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Importance of Logistics Service Quality in Customer Satisfaction: An Empirical Study

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ABSTRACT

To create value in logistics services to fill the expectation of customers gets more significant than ever to sustain competitiveness in the market. In this paper, considering there is a small amount of research done in logistic service quality, we aimed to investigate how logistics services affect customer satisfaction. An empirical study was made to measure logistic service quality factors; personnel quality contact, order condition, timeliness, order discrepancy handling, and operational information sharing in logistics services. Confirmatory factor analysis (CFA) and structural equation modeling (SEM) has been used in this paper to explore customer satisfaction by using the five constructs of logistics service quality. One of the contributions of this article is; it is the first time the effects of operational information sharing on customer satisfaction in logistics services was investigated under the logistic service quality framework. Customer satisfaction can be explained and improved by applying these five constructs of logistics service quality. Also, this research can help both practice and scholars to understand the fundamental elements of improving customer satisfaction. The results can be used in any firm to gain competitiveness in logistic services.

Keywords: *logistic service quality, customer satisfaction*

1. INTRODUCTION

The logistics services are not only seen as an area of cost improvements but also seen as an area to gain a competitive advantage in market, because of its role that it plays to improve customer satisfaction (Bowersox *et al*., 2008; Novack *et al*., 1995). Understanding the desires of clients and finding ways to create value for them is getting more significant than ever to be able to get a competitive advantage. Today, customers are not only demanding higher quality in products but also requiring more top excellence in service which is closely related to the concept of behavioral intentions and customer satisfaction (Bowersox *et al*., 2002; Parasuraman *et al*., 1985). It is obvious that enterprises whose activities are not concentrated on customer expectations could not manage to survive in the market. Therefore, to find the critical elements of quality of service is essential to build a long-term relationship with the customers by changing their behavioral intentions. Because of the competitiveness of the service sector, the capability of firms to figure out customers' expectations is getting more compelling. Additionally, considering logistics enterprises, to understand needs of customers and to satisfy their desires is harder than other businesses (Mentzer *et al*., 2001; Mentzer *et al*., 1999). Therefore, to follow the needs of clients getting critical for the service providers to improve new services to generate value for customers and to sustain relationships with clients.

Although a few authors investigated dimensions of LSQ, there is no consensus on the attributes of LSQ. Considering there has been little research done in LSQ, this paper aims to address the main dimensions that impact customer satisfaction in logistics service. The primary purpose of this article is to understand the concept of customer satisfaction with analysis of the LSQ factors with the perspective of service quality approach. To better our understanding of LSQ, this paper will first shed light on service quality approach (SERVQUAL) and how historically LSQ has been broadened from SERVQUAL in the literature review section. In the third section, the governance structures of LSQ, research hypotheses and its relationship to customer satisfaction are addressed. The results of the conducted survey and data analysis can be found in the fourth section. In the last part, conclusion, limitations, and suggestions for future research are addressed.

2. LITERATURE REVIEW

While quality is defined as a comparison between expectations and performance, service quality is defined as a measure of performance which results in customer satisfaction (Juran, 1980). Customers' quality assessment not only relies on the outcome of service but also depend on all processes of service delivery (Parasuraman *et al*., 1985). Parasuraman *et al.* (1985) introduced the five-dimensional structure of service quality (SERVQUAL); tangibles, responsiveness, empathy, reliability, and assurance. SERVQUAL is an approach to see gaps between customer perceptions and customer service (Parasuraman *et al*., 1985). However, Parasuraman *et al*., (1985) argue that the characteristics of services – intangibility, heterogeneity, and inseparability – are less invisible in logistic services. There are many studies which empirically investigate five dimensions of this SERVQUAL, and several scholars have extended Parasuraman's work to develop scales for measuring the effects of logistics service quality on customer's satisfaction (Langley and Holcomb, 1991; Bienstock *et al*., 1996). Since the 1980s, LSQ has gained considerable attention to customer's satisfaction (Richey *et al*., 2007). The relationship between enhancement in LSQ and customer satisfaction was supported by a number of empirical studies (Daugherty *et al.*, 1998; Innis and La

Londe, 1994; Mentzer *et al*., 2001). According to Mentzer et al. (1989), Logistic Service Quality consists of two elements as a marketing customer service and physical distribution service. Also, Saura *et al*. (2008) claim that two perspectives, objective and subjective, exist in logistics service quality: While objective perspective concerns physical distribution and subjective perspective concerns customer satisfaction in logistic service.

