
5) Havi Logistics (M) Sdn Bhd
6) Citra Multimodal services Sdn Bhd
7) Freight Management (M) Sdn Bhd
8) Iglo (M) Sdn Bhd
9) North Port Malaysia Berhad

The *Halal* manufacturers who are located in Klang valley should not have any problem to adopt those services, but the situation is different for the *Halal* manufacturers who are located outside of Klang valley. Since *Halal* transportation and *Halal* warehousing services are new approaches in supply chain activities and the high standard of *Halal* quality of Malaysian Standards, only a very small numbers of logistics providers who are qualified to be awarded as *Halal* service providers. Hence,

the small number of suppliers in *Halal* transportation and *Halal* warehousing services and their location limited to Kuala Lumpur and Selangor as major reasons why supplier availability was found as negatively related to its adoption among Malaysian *Halal* manufacturers.

Even though all *Halal* transportation and *Halal* warehousing service providers are located in Kuala Lumpur and Selangor, not all of the *Halal* manufacturers in that area are adopting their services. Al-Qirim (2007) claimed that lack of assistance of technology vendors in New Zealand in terms of competence and technical advice, lack of promotion are also reasons why a new technology was not well accepted. It could be same for the *Halal* manufacturers. During the data collection, most of the respondents claimed that they have never been approached by the *Halal* transportation and *Halal* warehousing service providers to promote their services to them. Without good promotion and marketing strategies, we cannot expect all of the *Halal* manufacturers to willingly switch from traditional transportation system and warehousing system to *Halal* transportation and *Halal* warehousing system. As mentioned by Tieman and Nistelrooy (2014) the adoption process should be manufactured driven, but as a collective effort by service providers and government regulations.

Therefore, this kind of information could be used as a base for Halal services provider to develop a new marketing plan in order to fulfil the demand for their services. The intention to adopt is already there, but it must be supported by Halal service providers approaching them and giving extra information about how beneficial their services are to ease the doubt of Muslim consumers about Halal products in Malaysia.

6.4 MODERATING FACTOR

This study hypothesized that top management attitude will positively moderated the positive relationship between perceived benefits and the intention to adopt *Halal* transportation and *Halal* warehousing services. Unfortunately the results were not significant. In addition to that matter, top management attitudes were found as

negatively moderated for the relationship between perceived benefits and the intention to adopt *Halal* warehousing services. Even though perceived benefits were found to have a positive relationship with the intention to adopt *Halal* transportation and *Halal* warehousing services, the top management attitude failed to enhance the relationship between those variables. Therefore top management attitude can be claimed to not have any moderating effects on the intention to adopt *Halal* transportation, but has a negative moderating effect on intention to adopt *Halal* warehousing services. It may be due to the low understanding about *Halal* concept as a whole and belief that the *Halal* logo itself can already established that their products are *Halal* to be consumed. Since their products are already certified *Halal*, the top management cannot comprehend the need to spend more to adopt *Halal* transportation and *Halal* warehousing services. Furthemore, Omar and Jaafar (2011) mentioned that the *Halal* industry player view the adoption of *Halal* supply chain will just increase the cost and create problems for them, without understanding the effect behind the adoption decisions for their products. Furthermore, 260 of the respondents (75.6) and 241 of the respondents (70.1%) already have their own transportations and warehouse respectively. Hence, with current transportations and warehousing services, they are already certified as *Halal* manufacturers, the top management cannot see why should they still need to adopt another transportations and warehousing services.

6.5 CONCLUSION

Halal transportation and *Halal* warehousing services is complex, but, since Muslim consumers require higher assurance of *Halal* goods, the adoption of *Halal* transportation and *Halal* warehousing services is the only way *Halal* integrity can be protected. As argued by Lada et al. (2009), Alserhan (2010), Ibrahim and Mokhtarudin (2010) and Wilson and Liu (2010), *Halal* needs a supply chain approach. *Halal* should also take into consideration the spiritual needs of the Muslim consumers (Alserhan, 2010) and Islamic values (Zakaria and Abdul-Talib, 2010). Furthermore, (Tieman, 2011) proposed that, currently, *Halal* manufacturers should extend their *Halal* activities beyond of their ingredients and manufacturing processes, till the supply chain activities to confirm that their *Halal* credence is not in doubt.

The main objective of the study is to identify what are the barriers and the enablers to then adoption of *Halal* transportation and *Halal* warehousing services. This study has found several variables that could be barriers and the enablers to the adoption of the subjects matter. The barriers and the enablers to the adoption of *Halal* transportation and *Halal* warehousing services according to its importance that should be noted by the parties involved are as below;

i) Enablers to the adoption of *Halal* transportation services
   1. Competitive pressure
   2. Customer pressure
   3. Awareness
   4. Perceived benefits

ii) Enablers to the adoption of *Halal* transportation services
   1. Customer pressure
   2. Competitive pressure
   3. Perceived benefits
   4. Awareness

iii) Barriers to the adoption of *Halal* transportation and *Halal* warehousing services
   1. Cost
   2. Complexity

The other three (3) variables which are organizational readiness, government support and the supplier availability were found not to be significant to the study, but it does not indicate that the variables were not important factors that should be ignored by the relevant parties. Hopefully the findings of the study can help the parties involved in this field like *Halal* manufacturers, *Halal* service providers and the related government agencies to develop a better plan and strategy in order to enhance the adoption rate of the services. It should be noted that, the higher rate of the adoption of *Halal* transportation and *Halal* warehousing services will not bring benefits to those parties only, but also for the sake of the consumers who are seeking for purely *Halal* products.

As Malaysia is a developing country, these findings may reflect to other developing countries which have similar characteristics like Malaysia such as in terms the majority of the people are Muslims and has a *Halal* authorizing body in their respective countries. Even though there are some differences compared to the other developing countries, but as long as they also adopting the Malaysian's *Halal* standards, the study will also be benefitting to them.

The previous discussion of results can be categorized around four points that help answer the research questions. First, in response to the first objective which is to develop a model of the intention to adopt Halal transportation and Halal warehousing services, all the hypothesis showed which factors are significant and insignificant to the intention to adopt those services. The significant factors are divided into two categories; either barriers or enablers to the intention to adopt.

