Exploring the service quality in the e-commerce context: a triadic view

Lin, Yong; Luo, Jing; Cai, Shuqing; Ma, Shihua; Rong, Ke

DOI:
https://doi.org/10.1108/IMDS-04-2015-0116

Exploring the Service Quality in the e-Commerce Context: A Triadic View

Yong Lin[1], Jing Luo[2], Shuqin Cai[3], Shihua Ma[4], Ke Rong[5]

[1, 2] Business School, University of Greenwich, London, UK, SE10 9LS

[3, 4] School of Management, Huazhong University of Science & Technology, Wuhan, China, 430074

[5] Business School, University of Bournemouth, Bournemouth, UK, BH12 5BB

Abstract

Purpose – This paper explores the quality factors influencing customer satisfaction in the e-commerce context using a triadic view of customer–e-retailer–3PL (third-party logistics) provider, and to investigate the impacts of service quality on customer satisfaction and loyalty in the e-retailing supply chain.

Design/methodology/approach – A literature review is used to determine the conceptual model and develop the measurement scales. Data is collected through a Web survey mainly conducted in China. Structural equation modeling is used to analyze the collected data and test the research hypotheses.

Findings – The results verify the proposed service quality framework, consisting of two dimensions (e-service quality and logistics service quality), in the e-commerce context. The results indicate that e-service quality and logistics service quality are strongly linked to customer satisfaction; that is, with e-service and logistics service, respectively. e-Service quality positively impacts customer satisfaction with logistics services, but logistics service quality negatively impacts customer satisfaction with e-services. Moreover, customer satisfaction with e-services is positively associated with customer loyalty for both e-services and logistics services. However, customer satisfaction with logistics services has no direct impact on related customer loyalty, and negatively impacts customer loyalty with e-services.

Research limitation/implications – The survey focuses only on China; future data should verify whether different cultural backgrounds will impact the research results.

Practical implications – The results show that e-retailers should not only focus on e-service quality, but also logistics service quality, which is critical to the success of e-commerce.

Originality/value – A two-dimensional (e-service and logistics) service quality framework is proposed and empirically assessed in the context of the e-retailing supply chain. These impacts of the path of service quality on customer satisfaction and loyalty are highlighted.

Keywords – supply chain, service quality, e-retailing, e-service, logistics service, customer satisfaction, customer loyalty

Paper type – Research paper

1. Introduction

As the Internet and its wide application to business has grown, so too has online shopping in many countries (Weltevreden, 2008). Electronic commerce (e-commerce) brings huge business opportunities (such as product sales and online service provision) and revenue growth (Rohm and Swaminathan, 2004) to companies like e-retailers, mainly due to its convenient and interactive nature, lower costs, and high degree of customization and personalization to customers (Park and Baek, 2007). However, even with the growing number of customers for online shopping, e-commerce has proven to be more complicated compared to traditional ways of doing business (Santouridis *et al.*, 2012). Improving the service quality of electronic commerce is regarded as one of the key factors leading to success or failure (Yang, 2001) in the e-retailing supply chain.

During the past two decades, service quality in the e-commencer context is increasingly recognized as an effective way of gaining and sustaining competitive advantage (Zeithaml, 2002; Zeithaml *et al.*, 2002), a strategic issue for long-term success (Parasuraman *et al.*, 2005), and a key determinant of customer satisfaction and loyalty (Gummerus *et al.*, 2004; Ribbink *et al.*, 2004). One branch of past research has focused on the quality of electronic services (e-service quality) (Santos, 2003; Kurt and Atrek, 2012; Carlson and O'Cass, 2011; Santouridis *et al.*, 2012) due to the acceptance and usage of Internet technologies in commerce, which differ in terms of interaction and exchange modes, compared to traditional businesses that are mainly based on paperwork.

However, extant research has not fully explored the entire e-commerce experience and the service quality perceived by customers. From a process point of view, e-service is only the first part of the customer's perceived online shopping experience; this stage includes searching for and browsing product information, and placing orders online. The other important facet of online shopping is logistics services (Yang *et al.*, 2006), whereby companies either deliver products to customer themselves, or outsource this to third-party logistics (3PL) providers (Semeijn *et al.*, 2005). A recent study showed that the two most frequent problems arising from online shopping are logistics-related, including long delivery time, and a mismatch between the received product and the product specification provided online (CNNIC, 2013). Logistics service quality is regarded as an important key for creating customer satisfaction (Mentzer *et al.*, 2001), which in turn has a great impact on customer loyalty (Bouzaabia *et al.*, 2013). Unfortunately, sometimes

its importance and functions are underestimated, and research on the role of logistics services in contributing to e-commerce and the success of the e-retailing supply chain is still scarce (Semeijn *et al*., 2005; Xing *et al*., 2011).

In the context of logistics outsourcing, online shopping usually occurs within an e-retailing supply chain consisting of the e-retailer, the customer, and the 3PL provider (see Figure 1); this represents a service triad, rather than a dyad consisting only of e-retailer and customer. The perceived service quality in this triadic context is much more complicated due to the fact that several roles interact with each other (Choi and Wu, 2009; Wu *et al.*, 2010). The service quality perceived by the customer is decided based on not only the e-services provided by the e-retailer, but also the logistics services offered by the 3PL provider. The e-service quality model proposed by Collier and Bienstock (2006) relates not only to website interactions, but also logistics services in terms of order accuracy, condition, and timeliness. However, the model still comprises a dyadic view, with a focus on the e-retailer and the customer. In this research, we discuss the service quality of e-commerce from a triadic perspective in order to fully investigate customers' experiences with not only the e-retailer, but also 3PL providers who complete the provision of logistics services to customers.

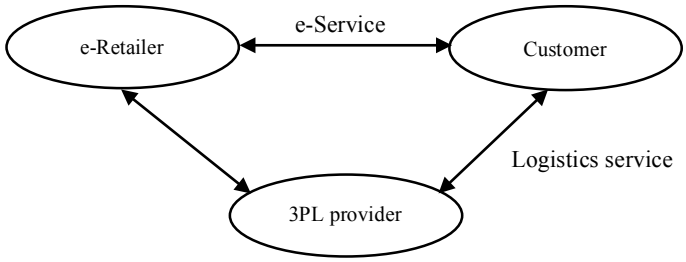

Figure 1. Service triad of customer–e-retailer–3PL provider in the context of the e-retailing supply chain

In order to better address the triadic nature (Choi and Wu, 2009; Wilhelm, 2011) of the online shopping (e-commerce) experience, this research proposes a framework of service quality that combines e-service quality and logistics service quality. It aims to capture the complex dynamics in the context of the e-retailing supply chain so as to better explore the interactions among e-retailers, customers, and 3PL providers, and to investigate the relationships between service quality, and customer satisfaction and customer loyalty in the e-retailing supply chain.

This research makes two contributions to the literature. First, it validates the proposed

service-quality framework with two dimensions (e-service quality and logistics service quality) in the context of the e-retailing supply chain. Second, it highlights the impact paths of both e-service quality and logistics service quality on customer satisfaction and loyalty with both the e-services and logistics services.

In the following sections, hypotheses related to e-service/logistics quality and customer satisfaction/loyalty are developed through a literature review. Then, results from the structural equation modeling study conducted to test the research hypotheses are presented. Finally, the theoretical contributions and managerial implications are discussed, and future research directions proposed.

2. Theoretical framework and hypotheses

2.1 Service quality and customer satisfaction and loyalty

Since the concept of service quality was introduced by Grönroos (1982), it has become an important research topic in the marketing literature. In particular, the research on service quality has largely been inspired by the conceptual GAP model developed by Parasuraman *et al.* (1985), and refined in their followed works (Parasuraman *et al.,* 1988, 1991). In general, service quality can be defined as results perceived from "a comparison of consumer expectations with actual service performance" (Parasuraman *et al.*, 1985, p. 42).

Many studies have been conducted on the relationships between service quality, and customer satisfaction and customer loyalty (Zeithaml *et al*., 1996; Olorunniwo *et al*., 2006; Kitapci *et al.*, 2013). The delivery of high service quality strengthens corporate brands and excellence in service encounters (Parasuraman *et al.*, 1988), and several studies indicate that perceived service quality also positively influences customer satisfaction, or is regarded as the antecedent of customer satisfaction (Lee *et al*., 2000; Tam, 2004; Pan *et al*., 2010). Moreover, many studies have revealed that customer satisfaction has direct and/or indirect effects on customer loyalty (and thus customers' behavioral intentions, including repurchase intention and word-of-mouth referrals) (Zeithaml *et al*., 1996; Cronin *et al.*, 2000; Ladhari, 2009); in turn, positive behavior will positively affect profits (Zeithaml, 2000). Service quality has also been proven to promote customer loyalty and retention (Imrie *et al*., 2000). In public and banking sectors, it has been found that the relationship between service quality and customer loyalty is

partially moderated by customer satisfaction (Caruana, 2002; Santouridis and Trivellas, 2010; Chodzaza and Gombackika, 2013). However, results from the retail industry have also indicated that customer satisfaction has no direct impact on customer loyalty to a retail store, though this loyalty may be enhanced by fostering a favorable attitude and getting customers to recommend the store to others (Sivadas and Baker-Prewitt, 2000).

Within the e-commerce context, the determinants (such as cleanness and comfort) of service quality in the traditional business environment are no longer applicable (Cox and Dale, 2001); hence, further in-depth research to identify antecedents of service quality in the e-commerce context is needed. Many researches have actually investigated service quality issues; however, many of them have focused on customers' online experiences (Santos, 2003) and logistics experiences (Mentzer *et al.*, 1989) separately. Only a few researches have combined these two aspects into integrated service-quality frameworks (Bienstock, 2006). As discussed above, following a triadic perspective, we propose that service quality should include the two dimensions e-service quality and logistics service quality to reflect the complex nature of the interaction within the e-commerce context. In the following two sections, we will discuss these two dimensions in detail.