The utility creation through physical distribution depend on the ability of logistics services to deliver "the right amount of the product at the right place at the right time in the right condition at the right price with the right information" (Coyle *et al*., 1996; Mentzer *et al*., 1999). This view led to the development of a measure of physical distribution service quality (PDSQ). Bienstock *et al*. (1997) conceptualized physical distribution service quality in the three top dimensions which are timeliness, condition, and availability. Because of the pursuit of competitive advantage in the market, the concept of utility creation has broadened to the value-added operational tasks and PDSQ is viewed as only one of the component of LSQ (Mentzer *et al*., 2001; Mentzer *et al*., 1999). Mentzer *et al*., (1999) broadened these dimensions and Parasuraman's (1985) five dimensions of SERVQUAL to nine LSQ constructs: Personal contact quality, order release quantities, information quality, ordering procedures, order accuracy, order condition, order quality, order discrepancy handling, and timeliness. Also, these dimensions were confirmed in another study by Mentzer *et al*., (2001). Through these nine dimensions, they only hypothesized a direct relationship between customer satisfaction and personal contact quality, order discrepancy handling, timeliness and ordering procedures with based on one organization, DLA, providing logistics services to internal customers. In 2007, Rafiq and Jaafar (2007) tested these nine LSQ dimensions in the context of the 3PL logistics industry. Different from these nine LSQ constructs, Feng *et al*. (2007) come up with six dimensions, which are timeliness quality, personal contact quality, order quality, order discrepancy handling, order condition and convenience, for the LSQ of the online shopping. Bienstock *et al*. (2008) expanded Mentzer's LSQ model by investigating logistics information technology use and acceptance in the framework of technology acceptance model. Soh *et al*. (2016) examined Mentzer *et al*. (1999)'s nine LSQ dimension by clustering into technical and functional quality dimensions in the 3PL industry. Also, Murfueld *et al*. (2017) investigated the impact of availability, timelines, and condition on customer satisfaction and loyalty in omnichannel retailing. On the other hand, Kilibarda *et al*. (2016) examined the importance of LSQ dimensions in freight forwarding companies. They found that assessment of the level of quality of service in various market segments is different. Additonally, Sohn *et al*. (2017) investigated these LSQ dimensions in the semiconductor manufacturing industry and 3PL. Based on their findings, authors claim that the impact of LSQ dimensions on customer satisfaction should be considered based on the customer's position in logistics triad.

The majority of the existing literature about LSQ has focused on logistics service providers, and there has been a severe lack of research done based on the customers' perspective. Surprisingly, given the importance of logistics service quality, these LSQ dimensions has not been tested in a broad spectrum of business to consumer context. Compared with the existing literature on LSQ, it can be seen that based on the Parasuraman's (1985) service quality model the gap between "expected service" and "external communications to customers" was not investigated in existing LSQ models. Bienstock *et al*. (2015) highlighted lack of studies for the importance of information technology in LSQ. Because of this gap in the prevalent literature, in this paper, besides personal contact quality, order discrepancy handling, timeliness, order condition, we examined the effects of operational information sharing and tested to identify their relationships with customers' satisfaction and LSQ.

3. RESEARCH MODEL AND HYPOTHESIS

In this study, the research model, which is presented in **Figure 1**, developed based on SERVQUAL literature is consistent with Parasuraman, Zeithaml and Berry's (1985) and Mentzer and Flint's (2001) constructs. Because customer satisfaction is a fundamental consideration in assessing the quality of service, it is a significantly important issue for businesses to obtain the competitive advantage and to build long-term relationships with customers (Innis and La Londe, 1994; Aranskis and Litvinenko, 2014). Therefore, this study hypothesizes that personal contact quality, order discrepancy handling, timeliness, order condition, and operational information sharing positively affect the perception of customers' satisfaction.

3.1 Personnel Contact Quality

Communication between the customer and contact person is significant during the service delivery to increase the perception of clients' expectations (Parasuraman et al., 1985). According to Lehtinen and Lehtinen (1991), the service quality was evaluated by customers using three dimensions: Physical quality, corporate quality, and interactive quality. The interactive feature which is seen as an interaction among customers, contact personnel, and other customers is the essential aspect of service quality (Lehtinen and Lehtinen, 1991). Bitner *et al*. (1994) claims that precise understanding of clients by frontline personnel, who are a part of the contact staff, facilitate to adopt customers' expectations and needs. The essential features of service personnel, such as experience, ability to empathize with the customers' situation, desire of him/her to solve the problems during the delivery process and their approach to the interaction between customers jointly affect the perception of clients about quality of service they took (Bitner *et al*., 1994; Mentzer *et al*., 2001). Because of the importance of the interaction between customer and staff in the perception of logistics service quality, the following hypothesis is proposed about the influence of personnel contact quality on customer satisfaction.