The second objective is to investigate the relationship between variables representing technology, organization and environment and intention to adopt Halal transportation and Halal warehousing services. H1-H18 were tested to meet this research objective. From nine variables which formed eighteen hypothesis tested, only six (6) variables that form twelve (12) were found supported. The six variables are cost and complexity which act as the barriers, and customer pressure, competitive pressure, awareness and perceived benefits act as the enablers to the intention to adopt Halal transportation and Halal warehousing services. Another three (3) variables which are organization readiness, government support and supplier availability were found as not supported.

The third objective is regarding the top management attitude as a moderating factor to the positive relationship between perceived benefits and the intention to adopt Halal transportation and Halal warehousing services. This objective was answered by testing the H19-H20, which were found as unsupported.

The findings from this study alone cannot solve the problem that was mentioned in the problem statement earlier, but it could help many parties to enhance the low adoption rate of Halal transportation and Halal warehousing services among Halal

manufacturers in Malaysia. This study will enrich the literature in Halal study, which currently focused on certification, ingredients and consumer behaviour. Moreover, most of the study were on foods only, and very little on pharmaceuticals and cosmetics. But this study focus on activities in Halal supply chain which is quite rare in the literature and concerned about those three major industry in Halal which are foods, pharmaceuticals and cosmetics. Furthermore, the findings in this study could provide some guidelines to Halal providers, government agencies in Halal industry and also the academicians to improve our Halal industry to ensure that Malaysia will be a Halal hub in this region in near future.

6.6 CONTRIBUTION TO THEORY

There are several important implications to the theory provided from this study. Firstly, the *Halal* supply chain literature is expanded through this research, which investigated the adoption of *Halal* transportation and *Halal* warehousing services among Malaysian's *Halal* certification companies. Most of the *Halal* researches are concerned with customers' buying behaviour (Husain et al., 2012). Although studies regarding *Halal* are emerging in the literature, most of them are looking at the *Halal* purchase intention, (Lada et al., 2009; Alam and Sayuti, 2011, Borzooei and Asgari, 2015, Hayat et al., 2015), Halal hub, Muhammad et al., 2009, Borzooei and Asgari, 2013, Halal certification (Shafei and Othman, 2006), *Halal* logistics (Tieman, 2007a,b,c,,2011,2013,2014), *Halal* logo (Mohamed et al., 2008) *Halal*an Toyyiban Food supply chain (Omar and Jaafar 2011,2013), *Halal* supply chain literatures especially in *Halal* transportation and *Halal* warehousing services expanded through this study.

There many literatures that mentioned the adoption of *Halal* supply chain is not an option, but as a must if we would like to confirmed that the *Halal* products are really *Halal* at the point of consumption. Omar and Jaafar (2011) claimed the GMP and HACP applied by *Halal* manufacturers are not sufficient to confirm products are *Halal* at the point of consumption since *Halal* is not included in the supply chain activities. Tieman (2007a) mentioned that due to *Halal* integrity is already at stake, though the control of supply chain is critical and belongs to academics to provide the solutions.

Tieman (2011), argued that a supply chain approach is important to guarantee the *Halal* integrity at the point of consumption due to the integrity of the *Halal* products is a result of various activities in the supply chain. Lada et al., (2009) Alserhan (2010) Ibrahim and Mokhtarudin (2010) and Wilson and Liu (2010) *Halal* products need a *Halal* supply chain approach, but, to date, to the best knowledge of the author, very little is known about factors that influencing the decision to adopt *Halal* supply chain services. As far as the author is concern, this is the first study to look at the barriers and the enablers to the adoption of *Halal* transportation and *Halal* warehousing services among Malaysian *Halal* manufacturers.

TOE framework that represent by Technology, Organization and Environment is a semisoft theory that is used to study the technology adoption at the organizational level. TOE has been used by many studies to explain technology adoption phenomena (Thong, 1999; Kuan and Chau, 2001). Most of the areas in technology adoption has been linked with the TOE framework, but not in the *Halal* supply chain study especially in *Halal* transportation and *Halal* warehousing services. By adopting this theory, it could provide additional support beyond research previously conducted and further understanding on the relationship that representing the TOE framework and the decision to adopt new technology. On top of that, since the unique features of the TOE framework, that allow any variables that can be justified to represent the technology, Organization and Environment, this study also included the awareness to be a factor in technological factor which is rarely used in other studies that adopting TOE framework as a theory. Perhaps, this is the first study that tries to integrate between *Halal* transportation and *Halal* warehousing and the TOE framework.

The last contribution for the theory on this study is the role of top management attitude. Other studies used top management attitude as a variable representing the organizational factor, but for this study as proposed by Raganath et al., (2004) , the top management attitude was tested as a moderating factor. Unfortunately, for this study, the top management attitude was not supported as moderating factor for the relationship between perceived benefits and intention to adopt *Halal* transportation and *Halal* warehousing services. But it does not mean that the top management attitude is not a moderating factor for the TOE framework as proposed by Raganath et al. (2004). May

be, in other area of study, the top management attitude will be a moderating factor for the TOE framework.

6.7 CONTRIBUTION TO PRACTICE

Based on the results, the study proposed for *Halal* transportation, *Halal* warehousing service providers, government agencies, *Halal* manufacturers and consumers themselves to take several adequate measures to enhance the adoption of *Halal* transportation and *Halal* warehousing services among Malaysian *Halal* manufacturers to ease the doubtness about the *Halal*ness of *Halal* products.

Since these findings are very similar to other findings in many areas of studies, it clearly indicated that perceived benefits is really an important variable that reflect the intention to adopt new innovations for the organizations. Therefore, this kind of information should be very meaningful to *Halal* industry players in Malaysia. The consistency in findings for this variable shows a strong indication that, in order to increase the adoption rate of *Halal* transportation and *Halal* warehousing services, the non-adopter that is the *Halal* certified manufacturers in Malaysia must understand the benefits they could get if they adopt those services in their business operations. It is believed that by providing them with potential benefits of adopting those services, it will enhance the adoption rate, though, all related parties either *Halal* service providers or government agencies should give them the information of how good this services for them. This responsibility should not only be borne by *Halal* service providers, but the *Halal* service providers should work hand in hand with the government bodies. If *Halal* service providers promote the benefits of adopting their services by themselves, maybe, *Halal* manufacturers will not buy the idea since they believed that *Halal* service providers are trying to persuade them to use their services. But, by cooperating with government agencies such as HDC, JAKIM and higher learning institution such as Universiti Teknologi Mara (UiTM), it will increase the confidence among the *Halal* manufacturers about the benefits of adopting *Halal* transportation and *Halal* warehousing services for their businesses.