2.2 e-Service quality

The quality of online business services is considered an important driver for the success of business-to-consumer (B2C) e-commerce (Parasuraman *et al.*, 2005) and companies' differentiation strategies (Santos, 2003; Kurt and Atrek, 2012). This area is usually referred to as electronic service quality (e-service quality, Barrutia and Gilsanz (2009)), and defined as "the extent to which a website facilitates efficient and effective shopping, purchasing, and delivery of products and services" (Zeithaml *et al.*, 2002, p. 363).

A considerable amount of research has been conducted on the criteria that consumers use to evaluate e-service quality delivered through websites (Carlson and O'Cass, 2011). These criteria range from website design, effectiveness and efficiency of online browsers (information availability and search function), security issues, online purchase (order transactions), and delivery of goods and services (Parasuraman *et al.*, 2005). One measurement scale that has frequently been adopted is e-SERVQUAL developed by Zeithaml *et al.* (2002). e-SERVQUAL consists of seven dimensions, including efficiency, reliability, fulfillment, privacy,

responsiveness, compensation, and contact. In addition to this widely adopted scale, several scales have been developed to measure e-service quality from different angles, including SITEQUAL (Yoo and Donthu, 2001), WebQual (Barnes and Vidgen, 2001; Loiacono *et al*., 2007), eTailQ (Wolfinbarger and Gilly; 2003), PeSQ (Cristobal et al., 2007), e-commerce quality (Gotzamani and Tzavlopoulos, 2009), and modified WebQual (Fink and Nyaga, 2009). However, like e-SERVQUAL, all of these scales focus solely on customers' online experiences and behaviors (Rowley, 2006).

Another strand of research indicates that e-service quality consists of more than just the interaction between the customer and the website; hence, there should be more dimensions by which to measure e-service quality. For instance, Parasuraman *et al.* (2005) split e-SERVQUAL into two scales: E-S-QUAL and E-RecS-QUAL. The first scale covers core dimensions including efficiency, system availability (which replaces the original dimension "reliability"), fulfillment, and privacy. The second represents responsiveness, compensation, and contact, which encompasses the recovery part of e-service quality. Similarly, Collier and Bienstock (2006) proposed an e-service quality framework consisting of three categories: process quality, outcome quality, and recovery; this extended the work on e-service quality to encompass not only website interactivity (process quality), but also outcome quality and recovery quality.

In the e-commerce context, customer satisfaction (or e-customer satisfaction) is normally defined as "the customers' comparing applause of an e-commerce enterprise, which causes the customers' re-purchase" (Anderson and Srinivasan, 2003). Meanwhile, customer loyalty (e-customer loyalty) can be defined as "the customer's favorable attitude toward an electronic business, resulting in repeat purchasing behavior" (Anderson and Srinivasan, 2003, p. 125).

The quality of e-services is sometimes regarded as directly leading to customer loyalty (Srinivasan *et al.*, 2002). However, the majority of the literature views e-service quality as an antecedent of customer satisfaction, wherein e-service quality influences customer loyalty via customer satisfaction (Ribbink *et al.*, 2004; Kim *et al*., 2009; Gounaris *et al*., 2010; Kassim and Abdullah, 2010; Carlson and O'Cass, 2011).

Therefore, in the e-commerce context it is expected that:

H1: e-Service quality directly and positively affects customer satisfaction with e-services.

H2: Customer satisfaction with e-services directly and positively affects customer loyalty to e-services.

2.3 Logistics service quality

Research on logistics service quality can be traced back to the 1970s, but findings show that it is difficult to measure, particularly in the online shopping context.

In relation to the B2C field, three dimensions, including availability of products, timeliness of delivery and quality of delivery, can be used to measure the *physical distribution service quality* (PDSQ, Mentzer *et al.* (1989)). Communication has been added as the fourth dimension to emphasize the importance of order status information in improving service quality (Emerson and Grimm, 1996). Besides the original three constructs of availability, timeliness and condition, return has been included in a so-called e-PDSQ measurement scale (Xing and Grant, 2006; Xing *et al.*, 2011) to evaluate how the retailer deals with damaged, unwanted or faulty products.

In a business-to-business (B2B) context, on the other hand, PDSQ can be evaluated against three outcome dimensions: availability, timeliness and condition (Bienstock *et al.,* 1997). Mentzer *et al.* (1999) extended the PDSQ framework with several other constructs, which cover the ordering process and receiving process. Mentzer *et al.* (2001) further developed and validated their scales of logistics service quality using a US company named DLA. Interestingly, based on Mentzer *et al.*'s (2001) service quality model, Collier and Bienstock (2006) conceptualized a model for e-service quality. Rafiq and Jaafar (2007) tested Mentzer *et al.* (2001)'s logistics service quality instruments in the context of the 3PL industry in the UK, and found the instruments to be valid and reliable.

Many studies on logistics service quality have focused on exploring the relationship between logistics service quality and customer satisfaction and customer loyalty. The positive impacts of logistics service quality on customer satisfaction have been highlighted by many researchers (Mentzer *et al.*, 2001), who have suggested that firms should customize their logistics services to meet the various requirements of different customer segments. Saura *et al.* (2008) indicated that logistics service quality (timeliness, personnel, information, and order quality) has a clear, positive, and significant impact on customer satisfaction. In addition, customer satisfaction with logistics services has been shown to have significant and positive impacts on customer loyalty and market share (Stank *et al.*, 2003). Bienstock and Royne (2010) found that industrial customers actually consider logistics service quality as a primary factor driving their satisfaction with logistics services. For example, personal contact quality has a positive effect on the

customer's satisfaction and purchase behavior (Bode *et al*., 2011).

However, there is also an argument that customer satisfaction does not always translate into customer loyalty (Oliver, 1999), because customer loyalty can also be determined by other factors. For instance, Saura *et al*. (2008) indicated that the positive relationship between customer satisfaction and customer loyalty with logistics services will be intensified by the application of information and communication technology, while Bouzaabia *et al*. (2013) indicated that different dimensions (operational and relational) of logistics service quality have different impacts on customer satisfaction and loyalty against different country backgrounds. In a B2B environment, proactive cost improvement and proactive performance improvement will also facilitate customer loyalty to logistics service providers (Wallenburg, 2009).

Thus, this research expects to observe a positive relationship between logistics service quality, and customer satisfaction and customer loyalty.

H3: Logistics service quality directly and positively affects customer satisfaction with logistics services.

H4: Customer satisfaction with logistics services directly and positively affects customer loyalty to logistics services.

2.4 Conceptual framework

In relation to the triadic point of view in the e-commerce context, the perceived service quality of online shopping is defined using two dimensions: e-service quality and logistics quality. This research investigates how these two factors influence customer satisfaction and loyalty. Figure 2 presents the conceptual framework, along with the hypotheses proposed in this research.

In order to fully understand the interrelationships within the service triad, as described in Figure 1, the following hypotheses are developed to test the relationships' interactions.

H1a: e-Service quality directly and positively affects customer satisfaction with logistics services.

H1b: e-Service quality directly and positively affects customer loyalty to e-services.

H1c: e-Service quality directly and positively affects customer loyalty to logistics services.

H2a: Customer satisfaction with e-services directly and positively affects customer loyalty to logistics services.

H3a: Logistics service quality directly and positively affects customer satisfaction with e-

services.

H3b: Logistics service quality directly and positively affects customer loyalty to e-services.

H3c: Logistics service quality directly and positively affects customer loyalty to logistics services.

H4a: Customer satisfaction with logistics services directly and positively affects customer satisfaction with e-services.

H4b: Customer satisfaction with logistics services directly and positively affects customer loyalty to e-services.

H5: Customer loyalty to logistics services directly and positively affects customer loyalty to e-services.

