Barriers and enablers in adopting Halal transportation services: A study of Malaysian Halal Manufacturers

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Abstract

The increasing demand for Halal products by Muslim consumers due to their religious obligation has created new services known as the Halal transportation services. These services are specially designed to meet the demand from the Halal manufacturers to maintain the integrity of their Halal products. However, the adoption of the halal transportation services in Malaysia is relatively low. By adopting the TOE framework, this study will try to identify the enablers influencing and barriers impeding the Halal manufacturers from adopting the Halal transportation services. Using the systematic sampling method, data was gathered from 140 participants of the Malaysia International Halal Showcase (MIHAS) 2013. The Structural Equation Modelling (SEM) approach was used to test the relationship between the research model construct. The findings show that perceived benefits, organizational readiness, customer pressure and competitive pressure are significant enablers for the adoption decision. Meanwhile, the complexity was found as a barrier to the adoption and government support was found to be a not significant factor to the adoption of Halal transportation. The findings, besides presenting the suitability of PLS in statistical analysis, have also provided useful information to a better understanding regarding the enablers and barriers to the adoption of Halal transportation services. Halal service providers and government agencies which are related to the Halal services could use the findings to make a proper plan in enhancing the adoption of Halal services among Halal industry players. The limitation, implication and suggestion for future research are also discussed.

Keywords: Halal transportation ; enablers to adoption, barriers to the adoption ; Halal Manufacturers in Malaysia; TOE framework, PLS

1.0 INTRODUCTION

The increasing awareness of Muslim consumers about their religious obligations has created greater demand for Halal products . As Muslim consumers become more knowledgeable and aware of dietary laws and concerns about their religion, they pay more attention to the type of products and services that they consume or utilize. (Salleh & Ramli, 2011). Muslim consumers also understand that the importance of using Halal products is vital for their daily activities and for their afterlife. Fortunately, several logistic companies understand that they also have to play their part in maintaining the Halal integrity of the Halal products, hence they are trying to meet the demand in this industry by getting certified by JAKIM or other authorized bodies to be the Halal transportation service providers. This will help to alleviate any doubts among the Muslim consumers regarding the use of the Halal products available in the market if their services are utilized. With regards to traditional supply chain management (SCM), it is a series of processes wherein raw materials are converted into the final products, then delivered to the end customers (Manzouri et al., 2011). On the other hand, the Halal supply chain can be defined as the integration of business processes and activities from point of origin to point of consumption according to the Islamic law known as Syariah. (Omar & Jaafar, 2011). The Halal supply chain is created by the Halal supply chain providers purely to meet the demand from the Halal manufacturers. It has not only attracted the practitioners to practice the Halal concept, but also academicians to know and understand the Halal supply chain since both have noticed the importance of the Halal supply chain in order to maintain the Halal integrity of the Halal products. There is no guarantee that the products are Halal at the point of consumption with the absence of the Halal services in between the factory to the end users. Thus, the Halal supply chain service offers a wide range of services to help reduce the doubts of Muslim users to consume Halal products. The activities contained in the Halal supply chain are warehousing, sourcing, transportation, handling of products, inventory management and other managements. In general, for this study, the researchers only focus on the Halal transportation. The Halal industry has a bright potential market that is good to invest in nowadays. In Malaysia, the numbers of Halal manufacturers, Halal Menu, Halal products are growing rapidly day by day and the main success of the Halal industry relies heavily on logistics service management capabilities in ensuring the integrity of Halal products (Illyas et al., 2012). This is because, without Halal services such as transportation and warehousing, no one could confirm whether the Halal products are really Halal at the point of consumption. According to Tieman (2007), the Halal integrity of products is the result of various activities in the 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 the Muslim market (Tieman,2011). That is why Halal transportation plays a key role in protecting the Halal status of any given product through proper transportation, storage and handling within the supply chain, until it reaches its final destination (Tieman, 2006). Although the concept of Halal is starting to be considered when using the products (Daud et al., 2012), consumers' awareness regarding the adoption of Halal transportation among Halal manufacturers is still low. According to Halal transportation providers, the adoption of Halal transportation among certified Halal manufacturers in Malaysia is still relatively low compared to the total number of Halal manufacturers today. The lacking of intention to adopt Halal transportation among Halal manufacturers in Malaysia is still very puzzling. Since Muslim consumers are still lacking information on the supply chain, and also can't be assured that there is no cross contamination which has taken place during the movement and storage of the Halal products (Bonne and Verbake, 2008), it is important to study the barriers that are impeding Halal manufacturers from adopting Halal transportation. Besides trying to identify the potential barriers to the adoption of Halal transportation, it is also good to study the enablers for the adoption. By understanding the potential enablers influencing the Halal manufacturers to the adoption of Halal transportation, relevant parties could take some action to increase the percentage of Halal

manufacturers adopting of Halal transportation. Due to that matter, the purpose of this study is to identify the potential enablers and the potential barriers that affect the intention to adopt Halal transportation for Halal manufacturers in Malaysia. An understanding of the enablers and the barriers is essential for the researchers in order to understand the real situation which occur in the Halal industry and ultimately provide information about the industry to the government.

In general, many studies have been done regarding Halal, and most of them focus Halal products, processes, and orientation. There are also studies regarding Halal logistics from the perspective of the service providers and policy makers (Kamaruddin et al.,2012), however, very little studies look into issues regarding Halal transportation from the perspectives of the Halal manufacturers. For these reasons, the objective of the study is to explore the underlying determinants that are likely to act as enablers and barriers in the adoption of Halal transportation among Halal manufacturers in Malaysia from the perspective of technology, organization and environment.