Complexity acts as a barrier to the adoption of *Halal* transportation and *Halal* warehousing services. It is something that cannot be avoided since *Halal* is Arabic word and synonymous to Muslims. But, since the world now understands the quality of *Halal* that focus of hygiene, safety, cleanliness and not calamitous to their health and well-being in whatever they consume, *Halal* is not only for Muslims only. Hence, for this issue, government and academician should play their role to ensure that *Halal* quality is still at the accepted level, but the complexity should be reduced. Halal providers should try to reduce the complexities of these activities without compromising the Halal's requirements. Hence, academicians should conduct more research to solve this issue. Beside that, government also could ease the academicians' jobs by providing research fund or grant to solve this problem. Increase in understanding will reduce the level of complexity for them.

On top of that, since this study shows that cost is a significant barrier to the adoption, and service is still relatively new to the *Halal* manufacturers, *Halal* service providers should not approach the potential clients at a premium cost. As proposed by Tieman (2013), the application of *Halal* transportation and *Halal* transportation services should not significantly increase the costs of *Halal* products to be in the market. *Halal* service providers should promote their services by giving a promotional discount to *Halal* manufacturers to introduce and attract them about these services. Once the *Halal* manufacturers noticed about these services and their advantages to their marketing strategies, Tieman and Nistelrooy (2014) argued that, *Halal* foods manufacturers will willingly pay a higher cost to use their services. In this scenario, the non-adoption of *Halal* transportation and *Halal* warehousing services among *Halal* manufacturers is not only on brand owner's fault, but also due to improper marketing strategies by the *Halal* service providers' themselves. Furthermore, the government are providing many incentives such as tax exemption for the *Halal* services providers. It should ease the burden of *Halal* service providers. Hence, *Halal* service providers should not put premium price for their services. Being *Halal* is not about money. The spirit of traditional supply chain is to reduce the cost and the objective of *Halal* supply chain services is to maintain the *Halal* quality. *Halal* transportation and *Halal* warehousing services is a new approach of handling products. Therefore, consumers are not really aware and educated about the services. Due to that factor, *Halal* service providers

should not enter the market at a higher price compared to traditional supply chain. Promotion by giving discount price, loyalty points, and certain privileges are believed to be able to reduce the cost for *Halal* manufacturers to adopt the services. Once they realized the quality of *Halal* services, they will be willing to pay extra cost for the services. (Tieman, 2013).

For the awareness factor, this study has found that it has a positive relationship with the intention to the adoption of *Halal* transportation and *Halal* warehousing services. By creating awareness among *Halal* manufacturers, it will help to increase the adoption rate among them. Halfest and MIHAS are the best events to increase the awareness about *Halal* transportation and *Halal* warehousing services. In addition, promotion the services during this event should be helpful for them since all the exhibitors for the events are *Halal* companies. But, the efforts should not be rested on the *Halal* service providers themselves. Government agencies should collaborate with them as the manufacturers will have high confidence if the efforts are supported by the government agencies.

Organizational readiness was found to be an insignificant factor to the adoption of *Halal* transportation and *Halal* warehousing services. Therefore, in order to increase the adoption rate of *Halal* transportation and *Halal* warehousing services among Malaysian's *Halal* manufacturers, a lot of efforts will still be required to ensure the *Halal* manufacturers are ready in term of financial and human resources to adopt the services. Readiness could be built either from inside or outside of the organization. From inside, the top management who make decisions to the organization should understand the whole of *Halal* concept. Once they realized this, they will provide financial assistances to adopt the services. From outside of the organization, it could be from many sources such as government regulations, customer pressures, competitive pressure and also support from the *Halal* service providers themselves.

The Malaysian government has provided several agencies to support the development of *Halal* industry in this country. HDC and JAKIM are the most prominent figure in *Halal* issues in Malaysia. Beside these efforts, *Halal* manufacturers do not see it as government support, but as the function of agencies themselves. Hence

the study has found that the government support is not a significant factor towards the adoption of *Halal* transportation and *Halal* warehousing services. Maybe the *Halal* manufacturers are looking for similar incentives as have been provided to logistic providers to be as *Halal* service providers, then they will see there is a government support for them. Hence, Malaysian government should be more aggressive in promoting *Halal* transportation and *Halal* warehousing services and at the same time try to offer an incentive to *Halal* manufacturers to adopt the services. If this direct incentive to *Halal* manufacturers, they may be notice that there are government support for them to survive in this competitive industry.

Customer pressure could enhance the adoption of *Halal* transportation and *Halal* warehousing services. If Muslims consumers start to not only rely on the *Halal* logo and become more curious about services used by the *Halal* manufacturers, by asking for *Halal* from farm to fork, it will create pressure to *Halal* manufacturers. For example, customers in Pakistan do not only focus on *Halal* logo and certifications itself, but also looks on the quality of *Halal* products itself, and they decide to buy products according to their careful evaluation of the products (Hayat et al., 2015) If this could happen in Malaysia, *Halal* manufacturers have no choice but to start to adopt the *Halal* services in their business operations. If the customers start pressuring and boycotting the *Halal* products which is do not adopt the *Halal* services, this scenario will also lead the *Halal* manufacturers who have not yet adopted the *Halal* services to adopt *Halal* transportation and *Halal* warehousing services. By joining with the Non-Government Agencies (NGOs) such as Consumer association of Penang (CAP), or any other agencies who already establish in Malaysia, customer pressure will become such a strong power to push Halal manufacturers to start adopting Halal services in their business operation.