***H1**: Perception of personnel contact quality positively affects customers' satisfaction.*

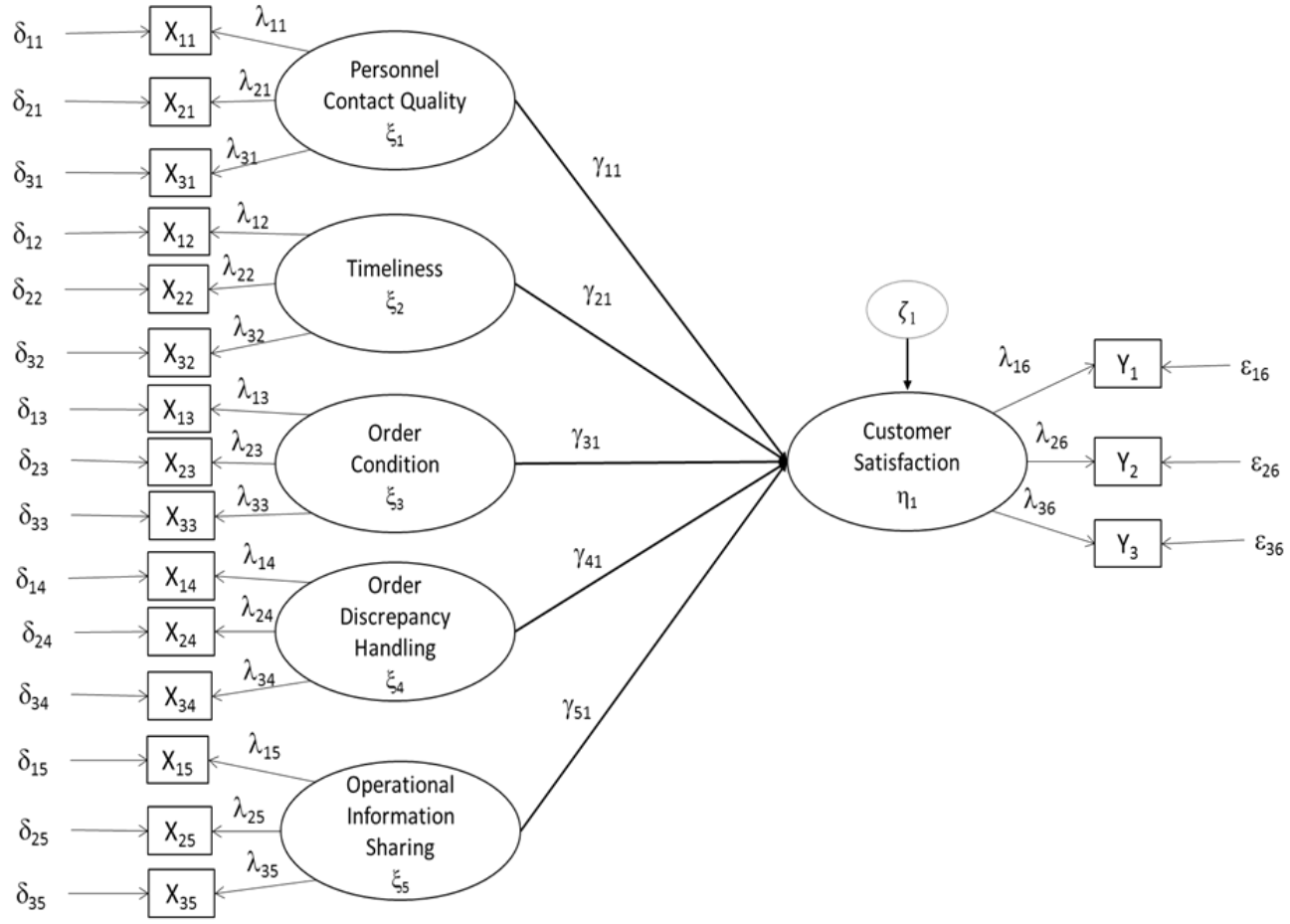

Figure 1 Causal model of the customer satisfaction in logistics services

3.2 Timeliness

Bienstock *et al*. (1996) conceptualized physical distribution service quality with three dimensions, timeliness, availability, and condition. Hult *et al*. (2000) define cycle time as a competitive weapon that starts from order placement to completion of delivery. This cycle time that consists of transportation time and back order time when products are not convenient is the most significant factor that shows the performance of the delivery system (Hult *et al*., 2000; Mentzer *et al*., 2001; Mentzer *et al*., 1999). Time utility is the most traditional and the most crucial feature of logistics service quality as much as the creation of place utility is on the perception of logistics service quality (Mentzer *et al*., 1999). Therefore, the following hypothesis is proposed about the influence of timeliness on customer satisfaction.