2.0 Research context and research Model

This paper is part of a larger study which investigates the enablers that influence and the barriers that impede Halal manufacturers in Malaysia from adopting Halal transportation for their products. As Halal transportation is a very new approach which has emerged in the logistics and supply chain industry, not many papers have been written about it. Since there is a lack of literature review regarding this subject matter, researchers use articles on other areas regarding the independent and dependant variables which are going to be studied as the literature review. Therefore, the purpose of this literature review is to examine the related constructs which are technology, organization and environment as exogenous constructs and the adoption of Halal transportation as an endogenous construct.

2.1. Halal supply chain services adoption intention

Adoption is often conceived as a dependent variable. (Kamaruddin & Udin, 2009) and it 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, 1995). It 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 behaviors. An innovation can be new products or service, a new production process technology (Kamaruddin & Udin, 2009). Halal transportation adoption is a situation where manufacturer especially Halal manufacturers, use Halal transportation in their supply chain activities in order to maintain the Halal integrity of their products, also known as Halal from farm to fork. Halal transportation is a new dimension of the supply chain in which Halal products are handled separately from non Halal products according to Syariah to avoid cross contamination in order to maintain their Halal integrity.

2.2. Halal Transportation

While transporting Halal products, Halal and non-Halal goods are not mixed in 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 the case of ambient or reefer (chilled

or frozen). (Tieman,2007) This is the uniqueness of Halal in Islam. It is very detailed and clear since there is a Hadith saying that there is clear between Halal and Haram. In order to maintain the Halalness of the Halal products, it must be handled by the right person using the right process. All the products can't simply be put together in the same transport to be moved to the right destination without considering their Halal status of the products. If there is any misconduct, the Halal integrity of the products could be questioned. Tieman, (2007) 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.

2.3 TECHNOLGY

Technological factors are referred to as innovation characteristics in some studies of organizational adoption (Premkumar & Roberts, 1999) while adopting a TOE framework in the study. It can be described as both internal and external technological factors that are relevant to the organizations. Many constructs 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 the adoption of RFID technology (Raganathan & Jha, 2005; Sharma & Citrus, 2005). Many researches including the Meta-analysis of 75 diffusion articles conducted by Tornatzky and Klein, (1982), found that the relative advantage and complexity are consistently related to innovation adoption.

2.3.1 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 the technology to be substituted (Brown & Russell, 2007; Premkumar et al., 1997, Rogers, 2003; Tornatzky and Klein, (1982) Perceived benefits refer to the degree in which new technology provide more benefits than old ones(Lin & Lin, 2008). For this research perceived benefits refer to the extent of management recognition of relative advantage that Halal supply chain services can provide to the firms. Some researchers (Bellaj et al., 2008 , Ghobakhloo et al., 2011) use it as a perceived relative advantage but it still carries the same meaning. Several prior studies have shown that perceived benefits or relative advantage is the best predictor of the adoption innovation (Khemthong & Roberts, 2005). Tornatzky and Klein (1982) found that relative advantage is one of the characteristics which explain best the behavior for adoption of innovation. Its benefits are increased sales, greater efficiency of internal processes, increased employee productivity, improved customer service, reduced inventory and procurement costs, and improved coordination with trading partners (Zhu and Kraemer, 2005). Since there is consistent findings mentioning that perceived benefit has a significant relationship with the adoption of new technology (Lertwongsatien & Mongpinunwatana (2003),Marimuthu et al. (2011) and Ghobakhloo et.al, (2011), researchers believed that perceived benefits will act as the enabler for the adoption of Halal transportation. Therefore ;

H1: Perceived benefit is positively related to adoption of Halal supply chain services

2.3.2. Complexity

According to Rogers, (2003); & Seymour et al., (2007), technological complexity denotes the difficulties associated with the understanding, implementing and using of innovation. Complexity is the extent to which new innovation is assumed as relatively difficult to understand and use.(Corrocher, 2003). Since complexity is negatively associated with adoption, it could mean that complexity is an inhibitor for adoption of new innovation.(Tornatzky and Fleischer, 1982, Premkumar et al., 1994, Premkumar & Roberts, 1999). According to Rogers (2003), even though complexity may not be as important as the relative advantage, it potentially represents as a barrier to technology adoption. Complexity arises as a result of technology being still new in the market. Halal supply chain services are a new approach and that is the reason why the adoption rate is still low. According to Ngai et al., (2007) consumer may not have confidence in the RFID system since it is still relatively new to them. Complexity is also found to have a negative relationship in the adoption of the Human Resource Information System. (Kassim et al., 2012).

Since Halal is an Islamic terms, and usually related to the Muslim people, it may be complex to be understood by the non-Muslim and not all Halal manufacturers are Muslims. Furthermore, in Malaysia, most of the big companies which have been certified as Halal manufacturers are non Muslim (Tieman, 2011). Unfortunately, most non-Muslims believe that as long their products does not mix with pork, it is already Halal. So, since the understanding of the Halal itself is already a problem, to understand what Halal transportation is might als be a problem for them. In addition, Bahruddin et al. (2011) mentioned that the complexities of Halal transportation extend much further than the usual concerns regarding the unbroken cool chains and the efficient delivery of fresh food produce.

H2: Complexity is negatively related to the adoption of Halal supply chain services

2.4. ORGANIZATION

This research defines organization as a context into which technology is going to be implemented (Orlikowski, 1993) and is being mentioned by Brown & Rusell (2007) as extremely relevant to the adoption process. Most commonly used for descriptive measure for this variable are firm size and organizational readiness.