Since the study found that competitive pressure is significantly associated to the adoption of *Halal* transportation and *Halal* warehousing services, the government or *Halal* service providers should approach the leader in the *Halal* industry to encourage them to use *Halal* services for their products. The result also indicated that, since higher competitive pressure will lead to the adoption of *Halal* transportation and *Halal* warehousing services. Once the leaders in their respective industry for Foods,

Pharmaceuticals and Cosmetics start, their competitors will also start to act in the same way. Though by approaching the main player for each category such as NESTLE for foods, PHARMANIAGA for pharmaceuticals to promote the using of Halal services as they did, it may open the eye their competitors to follow their footstep .Once this happens, the adoption of *Halal* transportation and *Halal* warehousing services among *Halal* manufacturers in Malaysia is should not a problem in future.

Since supplier availability was negatively related to the adoption of *Halal* transportation and *Halal* warehousing services due to small number of the providers, government should increase their promotion to encourage supply chain service providers to become *Halal* supply chain service providers. Due to a lot of incentives have been offered by the government, and according to JAKIM, there are many applications that have been forwarded to them, but failed to be awarded as *Halal* service providers, JAKIM should not loosen their regulations to increase the number of *Halal* service providers, but more training, seminars or workshop should be run to ensure the target groups have a better understanding about how to be certified as *Halal* service providers.

Even though the majority of Halal manufacturers are located in Klang Valley, it should not be the main reason why Halal service providers just ignore other states in Malaysia. On the other hand, *Halal* transportation and *Halal* warehousing service providers should focus their offer of services not only on areas around Kuala Lumpur and Selangor, but also to other areas in Malaysia. There is a great demand for the services throughout the whole nation as *Halal* manufacturers are scattered all over East and West Malaysia.

For the *Halal* service providers, since their services are relatively new in the market, a good marketing strategy should be developed to ensure their services could spark the interest to use their services. Providing an incentives such as price discounts, priority delivery (Gatignon and Robertson, 1989, Kalakota, et al.,1999) can be the types of enticements needed to encourage the desired behaviour. (Cool et al., 1997). It must be remembered that, suppliers are not the only organizations benefitting from the adoption (Cool et al., 1997) of *Halal* services, but also the consumers who are looking

for a pure *Halal* products. Pearson and Ellram (1995) found that quality and cost factors were the dominating criteria used when evaluating suppliers (Pressey et al., 2009). Hence, pricing and quality of services are also important factors that must be considered while developing a good marketing strategy to enhance the adoption of *Halal* transportation and *Halal* warehousing services.

The study is concerned about three *Halal* industries which are Foods, Pharmaceuticals and Cosmetics industries. Since the study has found that there is no statistical differences in these industries, the approach taken to overcome the low adoption of *Halal* transportation and *Halal* warehousing services should not differ across the industries. What actions to be taken for *Halal* foods, should be the same for *Halal* Pharmaceuticals and *Halal* cosmetics manufacturers.

Based on the above discussion, it can be concluded that every players involved in *Halal* industry has their own role. It cannot be handed by certain parties, but all parties should play their role accordingly. *Halal* manufacturers, *Halal* service providers, Customers and the government agencies should hand in hand start promoting, pressuring and encouraging the adoption of *Halal* transportation and *Halal* warehousing services in order to support Malaysia to be as *Halal* hub in this region.

6.8 LIMITATION OF THE STUDY

Halal transportation and *Halal* warehousing services are only meaningful for the *Halal* products only. The purpose of those services is to maintain the *Halal* credence of the products. The adoption of these services will not lead the non-*Halal* products to become *Halal*. Therefore, this study limits to the *Halal* manufacturers that have been certified by JAKIM but have not adopted the *Halal* transportation and *Halal* warehousing services, or \ one of those two services. This is due to the fact that, there are *Halal* manufacturers who have already adopted one of those services, or not adopting both of it yet. Furthermore, this study only focuses on the Halal manufacturers who only operate locally.

Even though the study has enough sample to run the analysis, non-probabily sampling technique was adapted due to the list of non-adopters are unavailable, hence, the findings of the study cannot be generalized to the current population. Furthermore, Halal transportation and Halal warehousing are unique and related to Islam, therefore the findings for the study may not be suitable to the type of technology investigated that are not related to a religious activity. Finally, this research includes only factors that are related to the TOE framework. There are other variables that could also contribute to the determinants of intention to adopt technology that cannot be applied to this study.

6.9 SUGGESTION FOR FUTURE RESEARCH

Even though this research has identified the barriers and the enablers to the adoption of *Halal* transportation and *Halal* warehousing services, it is only from the perspectives of non-adopters. For instance, future endeavours could be dedicated to investigate the enablers to the adoption from the adopters. What factors that derived them to be the early adopters of *Halal* transportation and *Halal* warehousing services. Although, the respondents claimed that they have an intention to adopt, but in fact, not all of them will adopt in the near future. Even if all the barriers are overcome, it will be much easier and better if the study is collaborated with the *Halal* transportation and *Halal* warehousing service providers. The list of actual adopters is genuine and easily targeted since *Halal* transportation and *Halal* warehousing service providers are still in business with them.

This study only focus on the domestic activities, but *Halal* is not only for locals. According to HDC, in 2014 *Halal* export increased by 14.8% to reach more RM 37 Billion. RM 15.48 billion for foods, RM2.31billion for Cosmetics and RM 0.51 billion for pharmaceuticals. The future study could focus on the adoption of *Halal* transportation and *Halal* warehousing services among Malaysian *Halal* manufacturers who are exported the products to other countries. The top ten countries as Malaysian *Halal* export destination are China (RM 4.6b), Singapore (RM3.6b), United States (RM 3.4b), Indonesia (RM 2.3b), Japan (RM 2.2 b), Netherlands (RM 2.1b), Thailand (RM 1.7b), India (RM 1.6b), South Korea (RM1.6b) and Australia (RM 1.3b). If this study

could be conducted, another area of supply chain could also be investigated ; terminal operations and container purification.

In the early stage of the study, compatibility was included as a variable to be studied. Due to the fact that Halal transportation and Halal warehousing services are still relatively new at that time, pre-test result shows that the variable should be excluded and replaced by the awareness. Now, it is believed that Halal transportation and Halal warehousing are already quite known among Halal manufacturers, though it is appropriate to include compatibility as another variable to be included since most of the literature in the TOE framework studies was using it as variable representing the technological context of the study.

