

# The Five Dimensions of E-tailing Service Reliability

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*Service reliability plays a key role in gaining competitive advantages for e-retailers. However, researches focusing on the dimensions of e-tailing service reliability are limited. The goal of this study is to explore the dimensions of e-tailing service reliability. Through literature review and in-depth interviews, we developed a questionnaire containing twenty-three items and carried out a survey. In this study, exploratory factor analysis is used to explore the factors and regression analysis is used to find the impact of factors on the service reliability. Results indicate that the dimensions of e-tailing service reliability containing product conformance, distribution reliability, information reliability, customer service reliability and web technology reliability.*

## INTRODUCTION

Internet has become an important channel for business to sell products and provide services. In 2013, U.S. e-commerce sales reached \$ 258.9 billion, an increase of 15 percent compared with 2012. According to E-marketer (2013), the size of U.S. online retail market will keep growing in the next few years and reach \$434.2 billion in 2017. China is in the similar situation. According to the 32<sup>th</sup> China Internet Development Statistics Report released by CNNIC, the netizens in China have reached 591 million by the end of June 2013, and the number of online shopping users have reached 271 million, an increase of 29 percent over the previous years (CNNIC, 2013).

Customers can buy the same goods through online or offline. Different shopping channel may result in different shopping experiences. In online retailing, customers normally make contacts with company through a cold technical interface rather than a real sales staff. Products are delivered by logistics providers without customers' direct involvement, which causes kinds of service failures, such as inaccurate product description information, late delivery, damaged goods and extra shipping costs (e.g., Bitner, Brown & Meuter, 2000; Zeithaml, Parasuraman & Malhotra 2002). Since service reliability issues can cause bad customer response, such as negative word-to-mouth and losing of customers, it is important for e-retailers to enhance online service reliability (Bitner, Brown et al. 2000).

Service reliability requires companies to perform accurately and timely, and avoid mistakes at their best. When shopping online, customers rely on the information and promises provided by the online retailers to make decisions (e.g., Cheung, Lee & Rabjohn, 2008; Subramani & Rajagopalan, 2003; David & Dina 2004). If online retailers' service reliability is low or they cannot keep their promise, customer's perception of low service quality may have negative effects on customer repurchase intention and word-of-mouth. Therefore, how to improve service reliability has become a challenge for online retailers. Hence, understanding the dimensions of e-tailing service reliability provides guidance for online retailers to improve service quality and enhance customer loyalty. Based on these reasons, this study explores the

dimensions of e-tailing service reliability and discusses the impact of the different dimensions on the overall service reliability and management.

## **LITERATURE REVIEW and RESEARCH QUESTION**

### **Definition of Service Reliability**

Parasuraman, Zeithaml et al. (1988) develop a 22-item instrument (SERVQUAL) and define service reliability as the ability to perform the promised service accurately and dependably in offline environment. For online businesses, service reliability has been defined as fulfillment reliability which means business should fulfill the promised service accurately. Zeithaml, Parasuraman et al. (2002) propose that online service reliability contains the accurate technical functioning of website and the correct description of service promises, billing and product information. This definition has been widely adapted. Wolfinbarger and Gilly (2003) propose that online service reliability should contain technical reliability and function reliability. They redefine online service reliability as function reliability and technical reliability. Boshoff (2007) find that online service reliability should have two sub-meanings, fulfillment and system availability. System availability is a higher-order factor that should include reliability of website as well as reliability of the system.

In this research, we define e-tailing service reliability as the ability to fulfill the promised service accurately and integrally based on the web technology. The definition includes the following four aspects: web technology --- the website and its supporting system are stable in the service process; correct and timely service --- providing accurate and timely service when needed; completed service --- services are not limited in the purchase process, but also contain distribution and after-sales service; fulfillment of promised service--- fulfilling the commitment throughout the whole process.

### **Studies of Service Reliability**

With the increasing development of e-business, there still exist gaps to be explored in the research of service reliability. Many scholars have studied service reliability as one of the dimensions of service quality, while some studied it from the perspective of service failure. The two aspects of service reliability will be discussed in detail.

#### *Studies of Service Quality*

In this stream, scholars mainly study the relationship between e-service reliability and factors including customer satisfaction, repurchase intention, and customer loyalty. Service reliability is shown to play an important role in service quality and affect other important factors that influence e-buyers' shopping behavior.