2.4.1. Readiness

Organizational readiness varies according to the internal characteristics and property of a firm to the type of new technology to be adopted. Even though there are differences in organizational readiness, it still plays an important role in the decision to adapt an innovation (Wei & Ling, 2011). Organizational readiness is defined here as the capability of the operation management to adopt the Halal transportation services in terms of financial and human resources. Brown and Russell (2007) found that organizational readiness is a vital variable in RFID adoption. Previously, Iacovou et al. (1995) proved that the availability of financial and technological resource (i.e., people, technology, and expertise) is a major factor 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 & Ramamurthy, 1995) are also important components of organizational readiness.

Organizational readiness is another important variable to be considered in new technology adoption (Asif & Mandivalla, 2005). Kinsella (2003) stated that organizations must be prepared to

make changes in their business process, and potential areas also need to be rearranged (Loebbecke & Palmer, 2006) to make sure that Halal transportation activities could be run in the organizations. Furthermore, a cultural willingness to move beyond traditional methods need to be developed (Hoske, 2004) to confirm the success of the new style of business processes.

H3: Organizational readiness is positively related to the adoption of Halal supply chain services

2.5. ENVIRONMENT

The role and influence of environmental factors influencing organizational adoption decision have been highlighted by Orlikowski (1993). Tornatzky and Fleischer, (1990) defined environment as the arena in which a firm conducts its business – its industry, competitors, access to resource supplied by others and deals with the government. According to Lertwongsatien and Wongpinunwatana (2003), environment is recognized in the innovation literature as an influential factor in the adoption of new innovation for an organization. Since Halal supply chain is related directly to the Muslim consumers in Malaysia, this research includes customer pressure as an additional construct to be measured in an environmental variable.

2.5.1. Customer Pressure

"Customer is always right", is the term used as a marketing strategy to ensure customers will be satisfied. Without customers, no matter how good any services or products are, it will not turn into a profit. In relation to customers, a business firm must necessarily be sensitive to clients' needs and demands (Chong, 2008). Competitive pressure and customer pressure are the external pressure which 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 & Wongpinunwatana, 2003; Mehrtens et al., 2001; Premkumar & Roberts, 1999,Seyal et al., 2004; Thong, 1999; Sophonthummapharn, 2009). Customer pressure has been ranked by Sophonthummapharn, (2009) as the third most important variable among 12 variables which have been studied regarding adoption of electronic customer relationship management

Iacovou et al. (1995) mentioned the importance of customers as a pressure to adopt the information system. Zhu and Kramer, (2003) said that, consumer readiness that will create customer pressure is an important factor for the decision makers of e-business adoption. Marimuthu et al. (2011) also classified customer as one of the direct external pressure and support to adopt new technology. Lastly, Henriques and Sadorsky (1996) mentioned that environmental plan is positively influenced by customer pressure. Hence;

H4: Customer pressure is positively related to the adoption of Halal supply chain service

2.5.2. Competitors Pressure

The adoption literature (e.g. Segar & Grover, 1993; Iacovou et al., 1995; Premkumar et al., 1997; Crook & Kumar, 1998, Zhu et al., 2003) have long recognized competitive pressure as an adoption driver especially in the studies in the organizational level. For this research, competitive pressure has been defined as pressure resulting from a threat of losing competitive advantage forcing firms to adopt and diffuse Halal supply chain services.

As market competition increases, firms may feel the need to seek competitive advantage through innovations. (Wang et al., 2010). Larger retailers are often keenly aware of what their competitors are doing, with respect to new technology that may provide competitive advantage. (Brown & Russell, 2007). According to Lin & Lin (2008), firms that are the first movers in deploying e–business tended to derive the greatest advantages. Porter and Millar (1985) suggested that, by adopting new technology firms might able to change the rule of the competition, affecting the industry structure and leveraging new ways of outperforming rivals, thus changing the competitive environments. The above discussion leads to the following hypothesis :

H5: Competitive pressure will be positively related to the adoption of Halal supply chain services.

2.5.3 Government support

Based on the interviews with Halal transportation service providers, they claimed that government support also has an impact on the growth in the demand for Halal transportation, since the government has the authority to enforce rules and regulations regarding issues in Halal transportation. Scupola (2009) mentioned that the government plays an important role in encouraging SMEs to move forward with new technology. He also mentioned that, it could be done if the government seriously engage in campaigns to disseminate information regarding the best practices of the new technology, introducing policies related to it to support business operations. Furthermore, Cui et al., (2008) also confirmed that government regulations are the important factors which influence technology adoption among business firms. According to (Zhu & Kraemer, 2005) without parallel development of laws, policies and strategic directions by government, it can result in discouraging the adoption of e-commerce. In addition, the government of Malaysia also offers an incentive to logistics providers to become Halal service providers in order to meet the demand from the Halal industry players. Hence,

H6: Government support will be positively related to the adoption of Halal transportation.