Beside those studies, the same study that uses another adoption theory could be used. Other moderating variables could be tested. The author believed that religiosity or religion could be a moderating factor in any *Halal* adoption study since *Halal* is closely related to the Islam and the Muslim consumers.

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APPENDIX A1

PRE-TEST REPORT

Construct	Indicators	Respondent 1	Respondent 2	Respondent 3	Action
TECHNOLOGY Perceived Benefit (PB)	1) Adopting *Halal* supply chain services is useful to expand our market 2) Applying *Halal* supply chain services will increase our *Halal* image and reputation. 3) Adopting *Halal* supply chain services will increase customer satisfaction 4) Adopting *Halal* supply chain services will increase our profit. 5) Using *Halal* supply chain services will increase the purity of our products	OK	OK	OK	No problem, the variable and the items will be remain with no changes.

Construct	Indicators	Respondent 1	Respondent 2	Respondent 3	Action
Complexity (CPX)	1) My company believes that *Halal* supply chain services are complex to use 2) The skills required to use *Halal* supply chain services are too complex for our employees 3) Integrating *Halal* supply chain services in our current work practices will be very difficult.	OK	OK	OK	No problem, the variable and the items will be remain with no changes
Cost	1)Extra cost is needed to apply *Halal* supply chain services 2) *Halal* supply chain services adoption cost is higher than its' benefit.	OK	OK	OK	No problem, the variable and the items will be remain with no changes

Construct	Indicators	Respondent 1	Respondent 2	Respondent 3	Action
	3) The amount of money and time will be invested to adopt *Halal* supply chain services are high 4) The cost of *Halal* supply chain services is quite high for our company				
Compatibility	1) *Halal* supply chain is compatible with most aspects of the firm's work. 2) *Halal* supply chain fits with the firm's work style 3) *Halal* supply chain is compatible with our infrastructure.	Not sure since he don't know about that	Not sure since he don't know how *Halal* supply chain requirements.	Not sure since their company still not use it yet.	This variable has been deleted since respondent don't know regarding *Halal* supply chain. The awareness has been proposed as a better variable to be studied compare to compatibility.

Construct	Indicators	Respondent 1	Respondent 2	Respondent 3	Action
ORGANIZATION Readiness (Rd)	1) Our organization not ready to adapt a *Halal* supply chain services 2) Our organization will face a problem if we implementing *Halal* supply chain services 3) Our organization already have a contract/account with other conventional logistic providers. 4) We have adequate knowledge to maintain *Halal* integrity by ourselves	OK	OK	OK	No problem, the variable and the items will be remain with no changes.
Firm Size	Based on numbers of fulltime employer				No problem, the variable and the items will be remain with no changes.

Construct	Indicators	Respondent 1	Respondent 2	Respondent 3	Action
ENVIRONMENT Government Support (GS)	1) There is no adequate incentive provides by govt if our organization adopting *Halal* supply chain services. 2) Government did not provide adequate training for us to understand the importance of *Halal* supply chain services 3) There is no regulation enforce us to apply *Halal* supply chain services. 4) Government did not provide adequate training for us to understand the importance of *Halal* supply chain	OK	OK	OK	No problem, the variable and the items will be remain with no changes.

Construct	Indicators	Respondent 1	Respondent 2	Respondent 3	Action
Customer Pressure (CSTP)	1) Our customers are not pressuring us to adopt *Halal* supply chain services				No problem, the variable and the items will be remain with no changes.
	2) Customers' requirements indicate that a company need to adopt *Halal* supply chain services.	OK	OK	OK	
	3) Customers' behaviours indicate that a company need to adopt *Halal* supply chain services.				

Construct	Indicators	Respondent 1	Respondent 2	Respondent 3	Action
Competitive Pressure (CMPP)	1) We believe that we will not lose our customers to our competitors if we do not adopt *Halal* supply chain services. 2) We don't feel it is strategic necessity to use *Halal* supply chain services to compete in the market. 3) Our company not experienced competitive pressure to adopt *Halal* supply chain services 4) Our company would not have experienced a competitive disadvantage if *Halal* supply chain services had not been adopt	OK	OK	OK	No problem, the variable and the items will be remain with no changes.

Construct	Indicators	Respondent 1	Respondent 2	Respondent 3	Action
Supplier (SPP)	1) *Halal* supply chain service provider is not available in my area. 2) *Halal* supply chain service providers did not promote their services to our organization 3) Our organization does not has any contacts with any of *Halal* supply chai service providers. 4) We believe that our current supply chain activities could match with services offered by *Halal* supply chain services provider	OK	OK	OK	No problem, the variable and the items will be remain with no changes.

