Halal logistics service quality: conceptual model and empirical evidence

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Abstract

Purpose – The purpose of this paper is to devise and test a model of halal logistic service quality.
Design/methodology/approach – To develop the halal logistics service quality model, the relevant literature was reviewed and a qualitative study was carried out on halal logistics service providers and their customers. A survey of 253 halal food and beverage firms in Malaysia was conducted, and based on the results, a model was developed and tested empirically.
Findings – Based on the literature review, interviews, pretest and empirical study, a valid and reliable measurement instrument for halal logistics service quality was developed.
Practical implications – The findings can help managers of halal logistics service providers to understand the criteria that halal food and beverage firms are considered to judge the quality of halal logistics services.
Originality/value – This study makes a valuable contribution by proposing a halal logistics service quality model.

Keywords Halal logistics, Conceptual modelling, Food firms, Logistics service quality

Paper type Research paper

Introduction

It has been widely recognized that logistics quality is the foundation of logistics companies. The level of service provided determines customer satisfaction, which determines their competitive edge over their competitors (Thai, 2013). Hence, third-party logistics (3PL) service providers must continuously focus on improving logistics service quality (LSQ) by providing their customers with exceptional logistics service (Stank et al., 1999). It is of great importance, therefore, for 3PL service providers to be able to measure LSQ from the consumer perspective.

Currently, there are many models for measuring LSQ (e.g. Perreault and Russ, 1976; Mentzer et al., 2001; Saura et al., 2008). However, the dynamic business environment has dramatically altered the nature of the logistics industry through the diverse requirements of different countries. In addition, as business environments differ, one model may not be...
suitable for measuring LSQ across various industries. For example, Mentzer et al. (2001) showed that the importance of LSQ factors is different among the textile, electronics and construction industries due to differences in the type of business.

Over the past several years, the importance of the halal business has dramatically increased (Soltanian et al., 2016). Its net worth reached about $1.292bn in 2013, and according to statistics, this number is anticipated to go up to $2.537bn by the end of the decade (Thomson Reuters, 2014). Several established non-halal food firms have entered the halal market due to the apparent increase in international demand for halal foods (Zakaria and Abdul-Talib, 2010). Halal industries must engage in an on-going process starting from the time the produce has been manufactured (Zailani et al., 2015), because they risk losing their status if any contamination occurs prior to retailing, that is, during transportation and storage. Therefore, considering the fact that logistics connect the two points of production (when halal is certified) and consumer purchase (when the halal product is sold), halal product logistics is a crucial stage ensuring the purity of halal products at consumption point (Tieman, 2011). As such, implementing halal practices is considered an area in which logistics companies can create competitive advantage, and the quality of halal logistics service is key to ensuring halal food quality from the point of view of Islamic law which will satisfy customers. The requirements of halal logistics are different from conventional logistics yet there are no studies on how business customers evaluate halal LSQ. To address this gap, the aim of this study is to develop a halal LSQ model. The findings of this study can help halal 3PL service providers to customize their logistics service based on customer perception of quality.

Logistics service quality
Based on recent research on service quality, in general, and LSQ, in particular, two approaches have shaped the definition and conceptualization of this subject. The first approach termed objective, views quality as matching service to specifications set forth by service providers (Crosby, 1991), whereas the second approach termed subjective, views quality as based on customer evaluation and perception. The first approach conceived of service as a physical object, observable and having attributes which can be evaluated (Garvin, 1984). It is based on the traditional concept that LSQ is made up of the physical distribution aspects of service and thus focuses on service providers rather than on customers. It also enables logistics executives to quantify the value created for the customers by the provider firms, but cannot measure customer perceptions of the value created by logistics services (Rafiq and Jaafar, 2007). Bienstock et al. (1997) took note of this shortcoming and found a valuable tool called conceptualized physical distribution service quality (PDSQ) for determining service quality when people obtain non-tangible services that are not physically apart from the customer. They concluded that an alternate approach is essential to measure logistics service quality, since business-to-business logistics services are proposed in circumstances in which the provider and customer are physically disconnected. As such, the second approach attempted to identify objective variables evaluated through customers’ perceptions in relation to their expectations (Bienstock et al., 1997; Mentzer et al., 1999, 2001).

As far as the quality of a service as perceived by customers is concerned, Gronroos (1984) noted two dimensions. The first is technical quality, which refers to the service outcomes and the second is functional quality, which refers to the process of service delivery. Bienstock et al. (1997) conceptualized PDSQ based on result, rather than on functional or process dimensions by developing three dimensions, namely, timeliness, condition and availability to measure LSQ. Although these three dimensions are critical aspects of the customer’s perception of LSQ, there are also other components that should be combined with PDSQ to conceptualize LSQ. Specifically, these include: order processing (Byrne and Markham, 1991; Langley and Holcomb, 1991), quality of contact personnel (Innis and LaLonde, 1994), information at order
placement (Byrne and Markham, 1991; Innis and LaLonde, 1994), order accuracy (Byrne and Markham, 1991), order completeness including accuracy, condition, and quality (Byrne and Markham, 1991; Sterling and Lambert, 1987) and the procedures for handling damaged, inaccurate, or return shipments (i.e. aside from the product condition itself) (Innis and LaLonde, 1994; Sterling and Lambert, 1987).