H2*: Perception of timeliness positively affects customers' satisfaction.*

3.3 Order Condition

As one of the most critical dimensions of physical distribution service quality, order condition refers to damage levels of orders during the delivery (Bienstock *et al*., 1996; Mentzer *et al*., 2001). In this study, because of the importance of order condition on the perception of satisfaction in the literature (Byrne and Markham, 1991), we hypothesized the direct relationship between order condition and customer satisfaction.

H3*: Perception of the order condition positively affects customers' satisfaction.*

3.4 Ordering Discrepancy Handling

Mentzer *et al*. (2001) defines ordering discrepancy handling as how logistics firms deal with differences in orders after orders arrive. The performance of logistics companies to correct discrepancies, such as wrong items and poor quality, has a significant impact on customers' perception about LSQ (Mentzer *et al*., 2004). Because of the significant effects of the correction of delivered conflicts on the perception of logistics service quality, the following hypothesis is proposed about the influence of the ordering discrepancy handling on customer satisfaction.

H4*: Perception of the ordering discrepancy handling positively affects customers' satisfaction*.

3.5 Operational Information Sharing

The logistics information systems which are used lately by logistic enterprises enable logistics services to increase their perception of service quality. The logistics information systems consist of internal and external information sharing. While the internal exchange of information in logistics services make it possible to increase service quality by increasing the timeliness and accuracy of orders in service, external information sharing, which includes real-time information sharing with the customers, makes it possible to close the gap of clients' expected

service quality. The process of service delivery has great importance in expectations as much as the outcome of a service (Parasuraman *et al*., 1985). Because of the ability of operational information sharing to facilitate the perception of service delivery quality, the following hypothesis is proposed about the influence of operational information sharing on customer satisfaction.

H5*: Perception of operational information sharing positively affects customer satisfaction.*

4. RESERACH METHODOLOGY AND DATA ANALYSIS

4.1 Sampling and Data Collection

Data collection was done by undergraduate and graduate students enrolled in marketing and logistics department at the University of North Texas. An online questionnaire was used to collect data for the study. The survey was announced through the University of North Texas' College of Business faculty as well as class mailing lists. Only one sampling procedure was used to recruit participants. Any particular gender or ethnic group did not frame the sample population. Upon accessing the link, respondents were able to read a description of the survey. Some of the participants were awarded extra credit while some will not get an award for their participation. A total of 341 completed questionnaires were collected in two waves to reach a satisfactory level of response. The first wave resulted in 190 and the second wave in 151 questionnaires. After removing incomplete and carelessly completed questionnaires, under 2 minutes, 302 questionnaires were retained for subsequent analysis. A comparison between early and late respondents (χ^2 = 23.003, df=17, p=0.149) also revealed no significant difference. Of the 302 usable responses, the gender composition of the sample is relatively balanced with 49% male and 51% female. A comparison between female and male respondents (χ^2 = 13.151, df=17, p=0.726) also revealed no significant difference. The 83.1% percent of respondents were between 18 to 22 (n=170) and 23 to 27 (n=81) old. This result is consistent with our use of UNT students as the sampling frame. **Appendix A** presents the demographic distribution of the final retained sample.

4.2 Materials and Construct Measurement and Reliability

Scale items for measuring the LSQ constructs were preserved based on the existing literature (Bienstock et al., 2008; Mentzer et al., 2001). The items that measure operational information sharing were developed based on Richey and Savitskie (2007) study. The LSQ instrument contains 19 questions that are measured on a seven-point Likert-scale (1 = "strongly disagree," 7 = "strongly agree") (see **Table 1**). Of the 19 items, one question corresponds to operational information sharing (OIS4) was found low factor loading (0.64) with the other OIS items in CFA. As a result, the study uses only 18 scale items shown in **Appendix B**.