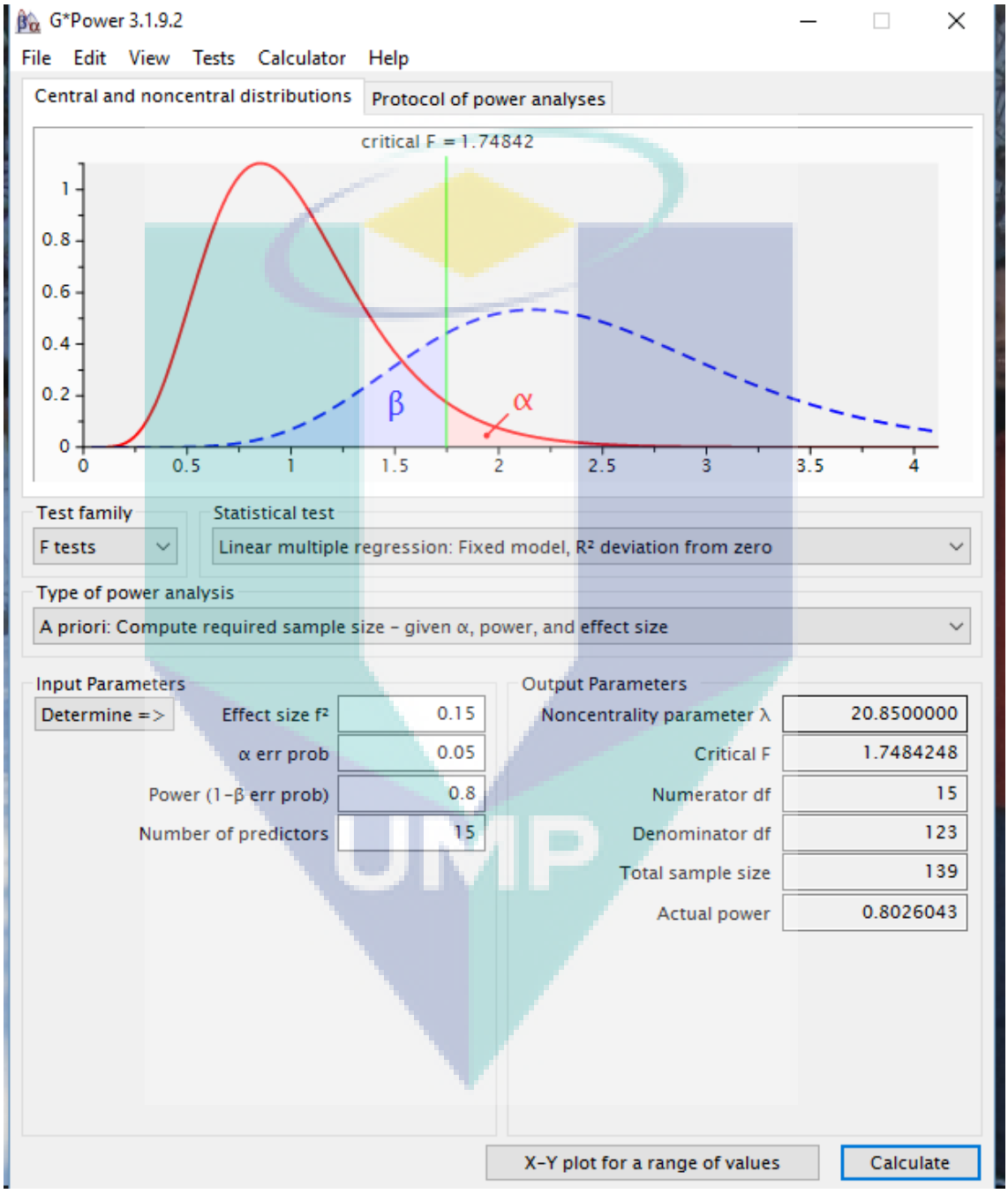
Construct	Indicators	Respondent 1	Respondent 2	Respondent 3	Action
Top Management Attitude	1)There is no need to apply *Halal* supply chain services at present. 2) Our products are already certified as *Halal* by JAKIM 3) Customers already believed with the *Halal* mark that our company has. 4) We believe that we could maintain *Halal* integrity by ourself.	OK	OK	OK	No problem, the variable and the items will be remain with no changes.

Construct	Indicators	Respondent 1	Respondent 2	Respondent 3	Action
***HALAL* SUPPLY CHAIN SERVICES** ***Halal* Transport**	a) My company does not have intention to adopt *Halal* transportation services in our operation next year. b) My company will not try to adopt *Halal* transportation services in our operation next year. c) My company does not have any plan to adopt *Halal* transportation services in our operation next year.	OK	OK	OK	No problem, the variable and the items will be remain with no changes.

Construct	Indicators	Respondent 1	Respondent 2	Respondent 3	Action
Halal Warehouse	a) My company does not have intention to adopt *Halal* warehousing services in our operation next year. b) My company will not try to adopt *Halal* warehousing services in our operation next year. c) My company does not have any plan to adopt *Halal* warehousing services in our operation next year	OK	OK	OK	No problem, the variable and the items will be remain with no changes.

APPENDIX A2

PRIORI POWER ANALYSIS



APPENDIX B1

POST HOC POWER ANALYSIS (HALAL TRANSPOTATION)

Post-hoc Statistical Power Calculator for Multiple Regression

This calculator will tell you the observed power for your multiple regression study, given the observed probability level, the number of predictors, the observed R^2, and the sample size.

Please enter the necessary parameter values, and then click 'Calculate'.

Number of predictors: 15

Observed R^2: 0.714

Probability level: 0.05

Sample size: 344

Calculate!

Observed statistical power:1.0

Related Resources

Formulas References Related Calculators Search

APPENDIX B2

POST HOC POWER ANALYSIS (HALAL WAREHOUSING)

Post-hoc Statistical Power Calculator for Multiple Regression

This calculator will tell you the observed power for your multiple regression study, given the observed probability level, the number of predictors, the observed R^2, and the sample size.

Please enter the necessary parameter values, and then click 'Calculate'.

Number of predictors: 15

Observed R^2: 0.728

Probability level: 0.05

Sample size: 344

Calculate!

Observed statistical power:1.0

Related Resources

Formulas References Related Calculators Search

APPENDIX C1

RESEARCH INSTRUMENT ACCORDING TO VARIABLES

Please answer each of the following questions by circling the number that best describes your opinion.

My company adopting Halal supply chain services for

a) Halal Transport Yes / No
b) Halal warehouse Yes / No

1.RESPONDENT PERSONAL INFORMATION

Position : _____

Experience / years working in the company : _____

Qualification : SPM/certificate/ Diploma/ Degree/ Masters/ Phd

Gender : Male / Female

Religion : Muslim/ Buddha / Hindu / Cristian / others ; Pls specify _____

Race : Malay / chinese / Tamil / Bumiputra / Others ; Pls specify _____

2. ORGANIZATION INFORMATION

Firm size (no. Of workers) : ☐ less than 4 ☐ 5-50 ☐ 51-150 ☐ More than 150

How long firm established in the industry (years) : ☐ less than 3 ☐ 3.1 – 6 ☐ 6.1 – 9 ☐ more than 9

My company have our own

a) Transport Yes / No

b) Warehouse Yes / No

Numbers of Halal products ; ☐ 1 – 2 ☐ 3-4 ☐ 5-6 ☐ 7 and above

Industry : ☐ Food ☐ Pharmaceutical ☐ Cosmetic

This question relates to Halal supply chain services adoption . Based on your opinion, please rank each statement on a scale of 1 to 5 to indicate your agreed level regarding Halal supply chain services. 1 mean strongly disagree at all and 5 is Strongly agree.