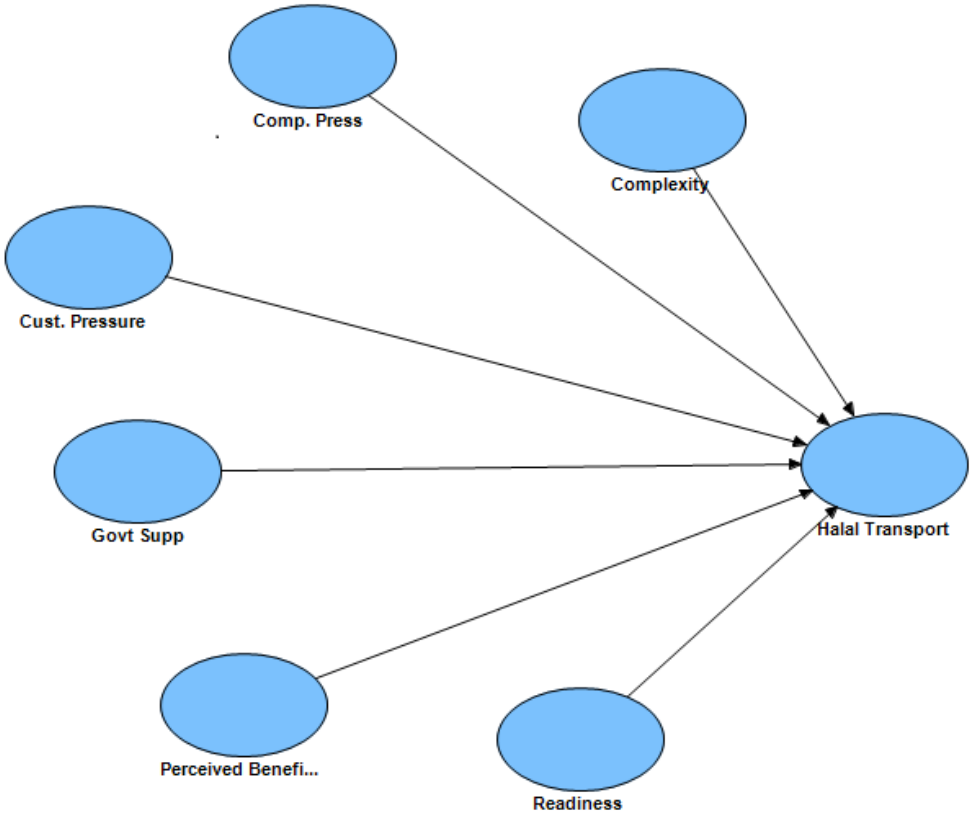

Fig 1 Research Model

3.0 RESEARCH METHODOLOGY

The unit of analysis of this study is at the organizational level. Respondents of this study are the Halal manufacturers who attended the Malaysia International Halal Showcase (MIHAS 2013) at Kuala Lumpur Convention Centre (KLCC), Kuala Lumpur on 3rd-6th of April 2013. The focus of this study is on three industries which are food, pharmaceuticals and cosmetics. Since the list of exhibitors were available, systematic sampling method was used in this study. Since the number of potential respondents are unequal based on the industries, respondents were divided based on the industries.

3.1. Data Collection.

Two hundred self-administered questionnaires were distributed to the exhibitors. A total of 100 of the questionnaires were distributed to exhibitors from the food industry, 65 for pharmaceutical and another 35 for the cosmetics industry. The process of distribution and collection of the questionnaires was carried out in 5 days, from the first day of the exhibition until the last day of the event. Out of 200 hundred questionnaires, 189 of them were collected, but due to poor quality of data, only 140 of them can be used for data analysis purpose. Another 11 respondents were reluctant to respond since the personnel who were qualified to answer the questionnaire were too busy entertaining their clients or did not attend the event.

3.2. Measures and assessment of goodness of measure.

The five point Likert scale was used to gather data regarding the independent variables, and the seven-point Likert scale was used to measure items in the dependant variable. This is an approach suggested by Podsakoff and Organ, (1986) to avoid common method variance before the data is analyzed. Since there were lack of literature in the Halal supply chain, most of the instruments were adapted from other fields of study and were modified to fit with the current study. Items measuring the perceived benefits were adapted from (Sophonthummapharn, 2009) , complexity (Thiesse et al, 2011), customer pressure (Premkumar & Roberts, 1999) and Sophonthummapharn, (2009), competitive pressure (Marimuthu et al., 2011) and Wang et al., (2010) and for government support (Marimuthu et al., 2011) and Lin and Ho (2008).

3.3. Goodness of measure

Validity and reliability are the two main criterias being used for testing goodness of measure. Validity is a test of how well the instruments used measure the particular concept it is intended to measure, and reliability is a test of how consistently a measuring instrument measures whatever concept it is measuring. (Sekaran & Bougie, 2010).

3.4 Construct validity

According to (Sekaran & Bougie, 2010), construct validity testifies to how well the results obtained from the use of measure fit the theories around which the test is designed. The problem is, whether the instrument cover the concept as theorized or not. This question, can be solved by assessing through convergent and discriminant validity. It can be done by looking at the respective loadings and cross loading to evaluate if there are problems with any particular items. Hair et al. (2010) suggested the cutoff value for loading at a minimum of 0.5 as significant. From Table 2, it is clearly shown that all the items measuring a particular construct loaded highly on that construct and loaded lower on the other constructs thus confirming the construct validity.

Table 1 Properties of the measurement items

Construct	Definition	Source	No. of item
Perceived benefits	regarding Halal transportation	Sophonthummapharn, (2009)	5
Complexity	Complexity in adopting Halal transportation	Thiesse et al., (2011)	3
Halal transportation	Intention to adopt Halal transportation	Chen et al., (2011)	3
Organizational Readiness	in adopting Halal transportation	Khemthong & Roberts, (2005) and Sophonthummapharn, (2009)	4

Customer pressure	in adopting Halal transportation	Sophonthummapharm, 2009	3
Competitive pressure	in adopting Halal transportation	Marimuthu et al., (2011) and Wang et al.,(2010)	4
Government support	in adopting Halal transportation	Marimuthu et al., (2011) and Chieh-Yu Lin & Yi-Hui Ho (2008).	3