Santos (2003) identifies two categories of online service quality dimensions: active groups and incubative groups and he finds that reliability is the most important dimensions in the active group. By using structural equation model, Yang, Jun et al. (2004) confirm that service reliability is the foremost factor of service quality.

Service reliability is also shown to be one of the most influential factor of customer satisfaction (e.g. Jun, Yang et al. 2004; Lee and Lin 2005; Grewal, Iyer et al. 2004). Wolfinbarger and Gilly (2003) develop an eTailQ scale and find that reliability is the strongest predictor of customer satisfaction and perceived service quality is the second strongest predictor of repurchase intention. Boshoff (2007) finds that reliability is the strongest predictor of value perceptions. Similarly, Kim, Jin et al. (2009) discover service reliability is one of the most critical influences on e-satisfaction and e-trust. Ding, Hu et al. (2011) find service fulfillment/reliability is the most significant factor that drives consumer satisfaction and loyalty. To summarize the dimensions of e-service quality, Ladhari (2010) selects numerous studies on e-SQ from well-known databases and subjects them to a thorough content analysis. He finds that reliability, one of the prominent dimensions in the traditional SERVQUAL instruments, is also one of the six dimensions that appear consistently.

#### *Studies of Service Failure*

Service failures are hard to eliminate due to the complexity of online retailing. Through in-depth

interviews and analyses, Holloway and Beatty (2003) categorize online retail service failures as logistical problems, website technology problems, payment problems, security problems, product quality problems and customer service problems. Forbes et al. (2005) sum up services failures as service delivery system failures and failed response to customer needs and requests. In his study, service delivery system failures denote slow/unavailable service, system pricing, package errors, out of stock, product defect, bad information and web site system failure and failed response to customer needs and requests which include special order / request, customer error and size variation. In online auction context, Kuo et al. (2011) classify service failures into 3 groups: service delivery system failures, buyer needs and requests and unprompted and unsolicited seller actions. In the service process, it is necessary to avoid errors as far as possible to get high service reliability. Therefore, we will identify the dimensions of service reliability from the aspect of service failure.

### Research Question

Through the review of relevant literatures, we conclude that reliability occupies a decisive position in service quality, customer satisfaction and customer loyalty. Service reliability requires companies to perform the promised service accurately and timely, and avoid mistakes as much as possible. However, most scholars explore the effects of service reliability as a single dimension of service quality. In fact, how to improve service reliability depends on the exploration and confirmation of service reliability dimensions. Therefore, the purpose of this study is to explore the dimensions of service reliability, and the effects of these dimensions on service reliability.

## RESEARCH

### Constructs and Generation of Scale Items

To develop the preliminary scale, we initially adapted the measurements from literatures (see Table 1). These measurements are mainly included in the model of reliability dimensions, such as Li and Suomi (2008), Barnes and Vidgen (2002) and Ding, Hu et al. (2011). Minor wording changes were made to avoid duplication.

With the preliminary scale, an in-depth interview was conducted. We interviewed 20 graduate students with rich online shopping experience to make comments on the scale. The main purpose was to know their perception of e-tailing service reliability, reason of service failures in online shopping process and their perceived elements of e-tailing service reliability. Then, we modified the scale items based on the feedback.

Finally, we interviewed ten more customers with rich online shopping experience to check if there is any important factor missed. The interview results show that the final 23-items involve all factors they can think of. So far, the initial measurement items of this study were built. (See Table 2)

**TABLE 1**  
**SCALE ITEM OF RELIABILITY IN THE RELEVANT LITERATURE**

Scale Items	Sources
Do the promised service by a certain time, Keep the records accurately, Customer feel safe in the transactions	Parasuraman, Zeithaml et al. (1988)
The product that one got was represents accurately, Customer got what one ordered from the website, The product was delivered by the time promised by the company	Wolfenbarger and Gilly (2003)
The quantity and quality of the product/service I received was exactly the same as what I ordered, The product/service I ordered was delivered to me within the time promised by the online retailer, The billing process was accurately handled and its records were kept	Jun, Yang et al. (2004), Forbes et al. (2005)