PERCEIVED BENEFITS					
1) Halal supply chain services is useful to expand our market	1	2	3	4	5
2) Halal supply chain services will increase our Halal image.	1	2	3	4	5
3) Halal supply chain services will increase customer satisfaction	1	2	3	4	5
4) Halal supply chain services will increase our profit.	1	2	3	4	5
5) Halal supply chain services will increase the purity of our products	1	2	3	4	5
COMPLEXITY					
1) My company believes that Halal supply chain services are complex to use	1	2	3	4	5
2) The skills required to use Halal supply chain services are too complex for our employees	1	2	3	4	5
3) Integrating Halal supply chain services in our current work practices will be very difficult.	1	2	3	4	5
COST					
1)Extra cost is needed to apply Halal supply chain services	1	2	3	4	5
2) Halal supply chain services adoption cost is higher than its' benefit.	1	2	3	4	5
3) The amount of money and time to be invested to adopt Halal supply chain services are high	1	2	3	4	5
4) The cost of Halal supply chain services is quite high for our company.	1	2	3	4	5
AWARENESS					
1)Our organization is not aware of availability of Halal supply chain services in the market.	1	2	3	4	5
2) Our organization have not noticed there are Halal manufacturer using Halal supply chain services.	1	2	3	4	5
3) Our organization considers that Halal supply chain services is not yet applicable to our environment.	1	2	3	4	5
READINESS					
1) Our organization gave its staffs formal explanation regarding Halal supply chain services.	1	2	3	4	5
2) The budget was important factor that our organization had to deal with before adopting Halal supply chain services.	1	2	3	4	5
3) Our organization has the financial resources to adopt Halal supply chain services.	1	2	3	4	5
4) Our organization has a knowledgeable staff to adopt Halal supply chain services.	1	2	3	4	5
GOVERNMENT SUPPORT					

1) There is adequate incentive provided by govt if our organization adopt Halal supply chain services.	1 2 3 4 5
2) Government provide adequate training for us to understand the importance of Halal supply chain services	1 2 3 4 5
3) There is regulation to enforce us to apply Halal supply chain services.	1 2 3 4 5
CUSTOMERS PRESSURE	
1) Our customers are pressuring us to adopt Halal supply chain services.	1 2 3 4 5
2) Customers' requirements indicate that our company need to adopt Halal supply chain services.	1 2 3 4 5
3) Customers' behaviours indicate that our company need to adopt Halal supply chain services.	1 2 3 4 5
COMPETITIVE PRESSURE	
1) We believe that we will lose our customers to our competitors if we do not adopt Halal supply chain services.	1 2 3 4 5
2) We feel there is a strategic necessity to use Halal supply chain services to compete in the market.	1 2 3 4 5
3)) Our organization has experienced competitive pressure to adopt Halal supply chain services	1 2 3 4 5
4) Our organization would experience a competitive disadvantage if Halal supply chain services is not adopted.	1 2 3 4 5
SUPPLIER	
1) Halal supply chain service provider is available in my area.	1 2 3 4 5
2) Halal supply chain service providers promote their services to	1 2 3 4 5
our organization.	1 2 3 4 5
3) Our organization has a contact with any of Halal supply chain	1 2 3 4 5
service providers.	1 2 3 4 5
4) We believe that our current supply chain activities could match with services offered by Halal supply chain services provider.	1 2 3 4 5
TOP MANAGEMENT ATTITUDE	
1) Top management considers the Halal supply chain services as important.	1 2 3 4 5
2) Top Management support the adoption of Halal supply chain services	1 2 3 4 5
3) Top management will allocate resources for adoption of Halal supply chain services.	1 2 3 4 5
4) Top management effectively communicate its support for adoption of Halal supply chain services.	1 2 3 4 5
Halal SUPPLY CHAIN	
a) Our organization have intention to adopt Halal transportation services in our operation in near future..	1 2 3 4 5 6 7
b) Our organization will try to adopt Halal transportation services in our operation	1 2 3 4 5 6 7

near future.	1	2	3	4	5	6	7
c) Our organization have any plan to adopt Halal transportation services in our operation near future.	1	2	3	4	5	6	7
a) Our organization does not have intention to adopt Halal warehousing services in our operation near future.	1	2	3	4	5	6	7
b) Our organization will try to adopt Halal warehousing services in our operation near future.	1	2	3	4	5	6	7
c) Our organization does not have any plan to adopt Halal warehousing services in our operation near future	1	2	3	4	5	6	7

APENDIX C2

QUESTIONNAIRE

Industry survey on Halal Supply chain services

Dear **[name]**,

On behalf of the Universiti Malaysia Pahang, I am conducting a PhD research on

Halal supply chains. The goal of this research is to identify what are the barriers impeding Halal Manufacturers to adopt Halal supply chain services in transportation and warehousing in food, pharmaceuticals and cosmetics industries. There is no previous research regarding this matter. Through this industry survey we would like to gather information from the industry perspective on Halal supply chain services. These research findings, hopefully could help all parties that involved especially for Halal manufacturers themselves and also from the government side. As **[company name]** is one of the leading Halal producers, your insights are important for this research. I have enclosed a brief survey for you to fill in. Once you have filled in the questionnaire, please return it. I will personally collect it soon.
Note : Your answer questionnaires will be treated confidentially.

I look forward to your reply.

In case of any questions or comments please contact me immediately.

Yours sincerely,

ABDUL HAFAZ NGAH

PhD Candidate

Technology Management Faculty

Universiti Malaysia , Pahang.

Tel : 019-9865188

Email : hafazngah@gmail.com

Please answer each of the following questions by circling the number that best describes your opinion.