A new multidimensional model called LSQ emerged from the work of Mentzer et al. (1999) who revised and validated the accuracy of the model of Bienstock et al. (1997) by employing an integral logistics focus. Based on their study, a set of dimensions were identified for measuring LSQ including: personnel contact quality, information quality, order discrepancy handling, order release quantities, order accuracy, timeliness, ordering procedures, order quality and order condition. Rafiq and Jaafar (2007) also used the nine dimensions from Mentzer et al. (1999) and re-classified order quality, order condition, order accuracy, order release quantities and timeliness as technical quality, while personnel contact quality, information quality, ordering procedure and order discrepancy handling were re-classified as functional quality.

Mentzer et al. (2001) and Rafiq and Jaafar (2007) confirmed the model, and it is now recognized as the most outstanding inclusive model due to the addition of the physical distribution of service dimension and the elements from the customer service dimension. Even though many researchers confirmed the model, a number of limitations were raised. For example, the assumption was made that all nine components to the model made a similar contribution, while a revision confirmed that customers select functional quality attributes of LSQ over technical quality in terms of level of satisfaction. Another limitation was that the LSQ model considers that all dimensions take place concurrently, but in reality, some of them rely upon others. At last, referring to the study by Mentzer et al. (2001), the importance of the LSQ dimensions differs based on the type of business. Therefore, due to the actual differences between the nature of the halal business and other businesses, in this study the LSQ model offered by Mentzer et al. (2001) was reexamined to develop a model, which is appropriate for measuring halal LSQ. Halal quality is reviewed in the following section.

**Halal LSQ**

A post-modern view of food quality is emerging from the factors of culture, environmental and ethical values, biological values, sensual and nutrition values, functional values and authenticity (Lam and Alhashmi, 2008). However, the understanding of specifically imposed values on food quality is not new in Islamic culture. Food permitted by Islamic dietary laws is called Halal food (permitted food). The term of “halal” is extracted from the Quran, which means “allowed, permitted, legal, or lawful” (Wilson and Liu, 2010; Zailani et al., 2017). The opposite of halal is called “haram” (Muhammad et al., 2009; Rosly, 2010). In order to practice Islamic religious principles, Muslims consume halal food. For that reason, nutrition, safety, storage and cleanliness of halal food, acknowledged as the “tayyib,” have to be ensured (Kamaruddin and Jusoff, 2009). The tayyib also set a proof on a particular food product’s safety (Muhammad, 2007; Hassan, 2011). Products certified as Halal are products that not only abide by the religious requirements, but also, include hygiene, sanitation and safety qualities (Talib et al., 2015) which are important quality aspects of food.

There are some similarities and differences between conventional and halal logistics. Christopher (2011) defines logistics as: “the process of strategically managing the procurement, movement and storage of materials, parts and finished inventory and the related information flows, through the organization and its marketing channel in such a way that current and future profitability are maximized through the cost-effective fulfillment of orders.” Halal logistics is essentially the act of distributing halal food along the halal supply chain. Hence, all the phases of transportation, warehousing, material handling and procurement are part of the core logistics, and must be Shariah-compliant in order to avoid
contamination during distribution. According to Tieman (2013, p. 5), “Halal logistics is the process of managing the purchase, transfer, storage, and control of material parts, livestock, partially finished or finished inventory of consumable and non-consumable products, and related data and certification flows through the business and the supply chain in accordance with the general doctrines of Shariah.” As such, the dimensions of LSQ in conventional logistics are also important for halal logistics. For example, timeliness is also an important dimension in halal LSQ, as on-time deliveries have a high priority in the food industry. However, in addition to this dimension of LSQ, halal logistics should meet Islamic laws.

Throughout his study, Lodhi (2009) pointed out the importance of halal assurance in all key steps of the supply chain and logistics of halal products, which is the assurance on protection of halal products from non-halal items till arrival to their final destination. Subsequently, halal LSQs have to set up measures to secure halal products from any potential contaminants. Talib et al. (2010) gave an example of contamination as any contact of the contaminated equipment with halal products or using the non-halal products with the equipment. Therefore, continuous segregation of the warehousing and transportation of halal and non-halal products should be practiced to refrain from contamination (Riaz and Chaudry, 2004; Jaafar et al., 2011). In addition, Soong (2007) believed that for tertiary packaging of halal commodities, logistic companies should use halal materials. In other words, the materials that are used in packaging should not be made of objects that are recognized as “najis” by Islamic laws, which have an adverse effect on one’s health. Lately, the concepts of halal logistics have drawn a considerable amount of attention both by academics and practitioners. A recent study by Tieman (2011) revealed that halal products might lose the status of halal if any direct contact with a haram object occurs in the process of transportation and warehousing. By mixing halal and haram foods, which is considered as a threat to halal food products, cross-contamination occurs. The latest study by Fathi et al. (2016) indicated the increase in Muslims’ awareness about this issue, and hence halal logistics is a vital act for halal integrity assurance (Tieman et al., 2013). As such, the quality of halal logistics services is vital for ensuring the halal food quality at consumption point according Islamic dietary law.