In this study, structural equation modeling was used to explain the relationship between customer satisfaction and the logistics service quality factors; personnel quality contact, order condition, timeliness, ordering discrepancy handling and operational information sharing in logistics services. To confirm construct reliability, unidimensionality, and validity we evaluated the five LSQ and one satisfaction constructs by using the method of CFA using AMOS. For the purpose of the discriminate and convergent validity, a structural equation procedure for obtaining correlations between latent constructs was used. We computed CR and AVE using the CFA results (Anderson and Gerbing, 1988; Bagozzi and Yi, 1988; Hair *et al*., 2010). A confirmatory factor analysis (AMOS) showed that the hypothesized model fit the data reasonably well (see **Table 1**). First, the overall fit indices for the measurement model were also acceptable results (Anderson and Gerbing, 1988; Bagozzi and Yi, 1988). A Joreskorg and Sorbom (1993) Goodness-of-Fit Index (GFI) of 0.906, a Bentler (1990) Comparative Fit Index (CFI) of 0.952, Adjusted Goodness-of-Fit Index (AGFI) = 0.87, Root Mean Square Residual (RMSR) = 0.063, and a chi-square (□2) of 300,345with 137 degrees of freedom. Second, as evidence of convergent validity, the measurement factor loadings were all significant (t values between 9.526 and 20.601) and all the standardized λs were above 0.5 (λs ranging from 0.668 to 0.903), the construct reliabilities (CR) were bigger than 0.70 (Hair *et al*., 2010) (CRs ranging from 0.758 to 0.910) and the average variance extracted (AVE) were above 0.5 (Fornell and Larcker, 1981) (AVEs ranging from 0.511 to 0.771) indicated that in each case. The variance captured by the construct was greater than the variance due to the measurement error. Third, the procedure described by Fornell and Larcker (1981) was used to test for discriminant validity, which is indicated by an AVE for each construct higher than the squared correlation between that construct and any other. As shown in **Table 1**, a squared correlation between any two constructs is higher than either of the constructs' AVE. Discriminant validity is supported because all the composite reliability scores on diagonal are higher than the off-diagonal correlation coefficients in **Table 1**. Based on the results, the evaluation form does consists of six constructs. The correlation estimates among the six latent constructs are all statistically significant. These results indicate acceptable levels of internal consistency, convergent, discriminant, and construct validity (Hair *et al*., 2010).

We revealed there is no significant difference between male-female and early-late groups. In each group analysis, the model fit of the unconstrained measurement models with groups loaded separately had adequate fit. Then we constrained the models to be equal, and we found that the chi-square difference test to be non-significant (p-value >0.05). A comparison between female and male respondents (χ^2 = 13.151, df=17, p=0.726) also revealed no significant difference. A comparison between early and late respondents (χ^2 = 23.003, df=17, p=0.149) also revealed no significant difference.

Table 1. Evidence of reliability and construct validity

	CR	AVE	OC	PCQ	T	ODH	OSI	S
OC	0,840	0,639	0,799					
PCQ	0,869	0,689	0,442	0,830				
T	0,758	0,511	0,260	0,451	0,715			
ODH	0,865	0,682	0,446	0,661	0,544	0,826		
OIS	0,845	0,580	0,518	0,563	0,539	0,672	0,762	
S	0,910	0,771	0,484	0,608	0,563	0,606	0,735	0,878

CFA global fit indices: chi-square=300.345; df=137; p-value=0.00; GFI=0.906; AGFI=0.87; NFI=0.94; CFI=0.952; RMSEA=0.063. The diagonal elements are √AVE and the off-diagonal elements are φ estimates.

OC= Order Condition, PCQ= Personnel Contact Quality, T= Timeliness, ODC= Order Discrepancy Handling, OIS= Operational Information Sharing, S= Satisfaction

4.3 Analysis and Results

The last stage of the analysis examines the causal relationship between latent constructs (see **Figure 1**). The results of the analysis are presented in**Table 2**. The fit indices, indicate a satisfactory model fit (χ^2= 267.015, df = 120, Goodness-of-Fit Index (GFI) = 0.912, Adjusted Goodness-of-Fit Index (AGFI) = 0.875, Root Mean Square Residual (RMSR) = 0.064, Bentler and Bonett's Normed Fit Index (NFI) =0.921, Bentler and Bonett's Comparative Fit Index (CFI) = 0.955). The path coefficients (λ_S) capture the effects of latent constructs on the observed variables (Xs and Ys). The focus of this study is the beta and the gamma estimates since this capture the hypothesized causal relationship between the endogenous variables (η_1 - customer satisfaction) and exogenous variable (ξ_1 – personal contact quality, ξ_2 – timeliness, ξ_3 – order condition, ξ_4 – order discrepancy handling, ξ_5 – operational information sharing).

The structural modeling revealed an R-square of 0.62. The results suggest that the exogenous variables of personnel quality contact, timeliness, and operational information sharing were all significant and positive predictors of customer satisfaction at the 95% confidence level. The results show that the order condition is significant and positive at the 90% confidence level. The exogenous variables of ordering discrepancy handling were not significant predictors of customer satisfaction. The results of the SEM analysis are presented in **Table 3** under Model 1. The results indicate the following:

Hypothesis 1 is supported, that is, the effect of personal contact quality on customer satisfaction (+ ve γ_1) is significant.

Hypothesis 2 is supported, that is, the effect of timeliness on customer satisfaction (+ ve γ_2) is significant.

Hypothesis 3 is supported, that is, the effect of order condition on customer satisfaction (+ ve γ_3) is significant.