My company adopting Halal supply chain services for

c) Halal Transport Yes / No
d) Halal warehouse Yes / No

1.RESPONDENT PERSONAL INFORMATION

Position : _____

Experience / years working in the company : _____

Qualification : SPM/certificate/ Diploma/ Degree/ Masters/ Phd

Gender : Male / Female

Religion : Muslim/ Buddha / Hindu / Cristian / others ; Pls specify _____

Race : Malay / chinese / Tamil / Bumiputra / Others ; Pls specify _____

2. ORGANIZATION INFORMATION

Firm size (no. Of Fulltime workers) :
☐ less than 4 ☐ 5-50 ☐ 51-150 ☐ More than 150
How long firm established in the industry (years) :
☐ less than 3 ☐ 3.1 – 6 ☐ 6.1 – 9 ☐ more than 9
My company have our own :
a) Transport Yes / No
b) Warehouse Yes / No

Numbers of Halal products ; ☐ 1 – 2 ☐ 3-4 ☐ 5-6 ☐ 7 and above

Industry : ☐ Food ☐ Pharmaceutical ☐ Cosmetic

Location / Town : _____

State : _____

This question relates to Halal supply chain services adoption(Halal transport & warehouse) . Based on your opinion, please rank each statement on a scale of 1 to 5 to indicate your agreed level regarding Halal supply chain services. 1 mean strongly disagree at all and 5 is Strongly agree.

1. Halal supply chain services is useful to expand our market	1 2 3 4 5
2. My company believes that Halal supply chain services are complex to use	1 2 3 4 5
3. Extra cost is needed to apply Halal supply chain services	1 2 3 4 5
4. Our organization is not aware of availability of Halal supply chain services in the market.	1 2 3 4 5
5. Our organization gave its staff formal explanation regarding Halal supply chain services.	1 2 3 4 5
6. There is adequate incentive provided by govt if our organization adopt Halal supply chain services.	1 2 3 4 5
7. Our customers are pressuring us to adopt Halal supply chain services.	1 2 3 4 5
8. We believe that we will lose our customers to our competitors if we do not adopt Halal supply chain services.	1 2 3 4 5
9. Top management considers the Halal supply chain services as important.	1 2 3 4 5
10. Halal supply chain service provider is not available in my area.	1 2 3 4 5
11. Our organization have intention to adopt Halal transportation services in our operation in near future..	1 2 3 4 5 6 7
12. Halal supply chain services will increase our Halal image.	1 2 3 4 5
13. The skills required to use Halal supply chain services are too complex for our employees	1 2 3 4 5

14. Halal supply chain services adoption cost is higher than its' benefit.	1 2 3 4 5
15. Our organization have not noticed there are Halal manufacturer using Halal supply chain services.	1 2 3 4 5
16. The budget was important factor that our organization had to deal with before adopting Halal supply chain services.	1 2 3 4 5
17. Government provide adequate training for us to understand the importance of Halal supply chain services	1 2 3 4 5
18. Customers' requirements indicate that our company need to adopt Halal supply chain services.	1 2 3 4 5
19. We feel there is a strategic necessity to use Halal supply chain services to compete in the market.	1 2 3 4 5
20. Halal supply chain service providers did not promote their services to our organization.	1 2 3 4 5
21. Top Management support the adoption of Halal supply chain services	1 2 3 4 5
22. Our organization will try to adopt Halal transportation services in our operation	1 2 3 4 5 6 7
23. Halal supply chain services will increase customer satisfaction	1 2 3 4 5
24. The amount of money and time to be invested to adopt Halal supply chain services are high	1 2 3 4 5
25. Integrating Halal supply chain services in our current work practices will be very difficult.	1 2 3 4 5
26. Our organization considers that Halal supply chain services is not yet applicable to our environment.	1 2 3 4 5
27. Our organization has the financial resources to adopt Halal supply chain services.	1 2 3 4 5
28. There is regulation to enforce us to apply Halal supply chain services.	1 2 3 4 5

29. Customers' behaviours indicate that our company need to adopt Halal supply chain services.	1 2 3 4 5
30. Our organization has experienced competitive pressure to adopt Halal supply chain services	1 2 3 4 5
31. Our organization does not have contact with any of Halal supply chain service providers.	1 2 3 4 5
32. Top management will allocate resources for adoption of Halal supply chain services.	1 2 3 4 5
33. Our organization has a plan to adopt Halal transportation services in our operation near future.	1 2 3 4 5 6 7
34. Halal supply chain services will increase our profit.	1 2 3 4 5
35. The cost of Halal supply chain services is quite high for our company.	1 2 3 4 5
36. Our organization has a knowledgeable staff to adopt Halal supply chain services.	1 2 3 4 5
37. Our organization have a plan to adopt Halal warehousing services in our operation near future	1 2 3 4 5 6 7
38. Our organization would experience a competitive disadvantage if Halal supply chain services is not adopted.	1 2 3 4 5
39. We believe that our current supply chain activities could match with services offered by Halal supply chain services provider.	1 2 3 4 5
40. Top management effectively communicate its support for adoption of Halal supply chain services.	1 2 3 4 5
41. Our organization has an intention to adopt Halal warehousing services in our operation near future.	1 2 3 4 5 6 7
42. Halal supply chain services will increase the purity of our products	1 2 3 4 5
43. Our organization will try to adopt Halal warehousing services in our operation near future.	1 2 3 4 5 6 7

APPENDIX C3

LIST OF PUBLICATIONS

No.	Title	JOURNAL
1	Adoption of Halal supply chain among Malaysian Halal manufacturers : An exploratory study	Procedia-Social and Behavioral Sciences. 2014. **129**: 388-395
2	Contributing factors of Halal warehouse adoption	Management and Technology in Knowledge, Service, Tourism & Hospitality – Lumban Gaol, Mars & Saragih (Eds) © 2014, Taylor & Francis Group, London, ISBN 978-1-138-00133-6
3.	Modelling of Halal warehouse adoption Using Partial Least Squares (PLS)	International Journal of Contemporary Business Management. **1**(1): 71-86
4	Barriers and enablers in adopting Halal transportation services: A study of Malaysian Halal Manufacturers	International Journal of Business and Management. 2014. **2** (2) : 49-70
5.	Barriers and enablers in adopting of Halal warehousing	Journal of Islamic Marketing. 2015. **6** (3):
6.	Applying the TOE framework in the Halal warehouse adoption study	Accepted to be published on Journal of Islamic Accounting Business Research