**Dimensions of halal LSQ**

As recommended by Mentzer et al. (2001), we carried out a qualitative research study for developing items and constructs that are relevant to halal LSQ. In order to develop a preliminary idea of this subject, a qualitative exploration was carried out by individually interviewing a total of 8 managers working with halal 3PL service providers and 15 customers utilizing halal logistics service. Customers of halal logistics services participated in five focus group sessions following the in-depth primary interviews. The focus group is used as a tool for studies of an exploratory nature as well as for researching and identifying new phenomenon (De Ruyter, 1996; Sekaran and Bougie, 2009). The duration of every focus group meeting was between 90 min to 120 min, and all of them were recorded with the consent of those interviewed. Customer relationships with halal 3PL service providers were examined in each of the focus group sessions. Additionally, the significant areas from their point of view for working with 3PL service providers were evaluated. This phase of our qualitative research led to the development of a survey designed to measure halal LSQ. Based on the survey results, it was concluded that nine concepts were the major areas of concern for halal logistics services customers; these were: volume flexibility, service diversity, halal assurance, timeliness, corrective actions, personnel contact quality, information quality, service ordering procedures and order receipt quality. The proposed dimensions cover both technical (order receipt quality and timelines) and functional (personnel contact quality, information quality, service ordering procedure, service diversity, volume flexibility, halal assurance and corrective actions) aspects of quality.
Rafiq and Jaafar (2007) showed that functional quality elements of LSQ are perceived as more important than technical ones for customer satisfaction. Among the nine recognized dimensions for halal logistics services in this study, seven of them are functional and only two dimensions are technical. As such, although both technical and functional aspects of quality were considered, the functional dimensions received more attention in halal LSQ.

“Personnel contact quality” refers to the customers’ orientation of the LSPs’ contact people (Mentzer et al., 1999). Customers are particularly concerned about the level of knowledge of customer service personnel and how compassionate and supportive they are with regard to individual customer special circumstances and problems (Hartline and Ferrell, 1996; Parasuraman et al., 1985). Parasuraman et al. (1985) argue that the quality perception in most of the service encounters is created in the interim of service delivery. Likewise, the research study by Surprenant and Solomon (1987) indicated the perception of the service quality is more affiliated with the service process than with the resulting service outcome, as the former involves staff contact. Therefore, personnel contact quality is an influential dimension of the employee-customer interface (Hartline and Ferrell, 1996; Hartline et al., 2000).

“Information quality” is defined as the perception of the customers about the provided information by suppliers with regard to the product of choice by the customers (Mentzer et al., 1999; Novack et al., 1994). Customers have the ability to make decisions once the information is accessible and the quality is satisfactory. This information is directly implemented both in forecasting lead-time demand and updating inventory parameters. Similarly, Chatfield et al. (2004) pointed out that this information might influence the order streams, stockouts, inventory levels and other dimensions of a supply chain. Consequently, information quality plays a vital role in the perception of customers toward logistics service quality.

Cleveland et al. (1989) defines “volume flexibility” as the ability of 3PL service providers to adjust variations in volume in accordance with customer demand. Volume flexibility has a direct impact on logistics service quality in two ways: avoiding out-of-stock situations for products that suddenly are in high demand or restricting high levels of inventory.

“Service diversity” refers to variation in product, logistics service and geographical area that are covered by providers of 3PL logistics service (Schmoltzi and Wallenburg, 2012). The remarkable increase in interest of the companies for outsourcing their logistics business functions to 3PL service providers could not be neglected. Following this strategy companies give 3PL service providers authorization in managing and coordinating the information and product flow along the numerous supply chain stages. To make this happen and to achieve the most objectives, 3PL service providers are obliged to expand their geographical area coverage, improve their capabilities and broad service offerings. Furthermore, the extent in which 3PL service providers cover widespread geographical areas and propose different types of products and logistics services has an unquestionable impact on customer perception of the quality of their services.

“Service ordering procedures” apply to the effectiveness and efficiency of the ordering procedures that are followed by the supplier (Mentzer et al., 1999; Rinehart et al., 1989). The three items of effectiveness, flexibility, and ease of use are the major areas of concern for customers when they order placements.