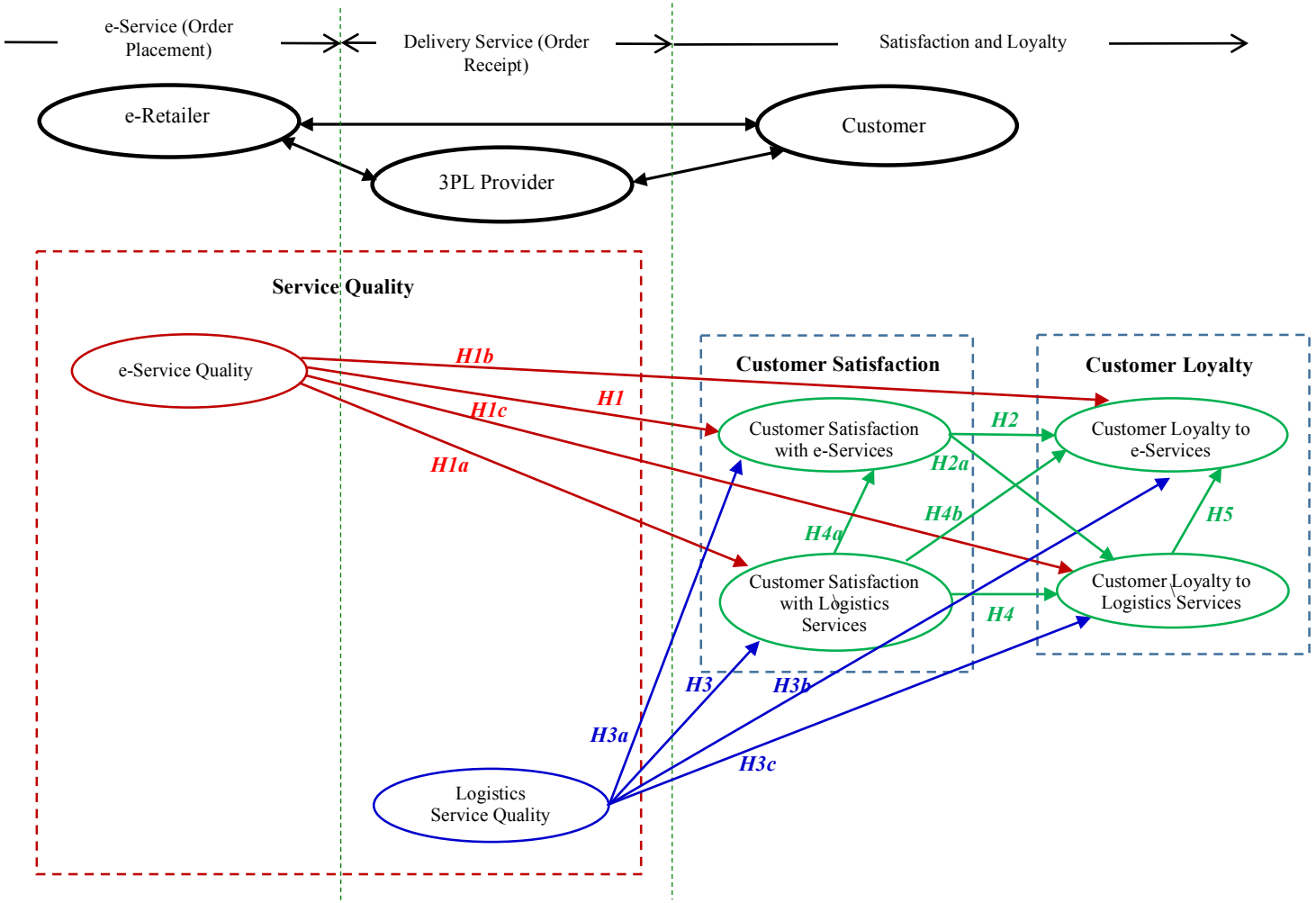

Figure 2. Conceptual framework of service quality of online shopping in the context of the e-retailing supply chain

3. Research methodology

A literature review was primarily used to determine the conceptual model and to develop the measurement scales. Data was collected via an online questionnaire, which was initially developed in English, and then translated into Chinese. Structural equation modeling techniques were used to analyze the collected data.

3.1 Measurement scales

The instruments used to measure service quality, customer satisfaction and loyalty were generated from an extensive literature review.

e-Service quality (ESQ) was measured using five constructs mainly derived from Ribbink *et al.* (2004). These include ease of use, website design, customization, responsiveness, and assurance.

Logistics service quality (LSQ) constructs were based on Bienstock *et al*. (1997), Mentzer *et al*. (2001), Ribbink *et al*. (2004), Rafiq and Jaafar (2007), Bienstock and Royne (2010), and include nine items covering personnel contact quality, order release quantities, information quality, ordering procedures, order accuracy, order condition, order quality, order discrepancy handling, and timeliness.

Customer satisfaction was measured using items adapted and developed from Zeithaml *et al*. (1996), Mentzer *et al.* (2001), Ribbink *et al.* (2004), and Saura *et al.* (2008). Customer loyalty was measured using items generated from Ribbink *et al.* (2004).

Appendix 1 shows the list of measurement constructs and items, and their detailed sources. All construct items were measured using seven-point Likert-type scales, with response options ranging from 1 (= strongly disagree) to 7 (= strongly agree).

3.2 Data collection

A Web survey was designed to measure service quality, and evaluate customer satisfaction and loyalty. The online questionnaire link (provided via SurveyMonkey.com) was sent out to contacts through QQ, which is the most popular social networking tool in China. These contacts were also asked to pass on the questionnaire link to their own contacts. As a result, the total number of requests and the response rate cannot be calculated. In total, 699 samples were collected. Within these 699 respondents, 495 were

valid, and the others were removed due to the presence of incomplete questions.

Table 1 shows the characteristics of the 495 respondents in the survey. In terms of gender distribution, there is no difference between males and females in terms of online shopping. The data shows that the majority of the respondents are in the age group of 20–29. The most-visited website is taobao.com, which was noted by 73.72% of the respondents. Since it was launched in May 2003, taobao.com has become one of the world's top 10 (Global Rank 8) most visited websites (Alexa.com, 2014), and was the top mobile commerce app in China in January 2014 (iResearch.com, 2014).

Table 1 Respondent characteristic

	Category	495 respondents	
		Frequency	Percent (%)
Gender	Male	240	48.5
	Female	255	51.5
Age	<19	8	1.6
	20–29	331	66.9
	30–39	115	23.2
	40–49	30	6.1
	50–59	10	2.0
	60–69	1	0.2
Monthly average amount of online shopping in RMB Yuan (during the data collection period, the exchange rate was USD/CNY: 6.117 (low)-6.196 (high))	<50	61	12.3
	50–99	77	15.6
	100–199	105	21.2
	200–299	66	13.3
	300–399	46	9.3
	400–499	21	4.2
	>500	119	24.1
Most-visited website for online shopping	Amazon	28	5.7
	eBay	4	0.8
	Taobao	370	74.7
	Dangdang	14	2.8
	Jingdong	57	11.5
	Other	22	4.5
Most-bought product category	Books	56	11.3
	Music/Games/Film	1	0.2
	Electronics	61	12.3
	Computer & Office	17	3.4
	Home/Garden/Pets	19	3.9
	Toys/Children/Baby	25	5.1
	Clothes/Shoes/Watches	255	51.5
	Sports/Outdoors	14	2.8
	Grocery/Health/Beauty	45	9.1

	DIY/Tools/Car	2	0.4

China was selected for this research because, as the second largest economy in the world, online shopping in the country has grown very rapidly during recent years. The number of Internet users in China reached 618 million by the end of December 2013, of which online shoppers amounted to 302 million; this represents a continuous growth rate of 24.7% compared to 2012 (CNNIC, 2014). Moreover, the total market transaction amount for online shopping hits 1.26 trillion Yuan (RMB) in 2012, with a growth rate of 66.5% (CNNIC, 2013).

3.3 Reliability and validity

After data collection, a series of analyses were performed to test the reliability and validity of the constructs based on the sample of 495 respondents.

Reliability of the measurement scale was measured using Cronbach's α (Nunnally, 1978). The Cronbach's α values for all measurement scales were greater than the recommended minimum value of 0.70 (see Table 2), which demonstrates that the measurement scales had high reliability (Garver and Mentzer, 1999).

Since all scales were directly adopted from prior research (see Appendix 1), content validity is assumed. In order to ensure the adequacy of the measurement model, discriminant validity should be evaluated in order to ensure that individual items intended to measure one latent construct do not at the same time measure a different latent construct (De Vellis, 1991). Chi-square difference tests for pairings of each scale with other study scales showed a significant difference at the 0.01 level, indicating sufficient discriminant validity for all scales (Garver and Mentzer, 1999; Gerbing and Anderson, 1988). Further, the AVE (Average Variance Extracted) value of each construct was tested (see Table 3), and most of them found to be larger than their correlation with other constructs, which shows good discriminant validity.

In addition to discriminant validity, convergent validity is tested by evaluating whether the individual scale item's standardized coefficient is significant or not, which means greater than twice its standard error (Anderson and Gerbing, 1988). As presented in Table 2, the coefficients for all items greatly exceed twice their standard errors. This

significance provides evidence of convergent validity for the tested items. Meanwhile, the standardized coefficients for the scale items presented in Table 2 exceed the recommended 0.70 minimum, and are significant at the 0.01 level, indicating sufficient convergent validity (Garver and Mentzer, 1999).

The smallest correlation among the variables is recommended as a proxy for common method variation (Lindell and Brandt, 2000). Inter-factor correlations were computed, and the results are shown in Table 3. The smallest correlation among the relationships specified in the model is 0.411 for EOU and CSL. The high inter-factor correlations (1.000) indicate that the items are measuring the same construct; other inter-factor correlations are quite low, which reveals the discriminant validity.

The common method bias was tested using Harman's single-factor test. The results (Table 4) of this test suggest that when all of the items for the constructs are subjected to an exploratory factor analysis, no one general factor accounts for the majority of the variances explained. This suggests that problems associated with common bias are not considered significant in this study (Podsakoff *et al.*, 2003).

Table 2 Measurement items

Measurement items		Cronbach's α	Standardized coefficients	*t*-Values	Mean	Standard deviation
Service Quality (SQ)						
LSQ (Logistics Service Quality)						
Personnel Contact Quality (PCQ)		0.823				
	PCQ1		0.816	18.586	4.6343	1.35785
	PCQ2		0.893	9.699	4.1556	1.50372
	PCQ3		0.868	4.803	3.8283	1.52071
Order Release Quantities (ORQ)		0.898				
	ORQ1		0.790	18.220	4.6101	1.3556
	ORQ2		0.811	14.947	4.4848	1.46597
	ORQ3		0.770	15.736	4.5556	1.49237
Information Quality (IQ)		0.924				
	IQ1		0.917	27.503	5.1596	1.34254
	IQ2		0.952	23.430	4.9273	1.35529
	IQ3		0.924	24.870	4.9919	1.33466
Ordering Procedures (OP)		0.886				
	OP1		0.948	15.893	4.5152	1.42109
	OP2		0.948	18.370	4.6687	1.41540
Order Accuracy (OA)		0.911				
	OA1		0.938	27.130	5.0848	1.29967
	OA2		00946	28.005	5.1475	1.30883
	OA3		0.880	27.472	5.1677	1.35058
Order Condition (OC)		0.850				
	OC1		0.890	20.086	4.7919	1.43098
	OC2		0.854	12.753	4.3737	1.52434
	OC3		0.889	16.136	4.5515	1.44986
Order Quality (OQ)		0.784				
	OQ1		0.927	21.999	4.8040	1.31942

