



# Online customer service quality of online shopping: evidence from Dangdang.com

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## Abstract

Through the survey and six hypothesis, we conduct an empirical study to analyze how the six dimensions (including accessibility, reliability, ease-of-use/usefulness, interactivity, responsibility/efficiency, safety/privacy) influence the perceived online customer service quality. The questionnaire is divided into four parts: basic personal information, introduction of background knowledge, perceived online customer service quality, factors which influence perceived online customer service quality. Our methodology combines factor analysis and regression analysis to a novel data set which comes from a real buyer of Dangdang.com. We find that the above six factors have significant positive influence to the perceived online customer service quality. We also find that the perceived online customer service quality will benefit from real-time online customer service.

**Keywords** Online customer service · Perceived customer service quality · Real-time online customer service · SERVQUAL

## 1 Introduction

Customer service means a series of activities to enhance customer satisfaction [1]. Customer service includes pre-transaction service, transaction service and post-transaction service [2]. The current customer service tools include Fax, Mail, hot-line Telephone, Email (response automatic or manually), BBS, Online Help Catalog, FAQ, etc. Customer is a key factor for a company to succeed. Not only products quality, products standard, products price, but also customer services can win valuable customers. The previous study shows that the enterprise which build excellent customer relationship may increase their profits more than 60% [3].

With the rapid development of IT, real-time online customer services (icon-style chatting tools such as QQ, MSN, Google talk, and embedded paged or boxed talk, Blog) are mostly applied in industry and focused by scientists. Online customer service system has become an important tool of online marketing. At the same time, it has also become a basic part to exhibit the enterprise and to interact with visitors. It's a hot topic to find the key factors which influence perceived online customer service quality.

Dangdang.com is a world leading integrated shopping website which invested by Chinese Cowan company, American Tiger fund, American IDG, Luxemburg Cambridge group, Asian Growth Capital Fund. Now Dangdang is one of the most popular websites to buy books. This study lists many factors which influence online service quality and customer satisfaction from previous literature, then explores the key factors which influence perceived online customer service quality in online customer services. The study finds that accessibility, reliability, ease-of-use/availability, interactivity, responsiveness/efficiency, security/privacy have significant influence to perceived online customer service quality (Table 1).

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**Table 1** Selected studies on e-service quality scale development