“Halal assurance” refers to the assurance that the 3PL service providers give to monitor and implement halal practice to ensure the integrity of halal products at the point of consumption (Zailani et al., 2015). Verification activities aim at judging the halal assurance. In practice, general verification by companies is often not appropriately performed (Keener, 2007) due to lack of technical resources (Panisello and Quantick, 2001). In general companies perceive verification as an essential but costly activity (Nguyen et al., 2004; Panisello and Quantick, 2001). Therefore, companies receive higher perception of quality if they assure that the food received from 3PL service providers is a true manifestation of Islamic principles.
“Order receipt quality” that affects the quality perception by the customer is defined as the lack of damage to an order as well as matching customers’ orders upon arrival (Mentzer et al., 2001; Bienstock et al., 1997). For instance, there is a chance of spoilage if the transportation of the food product happens in an improper way. Logically, customers would not be able to use the wrong or damaged products and they have to engage in a correction process with 3PL service providers. This engagement has a negative impact on the perception of quality by customers.

Novack et al. (1994) defined “corrective action” as how well the providers of 3PL service address any flaw in logistics services. Customers demand correction from the providers of 3PL services if their received orders do not meet the satisfactory condition and quality as well as the stated accuracy. How well 3PL service providers deal with these drawbacks contributes to the perception of service quality by customers.

“Timeliness” is the on-time delivery of customers' orders as promised. Timeliness is the time spent between the two steps of order placement and receipt (Hult, 1998; Hult et al., 2000). Studies show that the back-order time when products are not available as well as transportation time could affect delivery time (Bienstock et al., 1997; Mentzer et al., 1999).

Model conceptualization

Most of the researchers, including Mentzer et al. (1999) and Saura et al. (2008), proposed the dimensions of LSQ as a first-order dimension of a second-order LSQ construct. Mentzer et al. (2001) stated that in a second-order construct, equal weight is given to all dimensions; additionally, they are treated as if they take place simultaneously. In the logistics literature this is a very consistent limitation. This operationalization overlooks the processes, which means the temporal ordering of the dimensions being examined. Mentzer et al. (2001) believed that some of these dimensions are not only correlated with other dimensions, but also, dependent on them. In such a way, the process by which perception of logistics service dimensions influence each other, and eventually the satisfaction of the customer, is lost. Therefore, we conceptualize the nine components of halal LSQ in terms of a logical process. The proposed halal LSQ model is presented in Figure 1. According to this model, halal product order placement components include perception of interaction with halal 3PL personnel, contact quality, information quality, volume flexibility, service diversity, service ordering procedure, order receipt quality, corrective actions, and satisfaction.
service providers, information quality, volume flexibility, service diversity, service ordering procedure and halal assurance. Until the order receipt stage, customers do not have any perception of the tangible products that are delivered. At the order receipt stage of halal LSQ, we place order receipt quality and timeliness. This is the first time customers can really assess the quality of the received products and timeliness of the logistics process. Perception of the two order receipt components (i.e. order receipt quality and timeliness) are driven by the elements of order placement. Nevertheless, sometimes the orders customers receive are not according to expectation (Bienstock et al., 1997; Handfield and Nichols, 1999). If this happens, customers request the service providers to rectify the mistake. Hence, in the situation where the orders are not received in a satisfactory condition, dealing with providers of halal logistics service (i.e. corrective actions) is considered a part of order receipt activities. This process is followed by an assessment of the order receipt quality. It is important to understand that timeliness is affected, when corrective actions have to be addressed. If products or services are not received as ordered, they are not regarded as on time. Therefore, timeliness is driven by the process of placing orders (i.e. service diversity, personnel contact quality, flexibility of the volume, quality of the information, halal assurance and service ordering process), receiving accurate orders in an appropriate quality and condition and ultimately the corrective actions. Altogether, timeliness, order receipt quality and corrective actions are decisive factors in customer satisfaction. Research on service quality emphasized the interactions with the service provider as an influencing factor in customer satisfaction (Politis et al., 2014; Mentzer et al., 2001). As such, direct effects of personnel contact quality and service ordering procedure on satisfaction is expected.

Hypothesis development

This study hypothesizes that ordering-related constructs have an effect on order perceptions at the time of arrival. In particular, personnel contact quality, quality of information, service diversity, volume flexibility, halal assurance and the service ordering procedure involve customer-supplier interactions at the time of placing orders. As pointed out by Mentzer et al. (2001), every individual construct must affect order receipt quality perception and timeliness perception in a positive way. This is reflected in H1 and specifically in ten distinct hypotheses:

**H1.** Perception of ordering-related constructs positively affects order receipt perception:
(a) personnel contact quality, (b) information quality, (c) volume flexibility, (d) service diversity and (e) service ordering procedure and positively affects (a) order receipt quality and (b) timeliness.

If orders are made at an inaccurate rate, of low quality, or in poor condition, customers are forced to interact with halal 3PL service providers to handle the discrepancies. If discrepancies are handled well, such that orders are eventually accurate, of acceptable quality, and in proper condition, customers should have positive perception of the supplier’s corrective actions. As such the following hypothesis was developed:

**H2.** Order receipt quality positively affects corrective actions.

A considerable amount of past research highlighted timeliness as an essential factor in logistics services (Politis et al., 2014; Thai, 2013). Besides the hypothesized positive impact of the six order placement constructs on timeliness, in this paper we hypothesize that an order would be regarded on time when the order was considered as accurate and in good condition. Accordingly, timeliness is affected when the order receipt is not met as expected.
Hence, we hypothesize that order receipt quality perception and corrective action influence timeliness perception:

H3. Perception of order receipt quality positively affects perceptions of timeliness.