Table 2 Loadings and cross loadings

Item	Competitive pressure	Complexity	Customer pressure	Government Support	Halal Transport	Perceived Benefits	Readiness
compe1	**0.820**	-0.079	0.447	-0.022	0.515	0.476	0.547
compe2	**0.885**	-0.146	0.480	0.012	0.660	0.580	0.542
compe3	**0.864**	-0.202	0.514	0.079	0.664	0.530	0.602
compe4	**0.829**	-0.132	0.393	0.141	0.601	0.512	0.472
compi1	-0.124	**0.899**	-0.083	0.083	-0.258	-0.153	-0.101
compl2	-0.200	**0.879**	0.030	0.046	-0.222	-0.058	-0.005
compl3	-0.139	**0.915**	-0.035	0.171	-0.298	-0.251	-0.087
custx1	0.538	-0.052	**0.896**	-0.034	0.603	0.575	0.570
custx2	0.479	-0.038	**0.916**	0.004	0.615	0.500	0.555
custx3	0.392	0.001	**0.802**	0.014	0.503	0.560	0.400
gs1	0.054	0.167	0.017	**0.844**	0.006	-0.183	0.024
gs2	-0.012	0.182	0.011	**0.664**	-0.005	-0.191	0.019
gs3	0.031	0.116	-0.015	**0.923**	0.009	-0.153	-0.011
int_T1	0.701	-0.260	0.613	0.014	**0.909**	0.731	0.654
int_T2	0.643	-0.317	0.615	-0.058	**0.912**	0.654	0.588
int_T3	0.612	-0.213	0.560	0.086	**0.891**	0.594	0.623
pb1	0.587	-0.138	0.578	-0.078	0.648	**0.877**	0.565
pb2	0.563	-0.206	0.570	-0.255	0.663	**0.889**	0.500
pb3	0.547	-0.169	0.518	-0.114	0.651	**0.881**	0.560
pb4	0.528	-0.188	0.532	-0.050	0.665	**0.875**	0.500
pb5	0.433	-0.066	0.473	-0.182	0.514	**0.783**	0.456
ready1	0.494	-0.174	0.411	-0.183	0.588	0.558	**0.809**
ready2	0.525	0.025	0.546	0.090	0.581	0.405	**0.826**
ready3	0.519	-0.090	0.507	0.014	0.579	0.493	**0.858**
ready4	0.545	0.002	0.451	0.084	0.485	0.502	**0.763**

Bold value are loadings for items which are above the recommended value 0.5

3.5. Convergent validity

Table 4 summarizes the results of the measurement model. The results indicate that all the seven constructs i.e complexity, competitive pressure, customer pressure, government support, Halal transport, perceived benefits and readiness are all valid measures of their respective constructs according to their parameter estimates and statistical significance (Chow & Chan, 2008).

3.6. Discriminant validity

The discriminant validity of the measures is the degree to which items differentiate among constructs or measure distinct concepts. It can be assessed by examining the correlations between the measures of potential overlapping constructs. Items should load higher on their own constructs in the model. The average variance shared between each construct and its measures should be greater than the variance shared between the construct and other construct (Compeau et al., 1999). As depicted in Table 5, the square correlations for each construct are lower than the average variance extracted (AVE) by the indicators measuring construct indicating adequate discriminant validity. As a whole, the measurement model demonstrated adequate convergent validity and discriminant validity.

Table 3 Results of measurement model

Model constructs	**Measurement item**	**Loading**	**CR[a]**	**AVE[b]**
Competitive Pressure	compe1	0.820	0.912	0.722
	compe2	0.885		
	compe3	0.864		
	compe4	0.829		
Complexity	compl1	0.899	0.926	0.806
	compl2	0.879		
	compl3	0.915		
Customer Pressure	custx1	0.896	0.905	0.762
	custx2	0.916		
	custx3	0.802		
Government Support	gs1	0.844	0.856	0.669
	gs2	0.664		
	gs3	0.923		
Halal Transport	int_T1	0.909	0.931	0.817
	int_T2	0.912		
	int_T3	0.891		
Perceived Benefit	pb1	0.877	0.935	0.743
	pb2	0.889		
	pb3	0.881		
	pb4	0.875		
	pb5	0.783		

Readiness	ready1	0.809	0.887	0.664
	ready2	0.826		
	ready3	0.858		
	ready4	0.763		

[a] Composite reliability (CR) = (square of the summation of the factor loadings)/ {(square of the summation of the factor loadings) + (square of the summation of the error variances)}

b Average variance extracted (AVE) = (summation of the square of the factor loadings) / {(summation of the square of the factor loadings) +(summation of the error variances)}

Table 4 Summary results of the model construct

Model constructs	**Measurement item**	**Standardized estimate**	**T-Value**
Competitive Pressure	compe1	0.82	18.617
	compe2	0.885	42.852
	compe3	0.864	38.138
	compe4	0.829	28.757
Complexity	compi1	0.899	32.74
	compl2	0.879	21.531
	compl3	0.915	33.394
Customer Pressure	custx1	0.896	50.456
	custx2	0.916	67.988
	custx3	0.802	18.634
Government Support	gs1	0.844	3.590
	gs2	0.664	3.739
	gs3	0.923	3.683
Halal Transport	int_T1	0.909	43.998
	int_T2	0.912	52.639
	int_T3	0.891	44.157
Perceived Benefit	pb1	0.877	34.923
	pb2	0.889	36.011
	pb3	0.881	38.343
	pb4	0.875	32.928
	pb5	0.783	15.192
Readiness	ready1	0.809	24.500
	ready2	0.826	24.863
	ready3	0.858	31.277
	ready4	0.763	14.341

Since the study use a single source data, there is a potential for common method variance. However, the Harman single factor test was conducted to determine the extent of this bias. Podsakoff and Organ (1986) mentioned that common method bias is problematic if a single latent factor would carry the majority of the explained variance. The un-rotated factor analysis indicated

that the first factor explained 42.2% of the total variance explained, and thus the common method bias is not a serious issue in this study.