Author	Field	Dimensions
Joseph [4]	Banking service	6: Convenience/Accuracy, Feedback/Complaint Management, Efficiency, Queue Management, Accessibility, Customization
Jayawardhena [5]	Online bank service	5: Speed, Content, Design, Interactivity, Navigation, Security
O'Neill [6]	Online library	4: Accessibility, Responsiveness, Reliability, Empathy
Yang and Jun [7]	B2C e-Service	6 (for online buyers): Reliability, Accessibility, Ease of Use, Customization, Security, Trust; 7 (for online browser): Security, Responsiveness, Ease of Use, Availability, Reliability, Customization, Accessibility
Zeithaml [8]	e-service	11: Reliability, Responsiveness, Accessibility, Flexibility, Ease of Use, Efficiency, Assurance, Privacy/Security, Knowledge of Price, Web Design, Empathy
Yang [9]	Website service	14: Responsiveness, Trust, Ease of Use, Reliability, Convenience, Communication, Access, Capability, Courtesy, Customization, Continuous Improvement, Cooperation, Security/Privacy, Empathy
Santos [10]	e-Service	11: Ease of Use, Appearance, Links, Structure and Overall Arrangement, Contents, Reliability, Efficiency, Support, Communication, Security, Incentive
Jun [11]	e-service	6: Reliability/Responsiveness, Attentive, Ease of Use, Accessibility, Security, Trust
Allard [2]	Online travel	7: Accessibility, Navigation, Design, Reliability, Assurance, Responsiveness, Customization
Parasuraman [12]	e-Service	7: Efficiency, Reliability, Completion, Privacy, Responsiveness, Compensatory, Accessibility
Yang [13]	Portals service	5: Ease of Use, Content Validity, Quantity of Information, Accessibility, Interactivity
Bauer [14]	Online shopping	5: Functionality/Design, Entertainment, Process, Reliability, Responsiveness
Ibrahim [15]	Online bank service	6: Ease of Use/Accuracy, Accessibility/Reliability, Queue Management, Friendly Interface, Responsiveness, Customization
Ho [16]	Online travel	5: Information Quality, Security, Website Function, Customer Relationship, Responsiveness
Lin [17]	Online shopping	7: Web Design, Interactivity, Quantity of Information, Security, Responsiveness, Trust, Empathy
Sohn [18]	e-Service	6: Trust, Customized Communications, Ease of Use, Contents and Function, Reliability, Delivery Speed
Chang et al. [19]	Online shopping	4: Web Design (including Responsiveness), Reliability, Security/Privacy, Customer Service
Ladhari [20]	Review	6: Reliability, Responsiveness, Web Design, Ease of Use/Availability, Security/Privacy, Information Quality
Ladhari [21]	Online bank service	5: Tangible, Reliability, Responsiveness, Assurance, Empathy
Zavareh [22]	Online bank service	6: Efficiency/Reliability, Security/Trust, Empathy, Responsiveness, Ease of Use
Ba [23]	Virtual community	5: Tangible, Reliability, Responsiveness, Assurance, Empathy
Elmorshidy [24]	e-Business website	5: Tangible, Reliability, Responsiveness, Assurance, Empathy
Alqeed [25]	Airline industry	6: Tangible, Intangible, Reliability, Responsiveness, Assurance, Empathy
Xu et al. [26]	Online shopping	7: Web Design, Security, Responsiveness, Trust
Abdulaziz Abdullah Hamad et al. [27]	e-Service	6: Ease of Use, acceptance, user perception, Reliability

## 2 Literatures Review and Hypothesis

Online customer service quality is defined as the extent to which a Web site facilitates efficient and effective shopping, purchasing, and delivery of products and services [8]. Lots of scholars research in online service quality which focuses on online bank, website design (website service), online library, online shopping, online service, virtual community, online clothing, online travel, etc. They develop e-service quality scale dimensions from 3 to 15 (each includes several items).

We static the frequency of each dimension appeared in previous literature on e-service quality, then select the dimensions which are used more usually. The six dimensions can be drawn as accessibility, reliability, ease-of-use/availability, interactivity, responsiveness/efficiency, security/privacy which will influence the e-service quality. What's more, we modify some items according to the characteristics of online customer services.

**Accessibility (PA)** Accessibility refers that the site can provide a series of entrance (menus, buttons, links, etc.) to solve problem during the process of pre-transactions, transaction and post-transaction. A clarity entrance is one of the most important factors that the customers select online customer services [2, 4, 6, 7, 11–13, 15]. This dimension includes 6 items: you can quickly find the contents related to customer services (PA1); you can quickly find the customer service telephone, email and other methods for service (PA2); you can quickly find relevant help according to the classification of service theme (PA3); the relative links have strong logic, and ease to browse (PA4); online customer services are very useful tools (PA5); online customer services can solve the problem encountered when shopping (PA6).

**H1** Accessibility is positively related to the perceived service quality of online customer services.

**Reliability (RE)** Reliability is one of dimensions of SERVQUAL, which refers the ability to reliably, accurately perform the service commitment. Reliability includes two aspects: one means that the website functions such as search engine, payment instruments, etc. are reliable. The other means that the service commitment, financial information, product information and other relevant information provided by the website are reliable [2, 6, 7, 9–12, 14, 15, 18–25]. The items of reliability dimension in SERVQUAL includes: company can finish what committed to customers in time; company can care and help customers when they have difficulties; company are reliable; company can offer accuracy services

promised; company can correctly record the relevant information.

According to online customer services, we give the items of reliability dimension as following: the information of online customer services can always update (RE1); the information of online customer services is reliable (RE2); the information of online customer services is accuracy (RE3); the provider can solve relevant problem in committed time and feedback in time (RE4).