H4. Perception of corrective action positively affects perceptions of timeliness.

Considering the fact that halal products are perishable, corrective actions and order timeliness must have a strong impact on satisfaction of customers of halal logistics service. Nevertheless, according to the broad range of literature on service quality and halal service as stated previously, ordering procedure, halal assurance and personnel contact quality might have direct effect on satisfaction. Therefore, the next four hypotheses were developed:

H5. Perception of order receipt quality positively affects satisfaction.


H7. Perception of corrective actions positively affects satisfaction.

H8. Perceptions of (a) personnel contact quality, (b) service ordering procedure and (c) halal assurance positively affect satisfaction.

Research methodology

Measure of constructs
The qualitative research and literature (i.e. Bienstock et al., 1997; Mentzer et al., 2001; Saura et al., 2008; Huang et al., 2009; Thai, 2013) helped us to develop the items of nine halal LSQ constructs. The pre-testing procedure was conducted to examine the clarity, content validity and face validity of the measurement (Sekaran and Bougie, 2009). The pretest of the questionnaire was conducted among three academicians. After removing two items and revising some items, the academicians generally agreed that the questionnaire was well-designed and the items were quite easy to understand. To test the reliability of the items and to standardize the questionnaire, a pilot study with 35 business customers of halal products was conducted. The Cronbach’s $\alpha$ of the pilot study data ranged from 0.742 to 0.891, which indicated good reliability measures.

Data collection and sample
To examine the construct and process model of halal LSQ, the halal food and beverage firms in Malaysia as the customers of halal 3PL service providers were considered in the sampling. A list of 931 halal food firms was obtained from the 2015 Federation of Malaysian Manufacturers Directory. The questionnaire was distributed to all of the firms, considering the small sampling frame and the low response rate of mail surveys (Sekaran and Bougie, 2009). Managerial personnel who were in charge of the logistics services including logistics manager, purchasing manager, or supply chain manager were selected as the respondents. Company owners represented those small firms that participated in the survey, because they were more knowledgeable about their company operations and had strong influence over the operations and decisions in their firms. A structured mail questionnaire was mailed to each respondent. A total of 253 valid responses were received, yielding a 27.2 percent effective response rate.

According to the discriminant analysis, manufacturers accounted for 39.9 percent of the participating firms, followed by retailers (38.7 percent) and traders (21.4 percent). Regarding their current position, the majority of the respondents hold logistics or supply chain manager positions in their companies (78.3 percent). Other respondents were purchasing managers or owners of the firms. The majority of the respondents had more than four years of experience with 3PL service providers (67.9 percent).
Analysis
To examine the research model, the partial least squares (PLS) technique of structural equation modeling was carried out using SmartPLS Version 3.0. The underlying reason for choosing this technique was due to the exploratory nature of the study (Hair et al., 2011). Besides, PLS is prioritized over other techniques when the model is complicated (Hair et al., 2013). Taking into consideration the research studies carried out by Hair et al. (2013), a two-step approach for data analysis is required. The first step is analyzing the measurement model and the second step focuses on assessment of the latent constructs (see Nikbin et al., 2014; Zailani et al., 2016).

Results
Measurement model results
The validity and reliability of the reflective constructs were examined. In particular, composite reliability (CR) in connection with internal reliability was examined. The CR of all constructs was above 0.7 (Table I); therefore, the rule of thumb introduced by Hair et al. (2013) was satisfied. Individual item reliability was reasonably judged given that the loadings of each scale were all greater than 0.6. Furthermore, average variance extracted (AVE) was implemented to evaluate the convergent validity. Findings show the AVEs of all constructs were more than 0.5 suggesting satisfactory convergent validity (Fornell and Larcker, 1981).

The assessment of the discriminant validity of the constructs was carried out by applying two approaches (see Iranmanesh et al., 2017; Gilani et al., 2017; Zainuddin et al., 2017). First, the cross-loadings of the indicators were examined, in which none of the indicator loads exceeded the opposing construct value (Hair et al., 2012). Second, according to the Fornell and Larcker (1981) criterion, the square root of the AVE for each construct should surpass the intercorrelations of the construct with the other model constructs (Table II). Both analyses confirmed the discriminant validity of all constructs.

Assessment of the structural model
The measurement model yielded satisfactory results, and the structural model was evaluated subsequently. The predictive accuracy of the model was evaluated based on the explained variance portion, and the findings indicated that the model has the ability to explain 40.1, 48.2, 41.8, and 56.1 percent of the variance in order receipt quality, timeliness, corrective action and satisfaction, respectively. By utilizing a blindfolding method in PLS, Stone-Geisser $Q^2$ (cross-validated redundancy) was calculated to test the predictive relevance. A $Q^2$ value greater than zero indicates the predictive relevance of the model (Chin, 2010). The $Q^2$ value of 0.294 was obtained for average cross-validated redundancy, which exceeded zero. Hence, the recommended model displayed high predictive relevance and satisfactory fit.