accurately,	
The online retailer responded to my inquiry promptly,	
The system of the website rapidly retrieved the information I requested	
The online retailer shows a sincere interest in solving customer problems,	Lee and Lin (2005)
The online retailer has adequate security,	
Transaction with the online retailer is error-free.	
The product was represented accurately by the website,	Kim, Jin et al. (2009)
The product is delivered on time as promised by the company.	
The website is willing and ready to respond to customers' needs.	
The company performs the service correctly the first time,	Jun, Yang et al. (2004)
My online transaction are always accurate,	
The company keeps my records accurately	
Confirmation emails,	Holloway and Beatty (2003)
Order tracking functions,	
Delivering what is promised,	
Performing the service right at first time	
It delivers orders when promised,	Parasuraman, Zeithaml et al. (2005)
This site makes items available for delivery within a suitable time frame,	
It has in stock the items the company claims to have,	
It is truthful about its offerings	
Accurate delivery service,	Li and Suomi (2008) Li and Suomi
Complete order service,	(2009)
Company being truthful about its offering,	
The online service always correct,	
Keeping service promise,	
Keeping promotion promise,	
Accurate online booking records,	
Website always available	
Provides accurate information,	Barnes and Vidgen (2002)
Provides timely information,	
Provides believable information,	
Provides information at the right level of detail	
Correctness of order fulfillment,	Yang (2001)
Prompt delivery,	
Billing accuracy	
Accurate order fulfill,	Yang, Peterson et al. (2003)
Accurate records,	
Correct service,	
Keep service promise,	
Keep promotion promise,	
Accurate online transactions,	
Refund correctly	
Provides timely information,	Ding, Hu et al. (2011)
Reliable and secure system,	
The price reveals the product value	

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**TABLE 2**  
**SCALE MEASUREMENT ITEMS**

Variable	Measurement items	Variable	Measurement items
$X_1$	The quality of product that one got is in line with business commitment	$X_{13}$	After sale service was excellent
$X_2$	Provide detailed information	$X_{14}$	Accurate billing
$X_3$	Provide accurate information	$X_{15}$	Product delivery with right quantity
$X_4$	System runs smoothly	$X_{16}$	The retrieval results met my requirement
$X_5$	Keep the records accurately	$X_{17}$	Customer service showed a sincere interest in solving problems
$X_6$	Product delivery accurately and timely	$X_{18}$	I get what I ordered from the site
$X_7$	Online payment safely and reliability	$X_{19}$	Handle customer complaints promptly
$X_8$	The product that one got was described accurately	$X_{20}$	Accurate and effective links
$X_9$	Update information timely	$X_{21}$	Provide order tracking
$X_{10}$	The product that I got is in line with my expectation	$X_{22}$	The products sent by the site are well packaged
$X_{11}$	The products sent by the site were undamaged	$X_{23}$	Prompt responses to customers' inquiry
$X_{12}$	The return policy at this site was reasonable		

### Questionnaire Design and Data Collection

The survey questionnaire includes two parts. Part 1 is the general information about respondent's background. Part 2 is the measurement which includes the proposed 23 items and an extra item to assess consumers' perceived overall service reliability. A five-point Likert scale is used, where 1=strongly disagree, and 5=strongly agree. In the survey, respondents are requested to select the best choice that can reflect their perceptions of each scale item. In order to ensure the validity of content, a small scale test was conducted and then the questionnaire was revised according to the feedback. The formal questionnaires were handed out through field investigation, QQ, E-mail, BBS and so on. Field investigation was mainly aimed at students from local colleges and universities.

The questionnaires were distributed to 350 respondents and 277 respond, representing a response rate of 79.1%. The demographic characteristics of the respondents are described as follows: about 57.4% of the participants are male. As for the age of the group, the majority of respondents (87.7%) are in the range of 18-30, like the age of most online shoppers. As for the educational background, it shows that 87% of the respondents are undergraduate students, the remaining are doctoral students. It also shows that the major respondents (58.5%) are college students and the rest are workers from companies and government agencies. Moreover, the survey shows that respondents have shopped online 4.12 times during the past year which indicates that they have relatively rich e-tailing experience.

### DATA ANALYSIS

#### Item Analysis

The sample data is divided into two groups (high score group and low score group). In order to examine the difference between the two groups, independent sample T-test is conducted. Critical Ratio (CR) computed by item analysis is used to distinguish the degree of different respondents to every item in the scale. An item is discarded if its value of CR is less than 3 with significant level at  $p < .05$ . Based on the results of item analysis, we eliminate  $X_{22}$  item (The product sent by the site are well packaged).