**H2** Reliability is positively related to the perceived service quality of online customer services.

**Ease of use/availability (EOU)** EOU refers a friendly interface, especially when users search for useful information. EOU is an important factor for users to make a choice in which website to purchase. Although many emerging technologies of online customer services can provide potential convenience to customers, the customers may not adopt them at all if they are too difficult to use. The perception of EOU is a key reason for the users to make a decision whether or not to accept the customer services [7, 9, 10, 12, 13, 15, 18, 20, 22]. Good online customer services should be provided to the user: (1) the function easy to search related information; (2) the search engine to provide friendly interface, high performance search; (3) the function which allows the users to operate easily and switch back and forth between pages. Under the environment of e-commerce, EOU has been confirmed as a key factor affecting customer satisfaction [26]. Online customer services with better EOU should have the following characteristics: providing customer services with simple operation, no need of special professional knowledge (EOU1); providing a clear, beautiful interface for relevant contents (EOU2); providing adequate navigation (EOU3).

**H3** EOU is positively related to the perceived service quality of online customer services.

**Interactivity (INT)** Interaction means a kind of two-way transmission between webpage and information browser. "Interaction" is a big advantage of Internet media. The real "interactive" web site should show "interactivity" according to people's communication each other freely. The communication on network platform has large capacity and smooth channel; what's more, it can be not only synchronous, but also asynchronous. The so-called synchronous interaction refers to the activities occurring at the same time, such as the communication through chatting tool of ICQ, MSN, QQ and so on. Asynchronous interaction refers to the interaction occurring not at different time, such as a typical telephone messages, email, BBS, etc.

Strong interactivity means an active customer participation in the service process [5, 13, 17]. The items of interactivity dimension includes: the website provides good interactive performance for customer services; the website provides clear instructions for customer services; the customer could understand what information needed; the website allows a good bi-direction communication in customer service process; the website has instant communication tool to make quickly response for customer request; the customers could benefit from communication with other customers in the service process.

**H4** Interactivity is positively related to the perceived service quality of online customer services.

**Responsiveness/efficiency (EFF)** Responsiveness is the willing to help customers and rapidly improve the service level. As one of the dimensions of SERVQUAL, responsiveness dimension includes the following items: informing the customer the accurate service time; providing services on time; the staff are always willing to help customers; the staff can immediately provide service to meet customer demand. When customers face with problems or difficulties, they may come to online services for support. The response speed of customer services provided will greatly affect the evaluation result of service quality. As we have known, online customer services may happen in pre-transaction, transaction and post-transaction. When customers need support during these processes, they totally depend on the willingness of company to provide support services. The faster and more accurate of the response of online customer services, the more satisfaction which the customer perceived [2, 4, 6, 7, 9, 10, 12, 14–17, 19–25]. The items of responsiveness dimension include: the customers have clear aim when they call on customer services; the customer services can solve problem timely; the customer service staff answer questions professionally and accurately; the customer service staff response quickly.

**H5** Responsiveness is positively related to the perceived service quality of online customer services.

**Security/privacy (PRI)** The security dimension originates from the Assurance dimension of SERVQUAL which refers employees' knowledge, etiquette and ability to express confidence and reliability. Several items include: the employee are trustworthy; the customers will feel at ease in transactions; the employee are polite; the employee could provide better service by the support from the company. When transactions come to network, security is very important to build trust of customers because of no face-to-face contact between customers and company (and its employee). The founder of SERVQUAL Zeithaml

proposes the dimension of security/privacy (the degree that the website protects the personal information and privacy information) to scale for online service quality in 2000 [5, 7, 10–12, 16, 17, 19, 20, 22].

Security/privacy is very important to protect customers' privacy information and financial information. It has five items as following: the website publishes series protection clause of privacy information; the purchasing behavior, customer service behavior are listed as privacy; the website does not share the personal information with other institutes or persons; the website has strong safety technical system to protect customers' credit card information; all the linked sites are safe. Security/privacy is an important factor to influence customers' intention of purchase and re-purchase because of the huge risk of fraud and property loss existed in the online environments.