Nonparametric bootstrapping was applied (Wetzels et al., 2009) on 2,000 replications to test the structural model (see Yusof et al., 2017; Kurniawan et al., 2017; Nikbin et al., 2016). The results indicate that personnel contact quality ($\beta = 0.269$, $p < 0.01$), information quality ($\beta = 0.173$, $p < 0.05$), volume flexibility ($\beta = 0.160$, $p < 0.05$) and service ordering procedure ($\beta = 0.164$, $p < 0.05$) have a positive significant effect on order receipt quality (Table III). Meanwhile, service diversity ($\beta = 0.083$, $p > 0.05$) has no effect. Regarding the drivers of timeliness, the results show that personnel contact quality ($\beta = 0.160$, $p < 0.05$), service diversity ($\beta = 0.186$, $p < 0.05$), service ordering procedures ($\beta = 0.185$, $p < 0.05$), order receipt quality ($\beta = 0.179$, $p < 0.05$) and corrective actions ($\beta = 0.248$, $p < 0.01$) have significant effects on timeliness, while information quality ($\beta = 0.094$, $p > 0.05$) and volume flexibility ($\beta = 0.087$, $p > 0.05$) have no effect. Order receipt quality has significant effects on corrective actions also ($\beta = 0.646$, $p < 0.001$). Finally, personnel contact quality ($\beta = 0.182$, $p < 0.05$),
<table>
<thead>
<tr>
<th>Constructs</th>
<th>Items</th>
<th>Factor loadings</th>
<th>CR</th>
<th>AVE</th>
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<tbody>
<tr>
<td>Personnel contact quality (PCQ)</td>
<td>The designated 3PL contact person […] Makes an effort to meet our expectations Is responsive to our needs and requirement Has adequate knowledge/understanding of our needs and requirements Handles our feedbacks (claims, complaints, and returns) properly Responds quickly to our feedbacks</td>
<td>0.775 0.831 0.718 0.686 0.721</td>
<td>0.863 0.559</td>
<td></td>
</tr>
<tr>
<td>Information quality (IQ)</td>
<td>The information and documentation provided by our main 3PL service provider is […] Accurate Adequate Complete Credible</td>
<td>0.825 0.812 0.849 0.757</td>
<td>0.855 0.658</td>
<td></td>
</tr>
<tr>
<td>Volume flexibility (VF)</td>
<td>Our main 3PL service provider is able to […] Accommodate changes in volume Adjust operations to meet urgent orders Deliver/meet high volume requirement Deliver/meet low volume requirement</td>
<td>0.766 0.727 0.763 0.782</td>
<td>0.845 0.577</td>
<td></td>
</tr>
<tr>
<td>Service diversity (SD)</td>
<td>Our main 3PL service provider covers […] Vast geographic area Vast product variety Diverse logistics services</td>
<td>0.840 0.827 0.718</td>
<td>0.839 0.635</td>
<td></td>
</tr>
<tr>
<td>Service ordering procedure (SOP)</td>
<td>Logistics service ordering procedures of our main 3PL logistics service provider […] Are effective Are simple Do not take much effort Do not take much time Are flexible</td>
<td>0.739 0.683 0.811 0.841 0.752</td>
<td>0.877 0.589</td>
<td></td>
</tr>
<tr>
<td>Halal assurance (HA)</td>
<td>Our main 3PL service provider […] Has a comprehensive understanding of halal concept Has a halal committee Has halal certification Segregates completely halal and non-halal products Implements internal halal monitoring Checks the halal certificates of the products to consider them as halal products</td>
<td>0.749 0.795 0.668 0.781 0.791 0.768</td>
<td>0.891 0.557</td>
<td></td>
</tr>
<tr>
<td>Order receipt quality (ORQ)</td>
<td>Damage rarely occurs as result of the transport mode or carrier Goods delivered by our main 3PL service provide are undamaged The incidence of error from our main 3PL service provider is low</td>
<td>0.830 0.821</td>
<td>0.855 0.663</td>
<td></td>
</tr>
<tr>
<td>Timeliness (TI)</td>
<td>Time between pickup and delivery is short Orders arrive on the date/time promised The incidence of delayed delivery is low</td>
<td>0.762 0.843 0.832</td>
<td>0.854 0.661</td>
<td></td>
</tr>
<tr>
<td>Corrective action (CA)</td>
<td>Correction of errors is satisfactory The report of errors is adequate Response time to complaints is satisfactory</td>
<td>0.821 0.880 0.805</td>
<td>0.874 0.699</td>
<td></td>
</tr>
<tr>
<td>Satisfaction (SAT)</td>
<td>In general we (are/were) happy with the logistics service experience</td>
<td>0.827</td>
<td>0.855 0.659</td>
<td></td>
</tr>
</tbody>
</table>