#### Exploratory Factor Analysis

Exploratory factor analysis is used to identify online retailing service reliability dimensions. KMO Testing and Bartlett's Test of Sphericity are conducted to check whether the data is suitable for factor analysis. Results show that the value of the KMO equals .865 and Bartlett Test of Sphericity is significant at 0.000, indicating that factor analysis is suitable. Then we use principal component factor analysis with

a Varimax rotation to extract the dimensions. According to the results of factor analysis, we delete three items: two items ( $X_{12}$ : The return policy at this site is reasonable;  $X_{21}$ : Provide order tracking) with low loading (below 0.5) on any factor, one item ( $X_3$ : Provide accurate information) with high cross-loadings (above 0.5) on two or more factors. The scale items change after eliminating those items, so we conducted KMO Testing, Bartlett's Test of Sphericity and the principal component factor analysis again and the results of these tests are consistent with our expectation. Through scale purification processes, the final scale which consists of 19 items on five factors is established. These five factors account for 68.92 percent of the total explained variance (above 65%). According to the connotation of the items that factors contain, we label the five factors as product conformance, distribution reliability, information reliability, customer service reliability and web technology reliability (see Table 3).

**TABLE 3**  
**EXPLORATORY FACTOR ANALYSIS**

Dimensions	Items	Component					Cronbach alpha
		1	2	3	4	5	
Product Conformance	$X_8$ The product one got is represented accurately	.859					.828
	$X_1$ The quality of product one got is in line with business commitment	.893					
	$X_{10}$ The product I got is in line with my expect	.837					
Distribution Reliability	$X_6$ Product delivery accurately and timely		.711				.836
	$X_{18}$ I get what I ordered from the site		.892				
	$X_{15}$ Product delivery with right quantity		.859				
	$X_{11}$ The product sent by the site are not damaged		.813				
Information reliability	$X_9$ Updates information timely			.662			.789
	$X_2$ Provide detailed information			.790			
	$X_{14}$ Accurate billing			.819			
	$X_5$ Keep the records accurately			.854			
Customer service reliability	$X_{13}$ After sale service is excellent				.849		.873
	$X_{23}$ Prompt responses to customers' enquire				.872		
	$X_{19}$ Handle customer complaints promptly				.830		
	$X_{17}$ Customer service shows a sincere				.851		
Web technology	$X_{16}$ The retrieval results meet my requirement					.812	.774

reliability	$X_{20}$ Proper links					.830
	$X_7$ Online payment safely and reliability					.766
	$X_4$ System runs smoothly					.679
eigenvalue		6.89	2.230	1.528	1.315	1.130
Total explained variance (%)		36.26	48.00	56.04	62.96	68.92

Product conformance means that all aspects of the product that customer gets are in line with e-tailer's commitment and exhibition. Distribution reliability refers to the reliability of the whole process of sending goods/service from business to customer. It means that ordered product / service should be delivered to customer on time and well-packaged. Information reliability means all information that customers obtained during the whole shopping process should be true, credible and comprehensive. The information includes product/service description information, billing information, transaction information and introduction information. Customer service reliability indicates that the provided service is consistent with the service that business promises in the whole process of online shopping. It not only requires prompt answer, excellent after-sale service but also asks for retailers' positive attitude towards customers' complaints. Web technology reliability means strong, consistent and standardized technology support, which can ensure safe and reliable online payment transactions.

### Reliability and Validity Assessment

Factor reliability is estimated by computing its Cronbach Alpha. As shown in Table 3, the Cronbach Alpha value of the five factors are 0.828, 0.836, 0.789, 0.873 and 0.774 respectively (all above 0.7, the cut-off value for internal consistency). This indicates all the factors have high internal consistency and high reliability.

The validity test generally includes content validity test and structure validity test. As for content validity test, it refers to the suitability and consistency between the measurement items and the correlative contents. In this research, the scale items are defined through summarizing from existing literatures, in-depth interview and pretest to finalize the scale. Therefore, the questionnaire has high content validity. As for the construct validity, it is used to test the explanatory ability of the model we apply. The high total explained variance (68.92%), high loadings on all factors (above 0.5) and low cross-loadings on two or more factors (below 0.5) all indicate that the questionnaire has high construct validity.

### Regression Analysis

To assess the impacts of the five dimensions on overall service reliability, multiple regression analysis is conducted. Before building regression model, multicollinearity is tested. The variance inflation factor (VIF) for each independent variable is computed to determine the degree of multicollinearity. The maximal VIF value is 2.881, far less than 10 (the boundary of multicollinearity). Then the Durbin-Watson (DW) statistic is calculated to test serial correlation. The result of this test indicates that the DW value is 1.821, which means that the model has no serial correlation.