Hypothesis 4 is not supported, that is, the effect of order discrepancy handling on customer satisfaction (+ ve γ_4) is significant.

Hypothesis 5 is supported, that is, the effect of operational information sharing on customer satisfaction (+ ve γ_5) is significant.

Table 2 The estimates of measurement model

Construct	Standard estimate		t-Value
Customer Satisfaction (η_1)			
S1	λ_{16}	0.871	20.601
S2	λ_{26}	0.905	19.485
S3	λ_{36}	0.857	(λ_{36} set to 1.0)
Personal Contact Quality (ξ_1)			
PCQ1	λ_{11}	0.751	14.946
PCQ2	λ_{21}	0.858	17.734
PCQ3	λ_{31}	0.876	(λ_{31} set to 1.0)
Timeliness (ξ_2)			
TI1	λ_{12}	0.689	9.526
TI2	λ_{22}	0.763	9.997
TI3	λ_{32}	0.69	(λ_{32} set to 1.0)
Order Condition (ξ_3)			
OC1	λ_{13}	0.668	12.045
OC2	λ_{23}	0.868	15.198
OC3	λ_{33}	0.847	(λ_{33} set to 1.0)
Order Discrepancy Handling (ξ_4)			
ODH1	λ_{14}	0.74	14.306
ODH2	λ_{24}	0.884	17.806
ODH3	λ_{34}	0.845	(λ_{34} set to 1.0)
Operational Information Sharing (ξ_5)			
OIS1	λ_{15}	0.749	(λ_{15} set to 1.0)
OIS2	λ_{25}	0.874	14.456
OIS3	λ_{35}	0.77	12.998

In order to get a better picture of the critical role played by operational information sharing in the relationship between personal contact quality and customer satisfaction, we conducted a post hoc analysis with operational information sharing mediates the positive effect of the relationship between personal contact quality and customer satisfaction. The results of the SEM analysis are presented in **Table 4** under Model 2. The global fit indices of the model (Anderson and Gerbing, 1988; Bagozzi and Yi, 1988; Bentler and Chou, 1987) are not as well as the ones found for Model 1 ($\chi 2$=337.713, df=123, p-value=0; RMSEA=0.076; RMSEA=0.076; NFI=0.921; NNFI=0.900; CFI=0.934; GFI=0.893; AGFI=0.852). Different from the Model 1, the results show that order condition is significant and positive at the 95% confidence level, instead of 90% confidence level. The mediated relationship was verified by using the bootstrapping test (Cheung and Lau, 2007; Preacher and Hayes, 2008). The mediation effect was tested using 2000 bias corrected boot strapping resample's in AMOS. The direct and indirect effects were analyzed for potential partial mediation (discovered while fitting the model). Just indirect effects were analyzed for establishing full mediation. The results are summarized in **Table 5**. Based on the results in Model 2, there is partial mediation between Personal Contact Quality and Operational Information Sharing. The mediation test shows that direct and indirect effect are both significant (see **Table 4**).

Additionally, to examine the role played by order discrepancy handling in the relationship between timeliness-customer satisfaction and order condition-customer satisfaction, we conducted a post hoc analysis with order discrepancy handling moderates the negative effect of the relationship between timeliness and customer satisfaction. The results of the SEM analysis are presented in **Table 4** under Model 3. Goodness-of-fit indices in Model 3 is worse than the other two models. We plotted this interaction as shown in **Figure 2**. The results of the interaction tests are summarized in the Hypothesis Summary **Table 3**. The results indicate that the moderating effect of order discrepancy handling between timeliness and customer satisfaction is significant, while the moderating effect of order discrepancy handling between order condition and customer satisfaction is insignificant. Based on the results in Model 3, Ordering Discrepancy Handling dampens the positive relationship between Timeliness and Customer Satisfaction (see **Figure 2**).