Table 5 Discriminant validity of the constructs

Model Constructs	Competitive Pressure	Complexity	Customer Pressure	Government Support	Halal Transport	Perceived Benefits	Readiness
Competitive Press	**0.850**						
Complexity	-0.168	**0.898**					
Customer Pressure	0.541	-0.036	**0.873**				
Government Support	0.065	0.118	-0.007	**0.818**			
Halal Transport	0.723	-0.292	0.660	0.0137	**0.904**		
Perceived Benefits	0.620	-0.182	0.621	-0.1550	0.733	**0.862**	
Readiness	0.637	-0.076	0.588	-0.0036	0.688	0.600	**0.815**

Note: Diagonals represent the square root of the AVE while the off-diagonals represent the correlations

3.8 Hypothesis testing

For this, the path analysis was used to test 6 hypotheses generated from the research model. Figure 2 and Table 6 present the results. The R^2 for main model was 0.739, meaning that 73.9% of the variance in the extent of collaboration can be explained by the complexity, competitive pressure, customer pressure, perceived benefits, organizational readiness and government support.

Table 6: Path coefficient and hypothesis testing

Hypothesis	Relationship	Beta	Standard Error	T-Value	Decision
H1	Perceive Benefits -> Halal Transport	0.294	0.081	3.607**	Supported
H2	Complexity -> Halal Transport	-0.179	0.050	3.582**	Supported
H3	Readiness -> Halal Transport	0.211	0.071	2.971**	Supported
H4	Customer. Pressure -> Halal Transport	0.207	0.060	3.468**	Supported
H5	Comp Pressure -> Halal Transport	0.260	0.090	2.906**	Supported
H6	Government support -> Halal Transport	0.066	0.048	1.371	Not supported

****p < 0.01,**

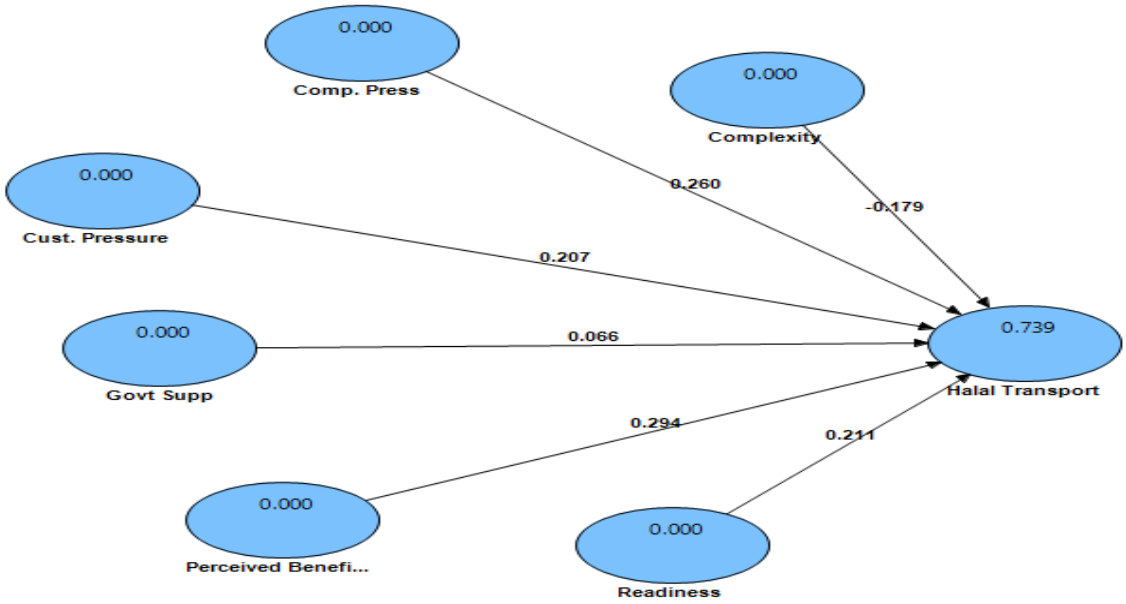

Figure 2: Structural Model

Table 7 Effect Size

Construct	R^2	f^2	Decision	Q^2	q^2	Decision
Full model	0.739			0.591		
Construct Excluded						
Perceived Benefits	0.700	0.149	Small	0.563	0.069	Small
Complexity	0.709	0.115	Small	0.563	0.069	Small
Readiness	0.717	0.080	Small	0.580	0.027	Small
Customer pressure	0.717	0.080	Small	0.575	0.039	Small
Competitive pressure	0.707	0.123	Small	0.550	0.100	Small

Effect size analysis (f^2) is a method to measure the changes is R^2 and q^2 to measure the changes is Q^2 to see either the impact of a particular independent latent variable on a dependent latent variable has a substantive impact or not. Q^2 value is the value that is calculated from blindfolding procedure to assess the predictive relevance. Cohen (1998) has set up the measurement to measure the impact of f^2 and q^2 at 0.02 as small effect, 0.15 as medium and 0.35 as a large effect at the structural level. Q2 will be considered as having a predictive relevance if Q2 > 0. (Fornell & Cha, 1994) Table 7 indicates that all constructs have a small effect on the adoption of Halal transportation among Halal manufacturers in Malaysia. The table indicates that all constructs also have a predictive relevance to the model.