Regression analysis is used to examine the importance of the dimensions to service reliability. The five dimensions generated by exploratory factor analysis were entered as independent variable and customer perceived overall service reliability serves as dependent variable. The result shows that  $R^2=0.474$  and adjusted  $R^2=0.437$  all above 0.4, which means the fitting of model and data is good. Then we used F-test to assess the degree of the overall model fitting for regression equation. The result is  $F=43.135$ ,  $p \leq 0.000$ , which means the regression model is statistically significant. The regression accounts for 47.4 percent of the variance of the dependent variable ( $F=43.135$ ,  $p \leq 0.000$ ). The regression model parameters are presented in Table 4 and the results of regression analysis are shown in Table 5.

As shown in Table 5, the t-value of "product conformance", "customer service reliability" and "information reliability" are significant and the standardized coefficient are all positive value. Hence these three dimensions, "product conformance", "customer service reliability" and "information

reliability” are statistical significant and have positive influences on perceived overall service reliability. Furthermore, the product conformance dimension is the most significant one with the largest beta coefficient.

**TABLE 4  
REGRESSION PARAMETERS**

Model	R-Value	R Square	Adjusted R Square	<i>F</i>	<i>DW</i>
1	.689	.474	.437	43.135***	1.821

**TABLE 5  
REGRESSION ANALYSIS RESULT**

Independent variable	Non-Standardized		Standardized Coefficient Beta	t-value	Sig.	VIF
	<i>B</i>	Standard Error				
(constant term)	3.318	.213	–	5.782	.000	–
Product Conformance	.278	.080	.332	5.075	.000	2.556
Distribution Reliability	.085	.069	.140	1.454	.052	1.677
Information reliability	.201	.083	.233	2.662	.000	2.881
Customer service reliability	.221	.079	.275	4.003	.000	2.389
Web technology reliability	.058	.076	.077	.938	.073	1.682

## CONCLUSION

By using factor analysis and multiple regression analysis to deal with the survey data, we explore and establish the five dimensions of e-tailing service reliability, including product conformance, distribution reliability, information reliability, customer service reliability and web technology reliability. We also analyze the impact of the five dimensions on perceived service reliability. Based on the results, we propose the following conclusions and managerial suggestions.

First, product conformance is the most influential determinant of e-tailing service reliability. It is also the factor that customers pay most attention to. In online environment, customers can't touch products directly, so an accurate description of product quality is more important to consumers than that in offline. Therefore, customers should be well informed about the product they buy and online retailers should give customers proper promises. In this way, the gap between the quality of product and the customer expectation can be reduced. In addition, online retailers should be responsible for the goods they sell, which means they should choose suppliers seriously and provide customers with high quality products.

Second, customer service reliability has significantly positive effect on customer's perception of overall service reliability of e-tailing. Customer wants to receive reliable help timely. Business should strengthen human resource management and the training of employee so that employees can deal with all kinds of problems quickly and accurately. We suggest that business should enhance its customer service system with recovery options and solutions to deal with service failures.

Third, information reliability is an important dimension of e-tailing service reliability. Due to information asymmetry in e-retailing, customers are eager to receive authentic information before making decisions. Information about product should be true and comprehensive and the statement should be accurate and well-understood. Since demonstrating commodity from multi-angle is better than exaggeration and over-promise, retailers can gather and demonstrate some customers' real shopping experience to help customers make decision.

Fourth, web technology reliability and distribution reliability only has a minor effect on perceived e-tailing service reliability. This may be associated with the rapid development of information technology.

With fast advancement, web technology is becoming more powerful and reliable. If the problems are caused by distribution, customers may attribute service failure to logistic providers rather than online retailers since most e-tailers outsource shipping services to third-party providers. However, business should continue to improve web technology and choose high quality logistic provider in order to provide an excellent service environment for online shopping.

## LIMITATIONS AND FUTURE RESEARCH

There are some limitations in this research. One main limitation is the sampling: the sample size is small, the respondents are mainly college students, and the geographical location is centered in one region.

In future we are going to work on two issues. First is to enlarge the sample size and increase the field of investigation to enhance the generalizability of the results. Second is to understand service reliability's impacts on customer satisfaction and loyalty.

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