OQ2		0.925	23.015	4.7859	1.24304
OQ3		0.755	9.252	4.0707	1.37246
Order Discrepancy Handling (ODH)	0.913				
ODH1		0.904	14.120	4.4202	1.44997
ODH2		0.938	12.484	4.3535	1.52119
ODH3		0.927	11.610	4.2808	1.49626
Timeliness (TL)	0.884				
TL1		0.899	18.937	4.6768	1.38257
TL2		0.917	21.427	4.8101	1.36033
TL3		0.887	15.997	4.4646	1.34159
ESQ (e-Service Quality)					
Ease of Use (EOU)	0.954				
EOU1		0.924	35.384	5.6081	1.32553
EOU2		0.963	37.005	5.5212	1.21523
EOU3		0.956	37.746	5.5273	1.19495
EOU4		0.909	32.988	5.3434	1.24329
Web Design (WED)	0.938				
WED1		0.948	24.625	4.8667	1.23479
WED2		0.951	24.147	4.8465	1.24062
WED3		0.930	27.984	4.9798	1.17652
Responsiveness (RES)	0.894				
RES1		0.883	22.303	4.7758	1.27266
RES2		0.919	19.040	4.6141	1.30190
RES3		0.922	18.526	4.6182	1.34287
Customization (CUS)	0.869				
CUS1		0.895	28.814	5.0182	1.17225
CUS2		0.906	22.599	4.8000	1.27987
CUS3		0.871	21.187	4.7010	1.26118
Assurance (ASS)	0.918				
ASS1		0.932	28.251	5.1111	1.27328
ASS2		0.947	28.698	5.0707	1.21772
ASS3		0.906	20.251	4.7414	1.36386
Customer Satisfaction (CS)					
Customer Satisfaction with Logistics (CSL)	0.899				
CSL1		0.891	21.119	4.5697	1.12691
CSL2		0.931	27.775	4.9010	1.12224
CSL3		0.913	27.630	4.9354	1.15581
Customer Satisfaction with e-Service (CSE)	0.934				
CSE1		0.906	28.435	4.9030	1.09779
CSE2		0.926	30.267	4.9354	1.05509
CSE3		0.906	25.628	4.7677	1.10050
CSE4		0.919	28.829	4.8949	1.07656
Customer Loyalty (CL)					
Customer Loyalty on Logistics (CLL)					
Word of Mouth – Logistics (WML)	0.939				
WML1		0.971	20.753	4.5879	1.16627
WML2		0.971	20.548	4.6000	1.19106
Purchase Intentions – Logistics (PIL)	0.919				
PIL1		0.962	22.429	4.6545	1.14525
PIL2		0.962	20.610	4.5717	1.15692
Customer Loyalty on e-Service (CLE)					
Word of Mouth – e-Service (WME)	0.925				
WME1		0.964	29.130	4.9434	1.10246
WME2		0.964	28.354	4.9394	1.12946
Purchase Intentions – e-Service (PIE)	0.877				
PIE1		0.944	30.778	5.0646	1.13102
PIE2		0.944	26.551	4.8707	1.14860

Table 3 Factor correlations

	AVE	Correlation																			
		ESQ	LSQ	CSL	CSE	CLL	CLE	ASS	CUS	RES	WED	EOU	TL	ODH	OQ	OC	OA	OP	IQ	ORQ	PCQ
ESQ	.874	1.000																			
LSQ	.905	.783	1.000																		
CSL	.928	.515	.558	1.000																	
CSE	.827	.744	.602	.671	1.000																
CLL	.928	.631	.564	.593	.746	1.000															
CLE	.924	.716	.556	.591	.912	.803	1.000														
ASS	.813	.881	.689	.454	.655	.556	.630	1.000													
CUS	.776	.981	.768	.506	.730	.619	.702	.864	1.000												
RES	.833	.852	.667	.439	.634	.538	.610	.750	.836	1.000											
WED	.852	.855	.669	.440	.636	.540	.612	.753	.839	.729	1.000										
EOU	.950	.798	.625	.411	.594	.504	.571	.703	.783	.680	.682	1.000									
TL	.740	.696	.889	.496	.535	.501	.494	.613	.683	.593	.595	.555	1.000								
ODH	.894	.625	.799	.446	.481	.450	.444	.551	.614	.533	.535	.499	.710	1.000							
OQ	.829	.642	.819	.458	.493	.462	.456	.565	.629	.547	.548	.512	.728	.655	1.000						
OC	.844	.669	.854	.477	.514	.482	.475	.589	.656	.570	.572	.534	.759	.683	.700	1.000					
OA	.809	.637	.813	.454	.489	.458	.452	.561	.625	.543	.544	.508	.723	.650	.666	.695	1.000				
OP	.743	.679	.868	.485	.522	.489	.482	.598	.667	.579	.581	.542	.771	.693	.711	.741	.706	1.000			
IQ	.937	.636	.812	.453	.489	.458	.452	.560	.624	.542	.544	.507	.722	.649	.665	.694	.660	.705	1.000		
ORQ	.748	.676	.863	.482	.520	.486	.480	.595	.663	.576	.578	.539	.767	.690	.707	.738	.702	.749	.701	1.000	
PCQ	.885	.584	.746	.417	.449	.420	.415	.514	.573	.498	.499	.466	.663	.596	.611	.637	.607	.647	.606	.644	1.000

Table 4 Total variance explained

Factor	**Extraction sums of squared loadings**		
	Total	% of Variance	Cumulative %
1	26.439	46.385	46.385

3.4 Data analysis method and process

In this research, structural equation modeling (Anderson and Gerbing, 1988) via AMOS 20.0 was the main statistical analysis tool used; the analysis is based on the sample of 495 respondents. For the structural model, the overall model fit (by using indices from various families of fit criteria: chi-square and normalized fit chi-square, root mean square residual (RMR), root mean square error of approximation (RMSEA), goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), comparative fit index (CFI), normed fit index (NFI), and incremental fit index (IFI)) were assessed to evaluate how well the structural model fit the data. The structural coefficients were then examined in terms of statistical significance in order to determine whether the proposed hypotheses were accepted.

4. Empirical analysis and results

4.1 Structural equation modeling results

Summary values for the variables were calculated by averaging the items in the scales. The descriptive statistics are presented in Table 5. All variables are sufficiently normally distributed, with skewness and kurtosis coefficients within the range of -2.00 to +2.00. The correlations are presented in Table 3. The correlation coefficients are positive and significant at the 0.01 level for all variable pairings.

Table 5 Descriptive statistics

Variable	Minimum	Maximum	Mean	Std. deviation	Skewness	Kurtosis
PCQ	1	7	4.2061	1.4608	-0.1231	-0.1056
ORQ	1	7	4.5502	1.4380	-0.2737	-0.0199
IQ	1	7	5.0263	1.3442	-0.3981	0.1340
OP	1	7	4.5919	1.4182	-0.1379	-0.2694
OA	1	7	5.1333	1.3197	-0.7599	0.9255
OC	1	7	4.5724	1.4684	-0.3491	-0.1800
OQ	1	7	4.5535	1.3116	-0.2456	0.2291
ODH	1	7	4.3515	1.4891	-0.1522	-0.1863
TL	1	7	4.6505	1.3615	-0.1933	0.0142
EOU	1	7	5.5000	1.2447	-0.8595	1.3191
WED	1	7	4.8976	1.2173	-0.2161	0.3516
RES	1	7	4.6694	1.3058	-0.2161	0.3516
CUS	1	7	4.8397	1.2378	-0.3040	0.4736
ASS	1	7	4.9744	1.2850	-0.4193	0.5239
CSL	1	7	4.8020	1.1350	-0.6280	0.8189

CSE	1	7	4.8753	1.0825	-0.3366	1.0974
WML	1	7	4.5939	1.1787	-0.1391	0.4762
PIL	1	7	4.6131	1.1511	-0.0950	0.6312
WME	1	7	4.9414	1.1160	-0.3838	1.0302
PIE	1	7	4.9677	1.1398	-0.4784	1.2198

Figure 3 presents the structural equation modeling results specified in the AMOS 20.0 output. The results relating to the fit of the structural model generally support a claim of good fit. Table 6 provides a summary of the goodness-of-fit statistics.

Table 6 Fit statistics of the structural model

Fit statistics	**Overall fit measure**	
	Notation	**Model value**
Chi-square to degrees of freedom	$x^2/d.f.$	1.286 (x^2=1759.121; *d.f.*=1368)
Root mean square error of approximation	RMSEA	0.024
Root mean square residual	RMR	0.067
Goodness-of-fit index	GFI	0.888
Adjusted goodness-of-fit index	AGFI	0.864
Normed fit index	NFI	0.941
Comparative fit index	CFI	0.986
Incremental fit index	IFI	0.986

As shown in Table 6, all of the indices fall within the recommended ranges, which supports a claim of good fit for the model. The chi-square statistics for the model are 1759.121, with 1368 degrees of freedom. In particular, the relative chi-square (chi-square/degrees of freedom) value of 1.286 is less than the recommended maximum value of 3.00 (Bagozzi and Yi, 1998; Kline, 1998), which represents a good fit. The RMR value of 0.067, and the RMSEA value of 0.024, which a below the recommended maximum of 0.08 suggested by Brown and Cudeck (1993), also indicate that the measurement model fits well.

While the GFI value of 0.888 and the AGFI value of 0.864 are both below the 0.90 level recommended by Byrne (1998), these were heavily impacted by the small sample size (compared to the 618 million Internet users in China, 495 respondents represents a very small sample). However, the GFI/AGFI values are still acceptable because they are within the range of 0.80-0.90 recommended by Joreskog and Sorbom (1989). This

research also used IFI and CFI to measure the goodness-of-fit of the model, since IFI and CFI are more appropriate to measure goodness-of-fit when the sample size is small (Byrne, 1998). In this study, the IFI (0.986) and CFI (0.986) index values for the measurement model both exceed the recommended level of 0.90 (Byrne, 1998), which indicates an adequate fit of the model (Hu and Bentler, 1999). The NFI value of 0.941 also indicates a reasonable fit.

From all of the values outlined above, it is inferred that the structural model represents an acceptable fit.