Table I. Measurement model evaluation (continued)
In general, we were pleased with the service quality of our main 3PL service provider 0.845
We were satisfied with the service of our main 3PL service provider 0.829
Our main 3PL fully provides the services that we want from them 0.741

Notes: CR, Composite reliability; AVE, Average variance extracted

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Items</th>
<th>Factor loadings</th>
<th>CR</th>
<th>AVE</th>
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<tr>
<td></td>
<td>In general, we were pleased</td>
<td>0.845</td>
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<tr>
<td></td>
<td>with the service quality of our</td>
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<td></td>
<td>main 3PL service provider</td>
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<td></td>
<td>We were satisfied with the</td>
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<td></td>
<td>service of our main 3PL service</td>
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<tr>
<td></td>
<td>provider</td>
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<tr>
<td></td>
<td>Our main 3PL fully provides</td>
<td>0.741</td>
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<td></td>
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<tr>
<td></td>
<td>the services that we want from</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>them</td>
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Table I.

<table>
<thead>
<tr>
<th>PCQ</th>
<th>IQ</th>
<th>VF</th>
<th>SD</th>
<th>SOP</th>
<th>HA</th>
<th>ORQ</th>
<th>TI</th>
<th>CA</th>
<th>SAT</th>
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<td>0.444</td>
<td>0.595</td>
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<td>0.288</td>
<td>0.416</td>
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<td>0.767</td>
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<tr>
<td>0.366</td>
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<td>0.381</td>
<td>0.339</td>
<td>0.363</td>
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<tr>
<td>0.516</td>
<td>0.420</td>
<td>0.468</td>
<td>0.313</td>
<td>0.427</td>
<td>0.359</td>
<td>0.814</td>
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<tr>
<td>0.431</td>
<td>0.483</td>
<td>0.425</td>
<td>0.415</td>
<td>0.393</td>
<td>0.307</td>
<td>0.490</td>
<td>0.813</td>
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<tr>
<td>0.452</td>
<td>0.397</td>
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<td>0.354</td>
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<td>0.646</td>
<td>0.541</td>
<td>0.836</td>
<td>0.812</td>
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<tr>
<td>0.475</td>
<td>0.313</td>
<td>0.348</td>
<td>0.406</td>
<td>0.550</td>
<td>0.486</td>
<td>0.586</td>
<td>0.601</td>
<td>0.625</td>
<td>0.812</td>
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</table>

Note: Diagonal terms (in italic) are square roots of the AVE

Table II. Discriminant validity coefficients

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Relationships</th>
<th>Path coefficient</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1a–a</td>
<td>PCQ → ORQ</td>
<td>0.269**</td>
<td>Supported</td>
</tr>
<tr>
<td>H1b–a</td>
<td>IQ → ORQ</td>
<td>0.173*</td>
<td>Supported</td>
</tr>
<tr>
<td>H1c–a</td>
<td>VF → ORQ</td>
<td>0.160*</td>
<td>Supported</td>
</tr>
<tr>
<td>H1d–a</td>
<td>SD → ORQ</td>
<td>0.083</td>
<td>Not supported</td>
</tr>
<tr>
<td>H1e–a</td>
<td>SOP → ORQ</td>
<td>0.164*</td>
<td>Supported</td>
</tr>
<tr>
<td>H1a–b</td>
<td>PCQ → TI</td>
<td>0.160*</td>
<td>Supported</td>
</tr>
<tr>
<td>H1b–b</td>
<td>IQ → TI</td>
<td>0.094</td>
<td>Not supported</td>
</tr>
<tr>
<td>H1c–b</td>
<td>VF → TI</td>
<td>0.087</td>
<td>Not supported</td>
</tr>
<tr>
<td>H1d–b</td>
<td>SD → TI</td>
<td>0.186*</td>
<td>Supported</td>
</tr>
<tr>
<td>H1e–b</td>
<td>SOP → TI</td>
<td>0.185*</td>
<td>Supported</td>
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<tr>
<td>H2</td>
<td>ORQ → CA</td>
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<tr>
<td>H3</td>
<td>ORQ → TI</td>
<td>0.179*</td>
<td>Supported</td>
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<td>H4</td>
<td>CA → TI</td>
<td>0.248**</td>
<td>Supported</td>
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<tr>
<td>H5</td>
<td>ORQ → SAT</td>
<td>0.174*</td>
<td>Supported</td>
</tr>
<tr>
<td>H6</td>
<td>TI → SAT</td>
<td>0.287**</td>
<td>Supported</td>
</tr>
<tr>
<td>H7</td>
<td>CA → SAT</td>
<td>0.271**</td>
<td>Supported</td>
</tr>
<tr>
<td>H8a</td>
<td>PCQ → SAT</td>
<td>0.182*</td>
<td>Supported</td>
</tr>
<tr>
<td>H8b</td>
<td>SOP → SAT</td>
<td>0.158*</td>
<td>Supported</td>
</tr>
<tr>
<td>H8c</td>
<td>HA → SAT</td>
<td>0.192**</td>
<td>Supported</td>
</tr>
</tbody>
</table>

Notes: t values are computed through bootstrapping procedure with 253 cases and 2,000 samples. *p < 0.05; **p < 0.01; ***p < 0.001 (one tail)

Table III. Path coefficient and hypothesis testing
service ordering procedure ($\beta = 0.158, p < 0.05$), halal assurance ($\beta = 0.192, p < 0.01$), order receipt quality ($\beta = 0.174, p < 0.05$), timeliness ($\beta = 0.287, p < 0.01$) and corrective actions ($\beta = 0.271, p < 0.01$) have positive significant effects on customer satisfaction.