Table 3 Test of hypotheses: Estimates of structural equation model

		Model 1		Model 2		Model 3	
Construct ***Hypothesized Relationship***		**Standard Estimate**	**t-Value**	**Standard Estimate**	**t-Value**	**Standard Estimate**	**t-Value**
(H1) Personal Contact Quality → Customer Satisfaction	γ_1	0.22	3.267	0.20	2.204	0.20	3.451
(H2) Timeliness → Customer Satisfaction	γ_2	0.21	3.111	0.27	3.406	0.27	2.763
(H3) Order Condition → Customer Satisfaction	γ_3	0.11	1.873	0.13	2.261	0.13	1.808
(H4) Order Discrepancy Handling → Customer Satisfaction	γ_4	0.01	0.110	0.04	0.511	-	-
(H5) Operational Information Sharing → Customer Satisfaction	γ_5	0.43	5.362	0.42 (β_1)	9,218	0.44	5.639
(H1a) Personal Contact Quality → Operational Information Sharing	γ_{11}	-	-	0.62	6.134	-	-
(H4a) ODH_x_TI → Customer Satisfaction	γ_{41}	-	-	-	-	0.62	-3.314
Fit Indices		**Model 1**		**Model 2**		**Model 3**	
Ch.Sq.		267.015		337.713		700,996	
Df		120		123		286	
CMIN/df		2.225		2.746		2.451	
p-value		0		0		0	
RMSEA		0.064		0.076		0.069	
GFI		0.912		0.893		0.859	
AGFI		0.875		0.852		0.814	
NFI		0.921		0.921		0.884	
NNFI		0.942		0.900		0.910	
CFI		0.955		0.934		0.927	
Squared Multiple Correlations (R^2)		0.619		0.601		0.639	

Table 4 Testing results of mediating effects of operational information sharing in model 2

Hypothesis	**Direct Beta w/o Med**	**Direct Beta w/Med**	**Indirect Beta**	**Mediation type observed**
Med PCQ- *OIS*- CS	.26***	.199*	0.263***	Partial mediation

* p-value is significant at 0.90 confidence level, ** p-value is significant at 0.95 confidence level, *** p-value is significant at 0.999 confidence level

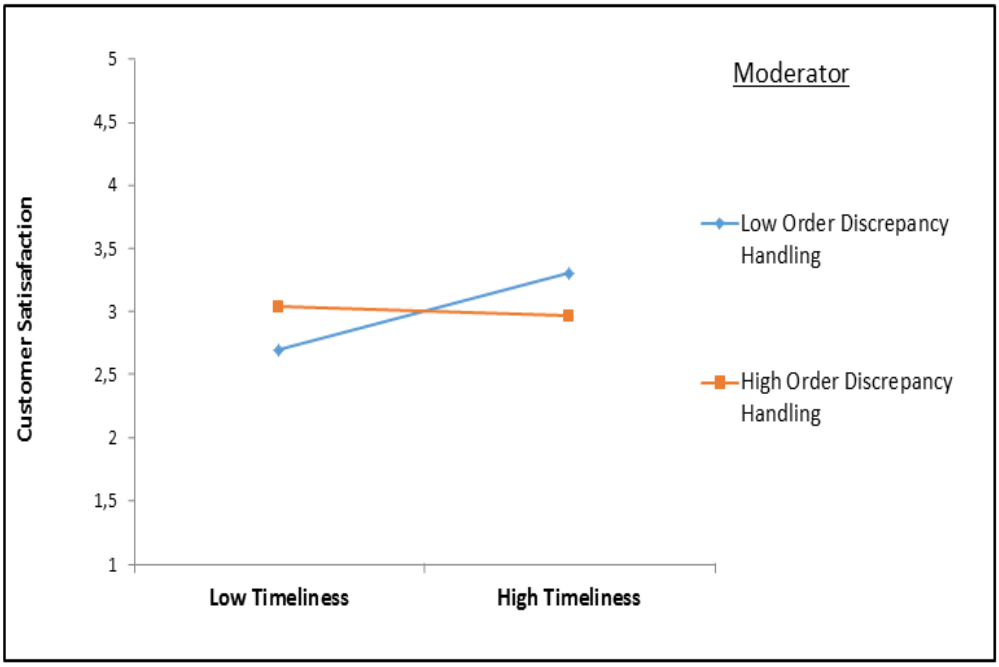

Figure 2 Moderating effects of order discrepancy handling between timeliness and customer satisfaction

5. CONCLUSION, LIMITATIONS, AND FUTURE RESEARCH

This research was conducted to investigate the customers' satisfaction in logistics services from the perspective of logistics service quality factors. The results indicate that there are significant relationships between the Timeliness, Order Condition, Personnel Contact Quality, Operational İnformation Sharing and perception of Customer Satisfaction in logistics services. These results indicate that Timeliness and Order Condition, which are leading two dimensions of physical distribution service quality (Mentzer *et al.*, 2001), still sustain their importance in LSQ. Also, results show that Personnel Contact Quality, which is one of the main three dimensions of service quality (Lehtinen and Lehtinen, 1991), has a significant impact on the perception of satisfaction. Additionally, we found that operational information sharing mediates the positive effect of the relationship between personal contact quality and customer satisfaction. Based on the results in Model 2, there is partial mediation between Personal Contact Quality and Operational Information Sharing. We found that order discrepancy handling moderates the negative effect of the relationship between timeliness and customer satisfaction. Based on the results in Model 3, Ordering Discrepancy Handling dampens the positive relationship between Timeliness and Customer Satisfaction.