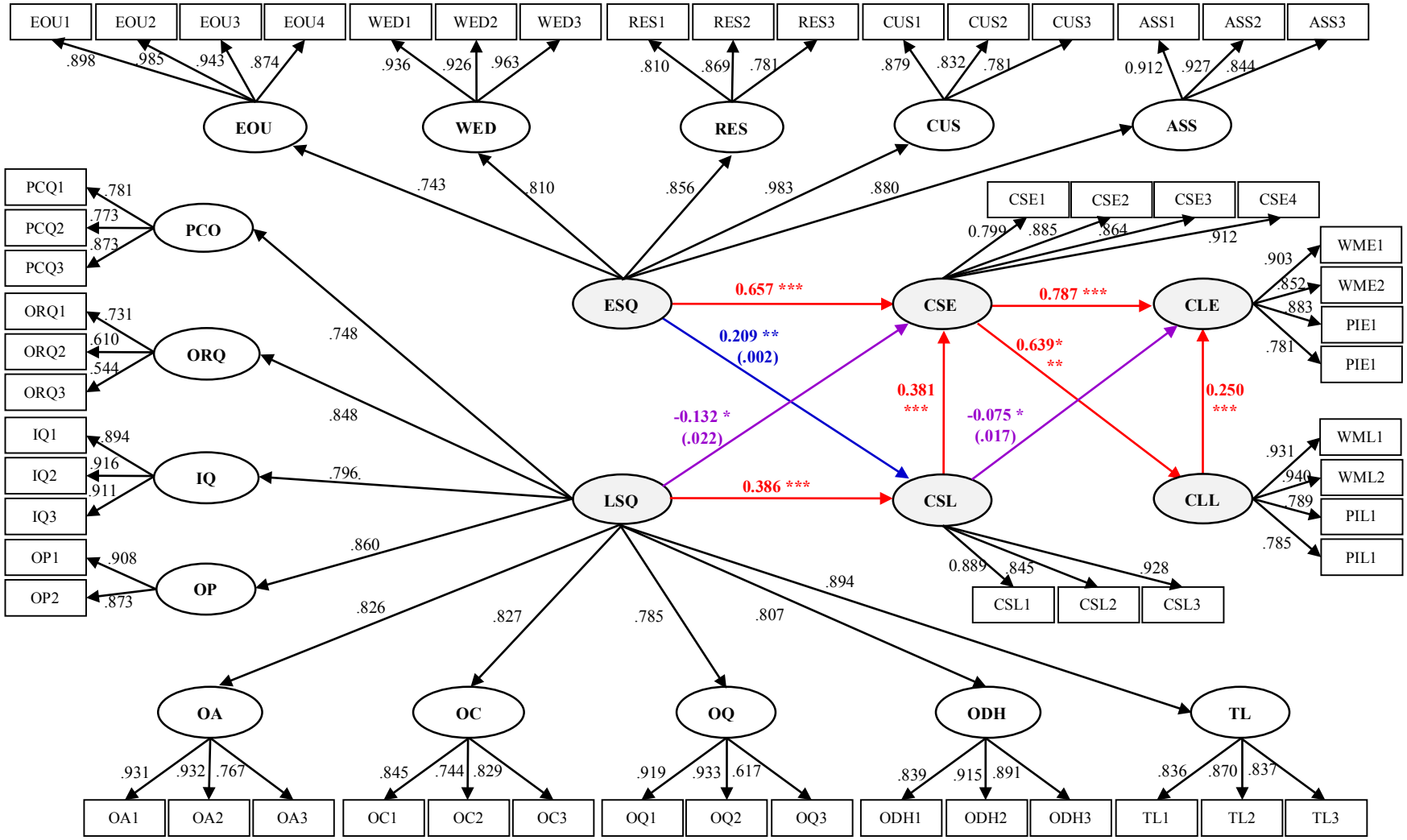

Figure 3. Path diagram of the structural model
(**Notes:** * Significant at level $p<0.05$, ** Significant at level $p<0.01$, *** Significant at level $p<0.001$)

4.2 Hypotheses testing and results

The results of the hypotheses test using the SEM technique are shown in Table 7.

Table 7 Results of the hypotheses test for the structural model

Hypothesis	Path	Estimate	SE	CR	*p*
H1	**CSE←ESQ**	**.657**	.050	10.728	***
H1a	**CSL←ESQ**	**.209**	.080	2.728	**.002 **
H1b	CLE←ESQ	.045	.052	0.858	.391 rejected
H1c	CLL←ESQ	.023	.079	0.318	.750 rejected
H2	**CLE←CSE**	**.787**	.068	13.182	***
H2a	**CLL←CSE**	**.639**	.082	9.596	***
H3	**CSL←LSQ**	**.386**	.069	5.579	***
H3a	**CSE←LSQ**	**-.132**	.050	-2.282	**.022 **
H3b	CLE←LSQ	-.040	.050	-1.652	.098 rejected
H3c	CLL←LSQ	.095	.066	1.564	.118 rejected
H4	**CLL←CSL**	**.061**	.052	1.281	**.200 rejected**
H4a	**CSE←CSL**	**.381**	.038	8.737	***
H4b	**CLE←CSL**	**-.075**	.031	-2.379	**.017 **
H5	**CLE←CLL**	**.250**	.034	6.764	***

(**Note:** Significance levels are denoted as * $p<0.05$, ** $p<0.01$, *** $p<0.001$)

As expected, the main hypotheses *H1*, *H2*, and *H3* are accepted. However, hypothesis *H4* is rejected. Unsurprisingly, *H1b*, *H1c*, *H3b*, and *H3c* are all rejected; however, contrary to expectations, *H1a*, *H2a*, *H3a*, *H4a*, and *H5* are accepted.

5. Research findings and discussion

This research has tested the interrelationships among service quality (including e-service quality and logistics service quality), customer satisfaction (with both e-services and logistics services), and customer loyalty (to both e-services and logistics services).

5.1 Theoretical contributions

This paper makes several theoretical contributions. First, this research developed and verified a service quality framework for the e-retailing supply chain context. Unlike in the manufacturing supply chain, which focuses on internal and external service quality (Seth *et al.*, 2006; Prakash, 2011), this research aimed to define service quality for the e-retailing service supply chain using two dimensions: e-service quality and logistics service quality. By theoretically integrating logistics service quality and e-service quality within the service quality framework, the study provides a more comprehensive framework in order to better understand how both e-services and logistics services individually, and at the same time jointly, contribute to the success of the e-commerce and e-retailing supply chain. Moreover, the paper proposes a triadic view (Choi and Wu, 2009; Wu *et al.*, 2010) in order to look into the interactions between e-commerce companies (e-retailers), logistics service providers, and customers in the e-retailing supply chain context.

Second, our research results (the acceptance of *H1* and *H2*) show that e-service quality has a positive impact on customer satisfaction with e-services, and that this customer satisfaction in turn has a positive impact on customer loyalty to e-services (ESQ→CSE→CLE), which is in line with studies by Ribbink *et al.* (2004) and Gounaris *et al*. (2010). Unfortunately, this chain of effect is not observed within logistics service quality.

As predicated, the results show that logistics service quality contributes significantly to customer satisfaction with logistics service (as indicated by the significance of hypothesis *H3*), which is in line with the results of Bienstock and Royne (2010). However, customer satisfaction on logistics service quality has no direct link with customer loyalty to logistics services (as indicated by the rejection of hypothesis *H4*) (LSQ → CSL ⇸ CLL). This differs from the research results of Saura *et al*. (2012), which indicated that there is a chain of consequence between logistics service quality, customer satisfaction, and customer loyalty. One explanation for this could be that there are many logistics service providers for customers to choose from. For example, taobao.com has 24 logistics companies that provided delivery services to their customers in 2012 (Taobao.com, 2014). Even if customers are satisfied with the logistics service quality, they may not always stay with one specific logistics service provider for delivery services. The service provided also depends on which company the seller has signed a contract with. Another explanation is that customers may be influenced by other factors, such as satisfaction with e-services, as indicated by the acceptance of *H2a*; this means that even if customers are not satisfied with the logistics service, they may stay with the same logistics service

provider contracted by the seller due to their satisfaction with the seller's e-service quality (which follows the route ESQ→CSE→CLL).

Furthermore, the rejection of hypothesis *H3c* indicates that logistics service quality has no direct impact on customer loyalty to logistics services. As with e-service quality, logistics service quality has no direct impact on customer loyalty to e-services, as indicated through the rejection of hypothesis *H3b*.

Third, our results for hypotheses *H3a* and *H4b* (both of which are accepted with significance at the $p<0.05$ level) indicate that logistics service quality has a negative impact on customer satisfaction with e-services, and also that customer satisfaction with logistics services has a negative influence on customer loyalty to e-services. For instance, poor logistics service quality will damage customer satisfaction with e-services, and poor customer satisfaction with logistics services will also damage customer loyalty to e-services. These relationships indicate a contribution to e-retailing supply chain theory. The identification of these negative impacts leads us to conclude that companies focusing only on e-service quality, without considering logistics service quality, will not achieve better performance in e-commerce and e-retailing supply chain management. In particular, the 3PL service industry in China is still in its infancy (Rahman and Wu, 2011); hence, e-retailers need to pay more attention to monitoring and controlling the quality of the logistics services provided by third parties, which could help to prevent potential negative impacts on customer satisfaction caused by low-quality logistics services. These results also agree with the findings of Davis *et al.* (2014), who stated that the value of business systems in the supply chain significantly depends on the degree of supply chain integration with supply chain partners – in this case the integration of e-commerce companies and logistics service providers.

Fourth, as an unexpected finding in this research, our results show that to some extent e-service quality has a positive impact on customer satisfaction with logistics services as indicated by the acceptance of hypothesis *H1a* with significance at the $p<0.01$ level. One reason for this could be that when logistics-service-related issues/complaints are solved efficiently through high-quality e-services, customer satisfaction with logistics services is maintained. In addition, if there are many choices for logistics services, as mentioned above, customer complaints in relation to logistics services may be lead to them switching to another logistics company.