4.0 Discussion and conclusion

The study has mixed findings compared to the conventional views about the influence of independent variables of perceived benefits, complexity, readiness, consumer pressure, competitive pressure and government support on the adoption of Halal transportation services among Halal manufacturers in Malaysia. The study also used partial least squares (PLS) techniques in testing the hypothesis. Besides assessing the overall research model, this study also evaluates the goodness of measure which is assessed by looking at the validity and reliability of the measures carried out by using the PLS approach. Both of the tests have proven that the measure has convergent and discriminant validity. This study also passed the reliability criteria either by using the cronbach alpha values or composite reliability values that have been used by other established researchers.

Among the six (6) hypotheses that have been tested, only five (5) hypotheses were supported, and one of them has been found to be the barrier to the adoption of Halal transportation. Perceived benefits, organizational readiness, competitive pressure and customer pressure have been found to be the enabler to the adoption of Halal transportation, and complexity is a significant barrier to the adoption.

Perceived benefits were found to have a significant relationship with the intention to adopt Halal transportation services. These findings are supported by other studies in the RFID technology adoption (Irwin Brown & John Russell, 2007; Tsai et al., 2010). It shows that, a higher perceived benefit will lead to a lower barrier to the adoption of Halal transportation services. The respondents of this study are the non-adopters of Halal transportation services who seem to understand the benefits of using Halal transportation services, but during the data collection process, they still haven't adopted the services. It is because the decision to the adoption of new technology does not only rely on the benefits only. There are more factors to be considered before the organization will decide whether to adopt it or not.

This study also found that organizational readiness has a positive relationship with the adoption of Halal transportation. In this study, organizational readiness has been measured by the financial and human resource capability to adopt the services. This result was aligned with (Brown & Russell, 2007, Iacovou et al, 1995) which also found that organizational readiness has a positive relationship with the adoption of new innovation. This signifies that, the higher the organizational readiness is, the higher their intention to adopt Halal transportation as part of their business operation will be. These statements are also parallel to the other Halal studies whereby Othman et al. (2006) mentioned that compliance with the Halal requirements are not a threat anymore, but a business opportunity. Zailani et al. (2011) support the statement by claiming that the capability to meet the Halal requirements nowadays could be a source of competitive advantages.

As predicted, customer pressure also was one of the construct that had a positive relationship with the intention to adopt Halal transport. This finding is consistent with other studies such as Al-Qirim, (2005), Sophonthummapharn, (2009) and Marimuthu et al., (2011). Since the majority of Malaysians are Muslims, and as Muslims they need to use Halal products that are certified as Halal. So as Muslim customers, they do not only look for Halal products, but also Halal process (Bonne & Verbeke, 2008). This statement is supported by Omar & Jaafar (2011) whereby they claim that customers demand for Halal products that have gone through the Halal manufacturing process and also Halal handling such as Halal transportation. In addition Tieman, (2007) also mention that for Muslim customers, the Halal handling such as Halal transportation is a critical success factor in confirming the Halal integrity of the Halal products. If the manufacturers are Muslims, may be the doubt of the Halal quality is not a serious matter, but since majority of the Halal manufacturers in Malaysia nowadays are non Muslim (Tieman, 2013), the application of Halal transportation is the best way to maintain the Halal integrity of their Halal products.

Apart from customer pressure, competitive pressure was also found to be a significant enabler to the adoption of Halal transportation. These finding confirmed the views of other researchers in other areas of study such as Kevin Zhu et al (2003) : e-business, (Low et al., 2011) : cloud computing. It shows that, the higher the competitive pressure, the higher the intention to adopt Halal transportation services will be. The nature of business is to make profit and not lose against their competitors. In order to survive, they must at least be at par with their competitors or be better than their competitors to gain the competitive advantages. Hence, in order to create a better scenario of adoption of Halal supply chain services, the main players in their industries either food, pharmaceutical or cosmetic should start adopting Halal services. So, for the sake of their business, their competitors will also start to look for Halal services also. When most of the main players or competitors start to utilize it, the other Halal manufacturers in the Halal industry will also start to adopt it, hopefully in future most of the Halal manufacturers are going to adopt Halal transportation services for their Halal products. In fact, if the Halal industry could reach to this level, the intention of the government of Malaysia to be a Halal hub in this region could be achieved.

The only variable found to be the barrier to the adoption of Halal transportation services was complexity. This finding is also supported by both of the studies regarding RFID adoption by Brown & Russell, (2007) and Wang et al., (2010). This demonstrates that complexity is a barrier to the adoption of new technology. Though Halal manufacturers seem to foresee the potential benefits of Halal transportation, complexity is still a barrier for them. As Halal is an Islamic term, and is usually related to the Muslim people, it may be complex to be understood by the non-Muslims. Furthermore, in Malaysia, most of the companies which are certified as Halal manufacturers belong to the non-Muslims (Tieman, 2011). Most believe that, as long as their products do not mix with non-Halal elements such as a pork, it is already considered Halal. However, Halal according to Syariah, is not only whether the products are mixed with non-Halal products or not, it is more than that. So, since it is already a problem for them to understand what the concept of Halal is,, to understand the concept of Halal transportation from the perspective of Syariah, could also be difficult for them. Halal transportation issue does not only concern Malaysian users, but also the world market. Researchers in this area have already spent a lot of time and energy in the effort to reduce the complexity of the Halal supply chain (Tieman, 2007) and make the industry player to understand it, but it is still quite complicated for the non-Muslims to understand the concept.