This research, through its empirical testing, also extends the understanding of LSQ in the era of information share. Unlike previous studies, we also examined the effect of operational information sharing by logistics services, which is getting more significant in today's information era, on the perception of customers' satisfaction. Logistics companies have to understand customers' changing attitudes and desires to get the competitive advantage in the market. Without understanding primary factors that behind their behavioral intentions, it is hard to survive in the market for logistics companies. A contribution of this paper is that operational information sharing with customers positively affects the perception of customer satisfaction. Finding out desires of clients can create new services to generate value for customers and able to make more attractive of their services for them. Additionally, empirical results show that e-mail, applications (Android, iOS, Windows Mobile), and SMS are the most used tools for interaction with customers.

Still, this study has some limitations. One of the limitations is the data was collected from sample frame of University of North Texas' College of Business students. Additionally, we only examined these LSQ factors from the view of business to customer perspective. In the future, we can expand this study business to business (B2B) framework and we can comparison different industry types to identify logistics service quality factors. Additionally, in B2B context we can expand this study by investigating other Mentzer's (1999) LSQ factors; order accuracy, ordering procedure, order quality. Considering structural modeling results of this study which revealed only 62% of customers' satisfaction (R square of 0.62) in LSQ, in future research, we can develop new LSQ constructs, and we can investigate the validation of these constructs by EFA and CFA.

Finally, any company who wants to create a competitive advantage in business should give importance to satisfy customers' desires. Therefore, logistics companies cannot build any long-term relationship without understanding the fundamental factors behind the customers' behavioral intentions. One of the business implications of this research, logistics service providers can easily target what areas to concentrate for the purpose of the improve their LSQ. Additionally, by getting feedback from their customers, firms can easily enhance their service quality and can build a long-term relationship with their customers by meeting their expectations.`

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APPENDIX 1

Appendix A. Demographic distribution of the sample

Demographic Profile	Total	Percent
Gender		
Male	148	49
Female	154	51
Age		
18-22	170	56.3
23-27	81	26.8
28-32	15	5
32 and Over	36	11.9
Occupation		
Full-time work	9	16.2
Part-time work	172	57
Unemployed	81	26.8
Academic Status		
Freshman	2	0.7
Sophomore	13	4.3
Junior	163	34.1
Senior	146	45.3
Graduate	38	12.6

Appendix B. LSQ Instrument and Corresponding Scale Items

Scale	Question	Source
Personal Contact Quality		
PCQ1	Contact employees make an effort to understand my situation	Bienstock *et al*. (2008)
PCQ2	Contact employees can resolve product/service problems.	Bienstock *et al*. (2008)
PCQ3	The service knowledge/experience of contact employees is sufficient.	Bienstock *et al*. (2008)
Timeliness		
TI1	The time between placing requisition and receiving delivery is short.	Mentzer *et al*. (2001)
TI2	Deliveries arrive on the date promised	Mentzer *et al*. (2001)
TI3	The amount of time a requisition is on back-order is short.	Mentzer *et al*. (2001)
Order Discrepancy Handling		
ODH1	Correction of delivered quality discrepancies is satisfactory.	Mentzer *et al*. (2001)
ODH2	The process of reporting of discrepancy process is adequate.	Mentzer *et al*. (2001)
ODH3	The response to order discrepancies is satisfactory.	Mentzer *et al*. (2001)
Order Condition		
OC1	Order received from logistics services is undamaged.	Mentzer *et al*. (2001)
OC2	Order damage rarely occurs as a result of the transport mode.	Mentzer *et al*. (2001)
OC3	Order damage rarely occurs as a result of the transport carrier handling.	Mentzer *et al*. (2001)
Operational Information Sharing		
OIS1	Operational information is sharing effectively with customers.	Glenn and Savitskie (2007)
OIS2	Services have an adequate ability to share both standardized and customized information externally with customers.	Glenn and Savitskie (2007)
OIS3	The information is accurate, timely and formatted to facilitate use.	Glenn and Savitskie (2007)
OIS4	Real time information about shipping can be access anytime.	Author
Satisfaction		
S1	What is your general impression of the logistics service provider? (1 = "terrible", 5 = "excellent")	Mentzer *et al*. (2001)
S2	Which words does best describe your feelings toward logistics service provider? (1 = "very dissatisfied," 5 = "very satisfied")	Mentzer *et al*. (2001)
S3	How satisfied are you with logistics service provider? (1 = "very dissatisfied," 5 = "very satisfied")	Mentzer *et al*. (2001)
Notes All six LSQ construct items were measured on a seven-point Likert-scale (1 = "strongly disagree," 7 = "strongly agree").		

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