Fifth, hypotheses *H4a* indicates that customer satisfaction with logistics services will facilitate customer satisfaction with e-services. This indicates that customer satisfaction with logistics services will indirectly impact customer loyalty to e-services via positive customer satisfaction with e-services (CSL→CSE→CLE). This result also implies that the higher the customer satisfaction with logistics services, the higher the customer satisfaction with e-services. Meanwhile, the results for *H5* indicate that customer loyalty to logistics services will enhance customer loyalty to e-services. This result implies that the higher the customer loyalty to logistics services, the higher the customer loyalty to e-services. These two results also verify the importance of logistics services to the success of e-commerce and e-retailing supply chain management (Rafiq and Jaafar, 2007; Bienstock and Royne, 2010; Xing *et al*., 2011). This also implies that within the service triad of the e-retailing supply chain, customer satisfaction not only depends on the e-service suppliers, but also on the third-party service suppliers. This is in line with the research results of Finne and Holmström (2013), which suggest that in addition to the main integrator, the sub-system supplier plays an important role in the triadic collaboration of service delivery to end users.

Sixth, the results indicate that service quality has no direct impact on customer loyalty, but it can affect this loyalty via different route. Hypotheses *H1b* and *H1c* are both rejected, which means that there are no direct relationships between e-service quality and customer loyalty to either e-services or logistics services. However, e-service quality will indirectly affect customer loyalty to e-services via positive customer satisfaction with e-services, as discussed above.

In sum, this research reveals the importance of logistics services and the quality of these in the context of the e-retailing supply chain, and again verifies the proposed framework of service quality with these two dimensions of e-service quality and logistics service quality.

5.2 Managerial implications

This research provides both e-commerce managers and supply chain managers with empirical evidence of the importance of service quality in the success of the supply chain in relation to the competition. From the perspectives of these two types of managers, this research demonstrates why careful consideration should be applied to both e-service quality and logistics service quality.

This research also demonstrates that high customer satisfaction with, and loyalty to, e-services cannot be achieved with poor logistics service quality and low satisfaction with logistics services. Both online (website) performance and offline (physical) fulfillment are important to customer satisfaction and loyalty (Semeijn, *et al.*, 2005). By referring to the verified path which are identified from the research results, both e-commerce companies and logistics companies may be able to elicit several effective and efficient ways in which to improve customer satisfaction and loyalty, based on improvements to service quality in relation to both e-services and logistics services.

It is imperative for e-commerce managers to take care not only of e-services, but also logistics services. One implication for e-commerce managers is that they may seek to either manage logistics services by themselves, or via 3PL service providers (Ramanathan, 2010) in order to improve logistics service quality and use this as a way to enhance customer satisfaction with, and loyalty to, their e-services. In terms of outsourcing to third parties, companies must build and maintain close relationships with the logistics service providers they use, in order to monitor and control the quality of the logistics services. If e-retailers manage the logistics services by themselves, they need to develop and enhance their logistics capabilities in order to ensure that they deliver high-quality logistics services. In fact, companies/sellers with strong logistics capabilities should avoid outsourcing due to the lack of synergy this creates (Cho *et al.*, 2008).

The results of this paper highlight the vital role of logistics (physical distribution) services to the success of Internet retailers (Rabinovich and Bailey, 2004) and successful e-retailing supply chain management. This has important implications for supply chain managers, especially those who provide logistics services as a third party to e-commerce companies. Aside from the objective to improve customer (end-consumer) satisfaction with, and loyalty to, their logistics service, these supply chain managers should also look into how they can help their business customers (the e-commerce companies) through their high-quality logistics services to facilitate customer (end-consumer) satisfaction with, and loyalty to, the e-services.

6. Conclusions and future research

This paper has proposed a conceptual framework of service quality in the context of the e-retailing supply chain, and tested several hypotheses using the collected data. The paper verified

the importance of logistics service quality to the success of e-commerce and e-retailing supply chain management. However, there are several limitations to the paper that could be considered as future research directions.

One of the limitations of this research is that the survey was only conducted in China; future data could be collected in other countries so as to verify whether different cultural backgrounds impact the research results. Comparative studies with results from different countries could be more interesting and valuable to international companies in order to improve global customer satisfaction with, and loyalty to, their e-services. Second, the majority of respondents in this research were in the 20–29 age group. Future research could consider age as a control variable in order to analyze whether age influences the research results, because different age groups could have different perceptions of service quality, satisfaction, and loyalty. Third, the measurement scales for e-service quality and logistics service quality were both derived from extant literature. New measurement scales may be developed in future research in order to reflect any new innovative technology applied to e-commerce and e-retailing supply chain management. Fourth, e-commerce companies are increasingly managing and delivering logistics services by themselves. It could be helpful to their decision making if further studies focus on comparing the performance difference between outsourcing and self-managing logistics services.

References

Alexa.com (2014), "*How popular is taobao.com?"*, available at http://www.alexa.com/siteinfo/taobao.com (accessed 01 February 2014).

Anderson, J.C. and Gerbing, D.W. (1988), "Structural equation modeling in practice: a review and recommended two-step approach", *Psychological Bulletin*, Vol. 103 No. 3, pp. 411-423.

Anderson, R.E. and Srinivasan, S.S. (2003), "E-satisfaction and e-loyalty: a contingency framework", *Psychology & Marketing*, Vol. 20 No.2, pp. 123-138.

Bagozzi, R.P. and Yi, Y. (1998). "On the evaluation of structural equation models", *Journal of Academy Marketing Science*, Vol. 6 No. 1, pp. 54-78.

Barnes, S.J. and Vidgen, R.T. (2001), "An evaluation of cyber-bookshops: the WebQual method", *International Journal of Electronic Commerce*, Vol. 6 No. 1, pp. 11-30.

Barrutia, J.M. and Gilsanz, A. (2009), "e-Service quality: overview and research agenda", *International Journal of Quality and Service Sciences*, Vol. 1 No. 1, pp. 29-50.

Bienstock, C.C. and Royne, M.B. (2010), "Technology acceptance and satisfaction with logistics services", *International Journal of Logistics Management, The*, Vol. 21 No. 2, pp. 271-292.

Bienstock, C.C., Mentzer, J.T. and Bird, M.M. (1997), "Measuring physical distribution service quality", *Journal of the Academy of Marketing Science*, Vol. 25 No.1, pp. 31-44.

Bode, C., Lindemann, E. and Wagner, S.M. (2011), "Driving Trucks and Driving Sales? The Impact of Delivery Personnel on Customer Purchase Behavior", *Journal of Business Logistics*, Vol. 32 No. 1, pp. 99-114.

Bouzaabia, R., Bouzaabia, O. and Capatina, A. (2013), "Retail logistics service quality: a cross-cultural survey on customer perceptions", *International Journal of Retail & Distribution Management*, Vol. 41 No. 8, pp. 627-647.

Browne, M.W. and Cudeck, R. (1993), *Alternative Ways of Assessing Model Fit*, Sage Publications, Newbury Park, CA.

Byrne, B.M. (1998), *Structural Equation Modeling with LISREL, PRELIS, and SIMPLIS*, Lawrence Erlbaum Associates, Mahwah, NJ.

Carlson, J. and O'Cass, A. (2011), "Developing a framework for understanding e-service quality, its antecedents, consequences, and mediators", *Managing Service Quality*, Vol. 21 No. 3, pp. 264-286.

Caruana, A. (2002), "Service loyalty: The effects of service quality and the mediating role of customer satisfaction", *European Journal of Marketing*, Vol. 36 No. 7/8, pp. 811-828.

Cho, J.-K, Ozment, J. and Sink, H. (2008), "Logistics capability, logistics outsourcing and firm performance in an e‐commerce market", *International Journal of Physical Distribution & Logistics Management*, Vol. 38 No. 5, pp. 336-359.

Chodzaza, G.E. and Gombachika, H.S.H. (2013), "Service quality, customer satisfaction and loyalty among industrial customers of a public electricity utility in Malawi", *International Journal of Energy Sector Management*, Vol. 7 No. 2 pp. 269-282.

Choi, T.Y. and Wu, Z.H. (2009), "Taking the leap from dyads to triads: Buyer-supplier relationships in supply networks", *Journal of Purchasing & Supply Management*, Vol. 15 No. 5, pp. 263-266.

CNNIC (2013), "*Statistical Report on Online Shopping in China 2012"*, available at http://www.cnnic.net.cn/hlwfzyj/hlwxzbg/dzswbg/201304/t20130417_39290.htm (accessed 28 January 2014).

CNNIC (2014), "*Statistical Report on Internet Development in China*, the 33th Survey Report", available at http://www.cnnic.net.cn/hlwfzyj/hlwxzbg/hlwtjbg/201301/P020140116509848228756.pdf (28 January 2014).

Collier, J. and Bienstock, C. (2006), "Measuring service quality in e-retailing", *Journal of Service Research*, Vol. 8 No. 3, pp. 260-275.

Cox, J. and Dale, B.G. (2001), "Service quality and e-commerce: an exploratory analysis", *Managing Service Quality: An International Journal*, Vol. 11 No. 2, pp. 121-131.

Cristobal, E., Flavián, C. and Guinalíu, M. (2007), "Perceived e-service quality (PeSQ): Measurement validation and effects on consumer satisfaction and web site loyalty", *Managing Service Quality*, Vol. 17 No. 3, pp. 317-340.

Cronin, J.J., Brady, M.K. and Hult, G.T.M. (2000), "Assessing the effects of quality, value, and customer satisfaction on behavioral intentions in service environments", *Journal of Retailing*, Vol. 76 No. 2, pp. 193-218.

Davis, J.M., Mora-Monge, C., Quesada, G. and Gonzalez, M. (2014), "Cross-cultural influences on e-value creation in supply chains", *Supply Chain Management: An International Journal*, Vol. 19 No. 2, pp. 187-199.

DeVellis, R.F (1991). *Scale development: Theory and Applications*, SAGE Publications, Newbury Park, CA.