Meanwhile, Government support was found to be not significant in the adoption decision for this study. Despite the findings of, most studies stated that government support has a positive relationship with the organizational adoption decision of a new technology, the finding of this study contradicted with the existing technology adoption studies in another field(Cui et al., 2008, Kendall et at., 2001). Even though it is different with the literature, it is still similar to the research done by Marimuthu et al. (2011) and (Salwani et al., 2009). Marimuthu et al., (2011) mentioned that in Malaysian context, the government support for E-business was perceived as not playing an important role in e-business adoption due to the lack of awareness among SMEs concerning the support provided by the government. E-business in Malaysia and Halal transport in Malaysia have quite similar situation as both quite new. Despite the government support for them there is, still an awareness problem. Actually there are many kinds of support provided by the government. Halal Development Corporation (HDC), Universiti Teknologi Mara (UiTM), Department of Islamic Development (JAKIM) and other agencies in Malaysia provide various kinds of support such as conducting workshops, seminars and even training for Halal manufacturers in Malaysia, Unfortunately, maybe they don't see it as a government, but more on the agencies' obligations to provide them with information and training for them. This kind of misunderstanding may be the reason why government support was not significant in this study. In terms of regulation, The Malaysian government has already provided a few rules and guidelines by introducing standards for

Halal practices. From MS 1500 until MS 2400, it is all about Halal products and the Halal supply chain.

5.0 Implications

By using PLS in the analysis, the results confirm that perceived benefits, organizational readiness, customer pressure and competitive pressure are the enablers, and complexity is the barrier in adopting Halal transportation services among Halal manufacturers in Malaysia. This kind of information provided useful information for the policy makers and Halal service providers to make an initiative on how to increase the adoption rate of Halal services either on transportation or other Halal services. In order to promote Malaysia as a regional Halal hub, the adoption of Halal services should not be an issue among Halal manufacturers. Furthermore, without adopting Halal services, the products could no bet confirmed Halal at the point of consumption.

Since the perceived benefits were found to be significant enablers to the Halal transportation adoption, Halal transport service providers should absorb this information to be in their marketing approach. Instead of informing the Halal manufacturers that they provide Halal transportation services, they should also explain the benefits of adopting their services to the Halal manufacturers. Expanding their market, increasing the Halal image and ensuring the purity of the products are among the benefits that Halal manufacturers will get if they are adopted Halal transportation services. It would be much easier to persuade the Halal manufacturers to adopt their services if the manufacturers can be convinced of the advantages and finally utilize their services of the in the near future.

Furthermore, this study also confirmed that organizational readiness has a positive influence in the adoption decision as well. To ensure that Halal manufacturers are ready to adopt the services, the government should make sure that Halal manufacturers have experts who understand the concept of Halal products according to the Syariah. Financial factor must be considered too. Therefore, since Halal transportation is still at the introductory stage, the fee charged by the service providers to the customers should not be much different compared to the traditional transportation providers in order to encourage the use of their services.

Besides the role of policy makers and the Halal service providers in enhancing the adoption of Halal transportation services, the customer also has a significant role to play. Currently, although customers have already asked the manufacturers to use Halal services, the manufacturers are still reluctant to use it, yet the customers are still buying the products. If the customers become more aggressive such as switching to other Halal products, may be, this strong signal will force the manufacturers to adopt the Halal services to protect their businesses.

In addition, this study has also shown that, competitive pressure also plays an important role in promoting Halal services. By ensuring the main players in the Halal industry adopt Halal supply chain services, it can encourage other manufacturers to adopt it also. As a matter of fact, if they do not follow the industry trends, they might be left behind. This statement is supported by Zailani et al. (2011) in which she mentioned that being Halal is no longer a treat, but as a source of competitive advantage. Evans, (2011), stated that it is near certainty that the companies that take the fullest advantage of having Halal qualities and values will be successful brand leaders in the Halal market of tomorrow. Hence this study could provide meaningful information for the government, Halal service providers, customer, Halal manufacturers and also for the academician and add to the body of knowledge in terms of its applicability in the Halal industry.

On the other hand, government support was found to be not a significant predictor for this study. From the perspective of the respondents of this study, the government's effort for the halal industry today would not affect them to adopt the Halal transportation services. Loukis et al., (2011) mentioned that the lack of incentive by the government will lead to the barrier for companies to change. In the current situation, the government only provides an incentive to the logistic service provides to become Halal service providers, but not for the Halal manufacturers who are adopting Halal services. It is the best time now for the government to start giving incentives to the Halal manufacturers who adopt the Halal supply chain services for transportation and all other services in order to encourage them to adopt the Halal services.

This paper still has its limitation since the respondents may not be representing the whole population of the Halal manufacturers in Malaysia since not all Halal manufacturers have the opportunity to participate in the exhibitions due to several factors such as economic and geographical matters. Hence, the findings of this study may not reflect the entire Halal manufacturers in Malaysia. Though the respondents of this research are only based on the manufacturers who are attending the MIHAS 2013, the researchers still believe that this knowledge could be a motion for further research regarding the adoption of Halal supply chain services among Halal manufacturers in Malaysia

The TOE framework is a soft theory whereby any variables that are related to the theory could be involved in this theory. A few potential variables which could be a better predictor was not used for this study. Besides those variables, the awareness and characteristics of the organization could also be a better predictor for this kind of studies. Future studies should try to understand the relationship between awareness and also characteristics of the Halal manufacturers such as in terms of the number of Halal products and geographical factors as most of the suppliers of Halal services are located in the Klang valley. This kind of knowledge would be meaningful to understand the enablers that encourage and barriers impede the Halal manufacturers in Malaysia from adopting the Halal transportation services.

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