**H6** Security/privacy is positively related to the perceived service quality of online customer services.

## 3 Methodology

### 3.1 Questionnaire design

The questionnaire is divided into four parts: basic personal information, introduction of background knowledge, perceived online customer service quality, factors which influence perceived online customer service quality. The basic personal information section includes origin, gender, education, occupation, age, monthly disposable income (expense), and online shopping history. The section of background knowledge introduces some knowledge about current online customer service modes, in order to answer the questions accurately for the responses. The section of influencing factors includes 6 dimensions (28 items) which are: accessibility, reliability, ease-of-use/availability, interactivity, responsiveness/efficiency, security/privacy. These dimensions and items come from the dimensions of traditional SERVQUAL dimensions, and then adapt according to the previous studies of relationship between perceived online service quality and its influence factors. This questionnaire is designed with series closed questions which can select only one answer from several choices except for basic personal information. The scale of perceived online customer service quality and its influence factors is designed with 5-likert scale (1 = strongly disagree; 2 = disagree; 3 = neither agree nor disagree; 4 = agree; 5 = strongly agree).

## 3.2 Sampling and procedure

In this study, we study perceived online customer service quality and its influence factors based on the survey of true buyers of Dangdang.com. We release the questionnaire on a special survey website “Star Questionnaires” which is operated by Shanghai Circulating information technology Co. Ltd. The questionnaire’s http address is <http://www.sojump.com/jq/2476807.aspx> (<http://www.sojump.com/m/2476807.aspx> for mobile version). We found a 6-people team to call people to finish the survey by the following methods: (1) publish the http link in the customer service micro-blog of Dangdang.com; (2) invite friends to fill in the questionnaire from social network such as Sina micro-blog, Tencent micro-blog, QQ Qzone, Renren network, etc. (3) invite friends by chatting tools such as QQ (the most popular chatting tool), MSN, etc. (4) invite friends by group email. (5) invite friends by mobile phone SMS.

We define that each computer or IP address can only answer the questionnaire once to ensure that every questionnaire is finished by one in-depended person. We have collected 1066 valid questionnaires by different users. There are total 573 males and 493 females, this sex ratio (53.75%:46.25%) is reasonable. Considering to degree distribution, undergraduates and graduates account for more than 80%. In fact, they are the main group who buy and read books. For age distribution, people aged 18–30 account for 90.34%. For occupation distribution, 50.94% are full-time students, followed by the teachers, the sales staff, R&D people, professionals (such as accountants, lawyers, architects, medical personnel, journalists), management personnel, administrative/Logistics personnel. The people whose age of online shopping is less than 3 years account for more than 63%. By observing their IP address, our respondents come from all over China mainland (except for Tibet), what’s more, we have three respondents oversea and 1 from Hong Kong. The respondents who come from Hubei, Guangdong or Gansu province have a large percent because that the main social network of our survey team locate in these three provinces. The further statistical data of respondents are detailed in Table 2.

## 4 Results and discussion

### 4.1 Reliability, validity analysis of questionnaires

In order to study real buyers of Dangdang.com more accurately, we filter out the users who visit dangdang.com

infrequently, total of 372, and then the other 694 questionnaire data remain. A reliability and validity test is used to delete the items which are unreasonable. The test result is shown as Table 3. According to DeVellis [28], the reliability coefficient  $\alpha$  is divided into several sections: 0.60–0.65 (better not to accept reliable samples); 0.65–0.70 (the minimum value to accept the samples); 0.70–0.80 (good value to accept the samples); 0.80–0.90 (very good value to accept the samples). If the internal consistency reliability coefficient  $\alpha$  of subscales is less than 0.60 or the reliability coefficient  $\alpha$  of total scale is less than 0.8, you should revise the scale the delete some items of the scale. In this survey, every value of  $\alpha$  for each item is almost 0.9, so we think, our survey data have good reliability.