Emerson, C.J. and Grimm, C.M. (1996), "Logistics and marketing components of customer service: an empirical test of the Mentzer, Gomes and Krapfel model", *International Journal of Physical Distribution & Logistics Management*, Vol. 26 No.8, pp. 29-42.

Fink, D. and Nyaga, C. (2009), "Evaluating web site quality: the value of a multi paradigm approach", *Benchmarking: An International Journal*, Vol. 16 No. 2, pp. 259-273.

Finne, M. and Holmström, J. (2013), "A manufacturer moving upstream: triadic collaboration for service delivery", *Supply Chain Management: An International Journal*, Vol. 18 No. 1, pp. 21-33.

Garver, M.S. and Mentzer, J.T. (1999), "Logistics research methods: employing structural equation modeling to test for construct validity", *Journal of Business Logistics*, Vol. 20 No.1, pp. 33-57.

Gerbing, D.W., Anderson, J.C. (1988), "An updated paradigm for scale development incorporating unidimensionality and its assessment", *Journal of Marketing Research*, Vol. 25 No. 2, pp. 186-192.

Gotzamani, K.D. and Tzavlopoulos, Y.E. (2009), "Measuring e-commerce-quality: an exploratory review", *International Journal of Quality and Service Sciences*, Vol. 1 No. 3, pp. 271-279.

Gounaris, S., Dimitriadis, S. and Stathakopoulos, V. (2010), "An examination of the effects of service quality and satisfaction on customers' behavioral intentions in e-shopping", *Journal of Services Marketing*, Vol. 24 No. 2, pp. 142-156.

Grönroos, C. (1982), "An applied service marketing theory", *European Journal of Marketing*, Vol. 16 No. 7, pp. 30-41.

Gummerus, J., Liljander, V., Pura, M. and Van riel, A. (2004), "Customer loyalty to content-based websites: the case of an online health care service", *Journal of Services Marketing*, Vol. 18 No.3, pp. 175-186.

Hu, L. and Bentler, P.M. (1999), "Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives", *Structural Equation Modeling*, Vol. 6 No. 1, pp. 1-55.

Imrie, B.C., Durden, G. and Cadogan, J.W. (2000), "Towards a conceptualization of service quality in the global market arena," *Advances in International Marketing*, 10 (Suppl. 1), pp. 143-62.

iResearch.com (2014), "*Taobao Fosters E-commerce Villages Across China"*, available at http://www.iresearchchina.com/news/5416.html (accessed 01 February 2014).

Joreskog, K.G. and Sorbom, D. (1989), *LISREL 7 User Reference Guide*, Scientific Software Inc., Chicago, IL.

Kassim, N. and Abdullah, N.A. (2010), "The effect of perceived service quality dimensions on customer satisfaction, trust, and loyalty in e-commerce settings", *Asia Pacific Journal of Marketing and Logistics*, Vol. 22 No. 3, pp. 351-371.

Kim, J., Jin, B. and Swinney, J. (2009), "The role of e-tail quality, e-satisfaction and e-trust in online loyalty development process", *Journal of Retailing and Consumer Services*, Vol. 16 No. 4, pp. 239-247.

Kitapci, O., Dortyol, I.T., Yaman, Z. and Gulmez, M. (2013), "The paths from service quality dimensions to customer loyalty: An application on supermarket customers", *Management Research Review*, Vol. 36 No. 3, pp. 239-255.

Kline, R.B. (1998), *Principles and Practice of Structural Equation Modeling*, Guilford Press, New York, NY.

Kurt, S.D. and Atrek, B. (2012), "The classification and importance of E-S-Qual quality attributes: an evaluation of online shoppers, *Managing Service Quality*, Vol. 22 No. 6, pp. 622-637.

Ladhari, R. (2009), "Service quality, emotional satisfaction, and behavioural intentions", *Managing Service Quality*, Vol. 19 No. 3, pp. 308-331.

Lee, H., Lee, Y. and Yoo, D. (2000), "The determinants of perceived service quality and its relationship with satisfaction", *Journal of Services Marketing*, Vol. 14 No. 3, pp. 217-231.

Lindell, M.K., Brandt, C.J. (2000), "Climate quality and climate consensus as mediators of the relationship between organizational antecedents and outcomes", *Journal of Applied Psychology*, Vol. 85 No. 1, pp. 331-348.

Loiacono, E.T., Watson, R.T. and Goodhue, D.L. (2007), "WebQual: an instrument for consumer evaluation of web sites", *International Journal of Electronic Commerce*, Vol. 11 No. 3, pp. 51-87.

Mentzer, J.T., Flint, D.J. and Hult, G.T.M. (2001), "Logistics service quality as a segment-customized process", *Journal of Marketing*, Vol. 65 No. 4, pp. 82-104.

Mentzer, J.T., Flint, D.J. and Kent, J.L. (1999), "Developing A Logistics Service Quality Scale," *Journal of Business Logistics*, Vol. 20 No. 1, pp. 9-32.

Mentzer, J.T., Gomes, R. and Krapfel, R.E. (1989), "Physical distribution service: a fundamental marketing concept?", *Journal of the Academy of Marketing Science*, Vol. 17 No.1, pp. 53-62.

Nunnly, J.C. (1978), *Psychometric Methods*, McGraw-Hill, NY.

Oliver, R.L. (1999), "Whence consumer loyalty*?*", *Journal of Marketing*, Vol. 63 No. 4, pp. 33-44.

Olorunniwo, F., Hsu, M.K. and Udo, G.J. (2006), "Service quality, customer satisfaction, and behavioral intentions in the service factory", *Journal of Services Marketing*, Vol. 20 No. 1, pp. 59-72.

Pan, J.-N., Kuo, T.-C. and Bretholt, A. (2010), "Developing a new key performance index for measuring service quality," *Industrial Management & Data Systems*, Vol. 110 No. 6, pp. 823-840.

Parasuraman, A., Zeithaml, V. and Berry, L.L. (1988), "SERVQUAL: a multiple-item scale for measuring customer perceptions of service quality", *Journal of Retailing*, Vol. 64 No. 1, pp. 12-40.

Parasuraman, A., Zeithaml, V.A. and Berry, L.L. (1985), "A concept model of service quality and its implications for future research", *Journal of Marketing*, Vol. 49 No. 4, pp. 41-50.

Parasuraman, A., Zeithaml, V.A. and Malhotra, A. (2005), "E-S-QUAL: a multiple-item scale for assessing electronic service quality", *Journal of Service Research*, Vol. 7 No.3, pp. 213-233.

Parasuraman, A., Zeithml, V.A. and Berry, L.L. (1991), "Refinement and reassessment of the servqual scale", *Journal of Retailing*, Vol. 67 No.4, pp. 420-450.

Park, H. and Baek, S. (2007), "Measuring service quality of online bookstores with WebQual", *Human-Computer Interaction. HCI Applications and Services*, Springer, Heidelberg, (ed. 4553/2007), pp. 95-103.

Podsakoff, P.M., MacKenzie, S.B., Lee, J.Y. and Podsakoff, N.P. (2003), "Common method biases in behavioral research: a critical review of the literature and recommended remedies", *Journal of Applied Psychology*, Vol. 88 No. 5, pp. 879-903.

Prakash, G. (2011), "Service quality in supply chain: empirical evidence from Indian automotive industry", *Supply Chain Management: An International Journal*, Vol. 16 No. 5, pp. 362-378.

Rabinovich, E. and Bailey, J.P. (2004), "Physical distribution service quality in Internet retailing: service pricing, transaction attributes, and firm attributes", *Journal of Operations Management*, Vol. 21 No. 6, pp. 651-672.

Rafiq, M. and Jaafar, H.S. (2007), "Measuring customers' perceptions of logistics service quality of 3PL service providers", *Journal of Business Logistics*, Vol. 28 No. 2, pp. 159-175.

Rahman, S. and Wu, Y.-C.J. (2011), "Logistics outsourcing in China: the manufacturer-cum-supplier perspective", *Supply Chain Management: An International Journal*, Vol. 16 No. 6, pp. 462-473.

Ramanathan, R. (2010), "The moderating roles of risk and efficiency on the relationship between logistics performance and customer loyalty in e-commerce", *Transportation Research Part E: Logistics and Transportation Review*, Vol. 46 No. 6, pp. 950-962.

Ribbink, D., van Riel, A.C.R., Liljander, V. and Streukens, S. (2004), "Comfort your online customer: quality, trust and loyalty on the internet", *Managing Service Quality*, Vol. 14 No. 4, pp. 446-456.

Rohm, A.J. and Swaminathan, V. (2004), "A typology of online shoppers based on shopping motivations", *Journal of Business Research*, Vol. 57 No.7, pp. 748-757.

Rowley, J. (2006), "An analysis of the e-service literature: towards a research agenda", *Internet Research*, Vol. 16 No.3, pp. 339-359.

Santos, J. (2003), "E-service quality: a model of virtual service quality dimensions", *Managing Service Quality*, Vol. 13 No. 3, pp. 233-246.

Santouridis, I. and Trivellas, P. (2010), "Investigating the impact of service quality and customer satisfaction on customer loyalty in mobile telephony in Greece", *The TQM Journal*, Vol. 22 No. 3, pp. 330-343.

Santouridis, I., Trivellas, P. and Tsimonis, G. (2012), "Using E-S-QUAL to measure internet service quality of e-commerce web sites in Greece", *International Journal of Quality and Service Sciences*, Vol. 4 No. 1, pp. 86-98.

Saura, I.G, Francés, D.S., Contrí, G.B. and Blasco, M.F. (2008), "Logistics service quality: a new way to loyalty", *Industrial Management & Data Systems*, Vol. 108 No. 5, pp. 650-668.

Semeijn, J., van Riel, A.C.R., van Birgelen, M.J.H and Streukens, S. (2005), "E-services and offline fulfilment: how e-loyalty is created", *Managing Service Quality*, Vol. 15 No. 2, pp. 182-194.