Discussion and implications
This study was designed with the aim of recognizing the potential elements of halal LSQ and investigating the weight of each factor based on customers. Nine potentially significant factors of halal LSQ were presented in this research. All of the generated items to tap these elements were confirmed to be reliable and valid measures among the customers using halal logistics service providers. Consequently, halal logistic service providers may concentrate at developing services which focus on the nine stated elements. These nine elements affirmed the complexity of the halal LSQ concept that requires a notable amount of consideration from logistics firms.

This study also confirmed that halal LSQ should be conceptualized as a process rather than as a single concept or second-order construct. When viewed as a process, logistics service providers can identify the drivers of various halal LSQ perceptions. The findings showed that, personnel contact quality, service diversity, and service ordering procedures, order receipt quality and corrective actions are driven factors of timeliness. However, the impacts of information quality and volume flexibility on timeliness were not supported. As most of the firms in this study have more than four years of experience in this industry, they can predict delivery duration and pick seasons. As such, the quality of provided information and volume flexibility has no effect on timeliness.

Order receipt quality is driven by personnel contact quality, information quality, volume flexibility and service ordering procedure. The relationship between service diversity and order receipt quality was not support. This means that the respondents believe that variation in product, logistics service and geographical area that are covered by providers of 3PL logistics service have no effect on the chance of damage to an order. These findings suggest that customer perception of supplier halal LSQ begins to form as soon as customers try to place orders, and the perceptions develop until customers receive complete and accurate orders, in good condition, with all discrepancies addressed. The process view enables halal logistics service providers to see the interrelationships among halal LSQ components.

In addition, the study showed that customer satisfaction is derived directly by personnel contact quality, service ordering procedure, halal assurance, order receipt quality, timeliness and corrective actions. It suggests that, in addition to the components that effect customer satisfaction of general logistics service, halal assurance plays an important role in the satisfaction of halal logistics service customers. Understating the important components of halal LSQ, as well as viewing it as a process, enables halal logistics service providers to satisfy their customers. Furthermore, among the six drivers of customer satisfaction, timeliness and corrective action have the highest effect. It suggests that although personnel contact quality, service ordering procedure, halal assurance and order receipt quality are important, customers care most about on-time delivery of orders and addressing flaws in logistics service. Considering the nature of the food industry wherein most of products are perishable, the higher value of timeliness and corrective action in comparison to other dimensions of logistics service quality is reasonable. Therefore, the 3PL service providers that operate in the halal food industry should give high priority to timeliness and corrective action.

In terms of theoretical contributions, to the best of our knowledge, this study is the first to develop and test a halal LSQ model. Although the importance of halal LSQ has been discussed in the past, this research provides a step forward and develops a halal LSQ model. Given the similarities and differences between requirements of halal logistics service and conventional logistics service, a general LSQ model is not enough to measure halal LSQ. For example, halal assurance was found as one of the components of halal LSQ which has direct effect on customer satisfaction. This component is not important for measuring LSQ in other businesses.
In addition, Mentzer et al. (2001) found no direct relationship between timeliness and satisfaction. However, as the halal food products are perishable, the time between pickup and delivery does play an important role in the satisfaction of customers. The results of this study confirmed the direct relationship between timeliness and satisfaction.

This study also has practical contributions to managers of halal 3PL service providers. Managers in halal logistics service firms can use halal LSQ items to evaluate their service quality as well as benchmarking their own and those of their competitors. Furthermore, the managers of halal logistics service firms can better understand the dimensions of halal LSQ that have a higher effect on customer satisfaction. For example, timeliness and corrective action are two factors that are highly important for the halal food and beverage firms. Furthermore, they should give special notice to halal assurance by completely segregating halal and non-halal products, implementing internal halal monitoring and checking the halal certification of the products. In summary, the findings of this study can help 3PL service providers to customize their services to cater to their specific customer segment desires.

Limitations and future studies
Although the objective of this study was successfully accomplished, it is limited by several factors. First, the data were collected from the halal food and beverage firms. The halal product is not only for foods, but also for other consumer products such as pharmaceutical and cosmetic ones. Future studies should therefore test the proposed halal LSQ model of this study in other halal businesses. Second, this study only employed data from Malaysian firms. Future studies could obtain more interesting results by collecting and comparing data from and among different countries.

References
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Lodhi, A.U. (2009), Understanding Halal Food Supply Chain, HFRC UK Limited, Chesham.


**Further reading**


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