Seth, N., Deshmukh, S.G. and Vrat, P. (2006), "A framework for measurement of quality of service in supply chains", *Supply Chain Management: An International Journal*, Vol. 11 No. 1, pp. 82-94.

Sivadas, E. and Baker-Prewitt, J.L. (2000), "An examination of the relationship between service quality, customer satisfaction, and store loyalty", *International Journal of Retail & Distribution Management*, Vol. 28 No. 2, pp. 73-82.

Srinivasan, S.S., Anderson, R.E. and Ponnavolu, K. (2002), "Customer loyalty in e-commerce: an exploration of its antecedents and consequences", *Journal of Retailing*, Vol. 78 No. 1, pp. 41-51.

Stank, T.P., Goldsby, T.J. and Vickery, S.K. (2003), "Logistics service performance: Estimating its influence on market share", *Journal of Business Logistics*, Vol. 24 No. 1, pp. 27-55.

Tam, J.L.M. (2004), "Customer satisfaction, service quality and perceived value: an integrative model", *Journal of Marketing Management*, Vol. 20 No. 7, pp. 897-917.

Taobao.com (2014), "*Who are providing logistics services to Taobao?"*, available at http://service.taobao.com/support/knowledge-891993.htm (accessed 01 February 2014).

Van Riel, A.C.R., Lemmink, J., Streukens, S. and Liljander, V. (2004), "Boost customer loyalty with online support: the case of mobile telecoms providers", *International Journal of Internet Marketing and Advertising*, Vol. 1 No.1, pp. 4-23.

Weltevreden, J.W.J. (2008), "B2c e-commerce logistics: the rise of collection-and-delivery points in The Netherlands", *International Journal of Retail & Distribution Management*, Vol. 36 No. 8, pp. 638-660.

Wilhelm, M.M., (2011). "Managing coopetition through horizontal supply chain relations: Linking dyadic and network levels of analysis", *Journal of Operations Management*, Vol. 29 No. 7-8, pp. 663-676.

Wolfinbarger, M.F. and Gilly, M.C. (2003), "eTailQ: Dimensionalizing, Measuring, and Predicting Etail Quality", *Journal of Retailing*, Vol. 79 No. 3, pp. 183-198.

Wu, Z.H., Choi, T.Y. and Rungtusanatham, M.J. (2010), "Supplier-supplier relationships in buyer–supplier–supplier triads: Implications for supplier performance", *Journal of Operations Management*, Vol. 28 No. 2, pp. 115-123.

Xing, Y. and Grant, D.B. (2006), "Developing a framework for measuring physical distribution service quality of multi-channel and 'pure player' internet retailers", *International Journal of Retail & Distribution Management*, Vol. 34 No.4/5, pp. 278-289.

Xing, Y., Grant, D.B., McKinnon, A.C. and Fernie, J. (2011), "The interface between retailers and logistics service providers in the online market", *European Journal of Marketing*, Vol. 45 No. 3, pp.334-357.

Yang, Y., Humphreys, P. and McIvor, R. (2006), "Business service quality in an e-commerce environment", *Supply Chain Management: An International Journal*, Vol. 11 No. 3, pp. 195-201.

Yoo, B. and Donthu. N. (2001), "Developing a Scale to Measure the Perceived Quality of an Internet Shopping Site (SITEQUAL)," *Quarterly Journal of Electronic Commerce*, Vol. 2 No. 1, pp. 31-46.

Zeithaml, V. (2002), "Service excellence in electronic channels", *Managing Service Quality*, Vol. 12 No.3, pp. 135-139.

Zeithaml, V., Parasuraman, A. and Malhotra, A. (2002), "Service quality delivery through web sites: a critical review of extant knowledge", *Journal of the Academy of Marketing Science*, Vol. 30 No.4, pp. 362-375.

Zeithaml, V.A. (2000), "Service quality, profitability, and the economic worth of customers: what we know and what we need to know", *Journal of the Academy of Marketing Science*, Vol. 28 pp. 67-85.

Zeithaml, V.A., Berry, L.L. and Parasuraman, A. (1996), "The behavioral consequences of service quality", *Journal of Marketing*, Vol. 60 No.2, pp. 31-46.

Appendix 1. Measurement scales and sources

Measurement items		Source
Service Quality (SQ)		
LSQ (Logistics Service Quality)		
Personnel Contact Quality (PCQ)		
PCQ1:	The designated delivery contact personnel makes an effort to understand my situation	Mentzer *et al.*, 2001; Bienstock and Royne, 2010
PCQ2:	Problems are resolved by the designated delivery personnel	
PCQ3:	The product knowledge/experience of delivery personnel is adequate	
Order Release Quantities (ORQ)		
ORQ1:	Products are consistently available for delivery when ordered	Changed after Mentzer *et al.*, 2001; Bienstock and Royne, 2010
ORQ2:	Logistics company does not impose maximum delivery size constraints	
ORQ3:	Logistics company does not impose minimum delivery size constraints	
Information Quality (IQ)		
IQ1:	Delivery information communicated by the carrier is available (timely, traceable)	Changed after Mentzer *et al.*, 2001; Rafiq and Jaafar, 2007
IQ2:	Delivery information communicated by the carrier is adequate	
IQ3:	Delivery information communicated by the carrier is accurate	
Ordering Procedures (OP)		
OP1:	Requisition procedures are effective	Mentzer *et al.*, 2001
OP2:	Requisition procedures are easy to use	
Order Accuracy (OA)		
OA1:	Deliveries rarely contain the wrong items	Mentzer *et al.*, 2001; Bienstock and Royne, 2010
OA2:	Deliveries rarely contain an incorrect quantity	
OA3:	Deliveries rarely contain substituted items	
Order Condition (OC)		
OC1:	Products rarely arrive damaged	Mentzer *et al.*, 2001; Bienstock and Royne, 2010 Bienstock *et al.*, 1997
OC2:	Product damage rarely occurs as a result of transport mode/carrier handling	
OC3:	Product packages rarely arrive damaged	
Order Quality (OQ)		
OQ1:	Products ordered from the website meet product specifications shown online	Mentzer *et al.*, 2001
OQ2:	Products ordered from the website meet technical requirements	
OQ3:	Substituted products are satisfactory	
Order Discrepancy Handling (ODH)		
ODH1:	Correction of delivered quality discrepancies is satisfactory	Mentzer *et al.*, 2001
ODH2:	The discrepancy report process is adequate	
ODH3:	Response to quality discrepancy reports is satisfactory	
Timeliness (TL)		
TL1:	Time between placing order and receiving delivery is short	Mentzer *et al.*, 2001; Bienstock and Royne, 2010
TL2:	Deliveries arrive on promised date/time	
TL3:	The amount of time a requisition is on back-order is short (Orders not delivered in time are subsequently sent quickly)	Mentzer *et al.*, 2001; Bienstock and Royne, 2010; Ribbink *et al.*, 2004
ESQ (e-Service Quality)		
Ease of Use (EOU)		
EOU1:	It is easy to get access to the company's website	Ribbink *et al.*, 2004
EOU2:	The site is user friendly	
EOU3:	Navigation on the site is easy	
EOU4:	It is easy to find my way on the site	
Web Design (WED)		
WED1:	The information on this site is attractively displayed	Ribbink *et al.*, 2004 ("e-scape" is used in Van Riel *et al.* (2004); "website design" and "e-scape" are both used in Ribbink *et al.* (2004))
WED2:	The site layout and colors are appealing (fascinating)	
WED3:	I am satisfied with the site design	
Responsiveness (RES)		
RES1:	It is easy to get in contact with this online company	Ribbink *et al.*, 2004
RES2:	This online company is interested in feedback	
RES3:	The online company quickly replies to requests	
Customization (CUS)		
CUS1:	I feel that my personal needs have been met when using this site or completing transactions with this online store	Ribbink *et al.*, 2004
CUS2:	This site provides me with information and products according to my preferences	
CUS3:	I feel that the online store has the same norms and values as I have	
Assurance (ASS)		
ASS1:	I feel secure about the electronic payment system of this company	Ribbink *et al.*, 2004
ASS2:	The online company is trustworthy	
ASS3:	I feel secure when providing private information to this online company	

Customer Satisfaction (CS)		
Customer Satisfaction with Logistics (CSL)		
CSL1:	What is your general impression of the delivery service? (1=terrible; 7=perfect)	Mentzer *et al.*, 2001; Saura *et al*., 2008
CSL2:	Which word best describes your feelings towards the logistics company? (1=completely dissatisfied, 7= completely satisfied)	Mentzer *et al.*, 2001
CSL3:	How satisfied are you with the delivery service? (1=completely dissatisfied, 7= completely satisfied)	Mentzer *et al.*, 2001
Customer Satisfaction with e-Service (CSB)		
CSE1:	I am generally pleased with the company's (e-retailer) online service	Ribbink *et al.*, 2004
CSE2:	The online company's (e-retailer's) website is enjoyable to use	
CSE3:	I am very satisfied with the online company's (e-retailer's) online service	
CSE4:	I am happy with this online company (e-retailer)	
Customer Loyalty (CL)		
Customer Loyalty to Logistics (CLL)		
Word of Mouth – Logistics (WML)		
WML1:	I would recommend this logistics company to other people	Created after Ribbink *et al.*, 2004
WML2:	I would recommend this logistics company's deliver services to other people	
Purchase Intentions – Logistics (PIL)		
PIL1:	I intend to continue using this logistics company	Created after Ribbink *et al.*, 2004
PIL2:	I prefer this logistics company above others	
Customer Loyalty to e-Service (CLE)		
Word of Mouth – e-Service (WME)		
WME1:	I would recommend this online company to other people	Ribbink *et al.*, 2004
WME2:	I would recommend this company's website to other people	
Purchase Intentions – e-Service (PIE)		
PIE1:	I intend to continue using this online company	Ribbink *et al.*, 2004
PIE2:	I prefer this online company above others	