The next step is to check the Kaiser–Meyer–Oklin (KMO) measure of sampling adequacy. This statistic is calculated for individual and multiple variables and represents the ratio of the squared correlation between variables to the squared partial correlation between variables [29]. The KMO value varies between 0 and 1. A value of 0 indicates that the sum of partial correlations is large relative to the sum of correlations, whilst a value close to 1 indicates that patterns of correlations are compact, and so factor analysis will yield reliable factors. Kaiser [30] suggests that values greater than 0.5 should be accepted. Pallant [31] suggests that the KMO statistic should be larger than 0.6. Hutcheson and Sofroniou [32] suggest that values between 0.5 and 0.7 are normal, values between 0.7 and 0.8 are good, values between 0.8 and 0.9 are great, and values above 0.9 are superb. The initial solution of our factor analysis revealed a KMO value of 0.974, which is an ideal condition met in our case [29].

Finally, Bartlett’s Sphericity Test should reach a significance value to support the factorability of the correlation matrix obtained from the items. Bartlett’s sphericity test reveals an approx. We have a sig. (significance value) zero ( $< 0.05$ ), which mean that the factorability of our correlation matrix is proper.

### 4.2 Factor analysis

We obtain seven components and keep the coefficients which are no less than 0.50 based on principal component analysis with fixed number of factors, correlation matrix and varimax rotation, as shown in Table 4.

The total effective factor load is above 0.646, and the cumulative factor contribution rate is above 77.483%. When we come to explain rotated factor matrix, the load factor must be no less than 0.45, and it would be better if the factor load is above 0.5 [33].

**Table 2** Basic information statistical data of respondents

Sex	Amount	%	Age	Amount	%	Education	Amount	%
Male	573	53.75	< 18	5	0.47	Under junior college	48	4.50
Female	493	46.25	18–30	963	90.34	Junior college	74	6.94
			31–40	68	6.38	Undergraduates	679	63.70
			> 41	30	2.81	Graduates	218	20.45
						Postgraduates	47	4.41
Province	Amount	%	Occupation	Amount	%	Shopping history (years)	Amount	%
Hubei	532	49.91	Fulltime students	543	50.94	< 1	286	26.83
Guangdong	91	8.54	Teachers	76	7.13	2–3	388	36.40
Gansu	80	7.50	Sales	59	5.53	3–4	192	18.01
Anhui	40	3.75	R&D people	58	5.44	4–5	97	9.10
Jiangsu	38	3.56	Professionals	44	4.13	> 5	103	9.66
Guangxi	30	2.81	Management personnel	37	3.47			
Beijing	28	2.63	Administrative	34	3.19			
Sichuan	24	2.25	Others	215	20.17			
Zhejiang	23	2.16						
Tianjin	22	2.06						
Others	158	14.82						

Table 4 lists the items of questionnaire data meeting the critical conditions and related value (more than 0.5 only). RE2 and EFF3 would be rounded, as the factor loading of RE2 (the information provided by online customer service can be depended on) and EFF3 (the answer given by Website is accurate) are both above 0.45 and below 0.5 which because most content of the two items were reflected in another one. PA6 (You often use online customer services to solve problems when you are shopping.) also reflects the customer is approval to the reliability of shopping on Dangdang in a certain extent. Therefore, another items strongly correlated with the RE dimension are reasonable and will be adjusted to the RE. The 7 factor rotated by varimax are respectively named by INT (interactivity), PRI (security/privacy), PA (accessibility), EOU (ease of use), CPV (perceived customer service quality), RE (reliability), EFF (responsiveness/efficiency).

### 4.3 Regression analysis

Using multiple regression method to verify the hypothesis, make:

$$CPV = \alpha + \beta_1 \times PA + \beta_2 \times RE + \beta_3 \times EOU + \beta_4 \times INT + \beta_5 \times EFF + \beta_6 \times PRI + \varepsilon$$

CPV for perceived customer service quality, PA, RE, EOU, INT, EFF, PRI for the influencing factors,  $\alpha$  for

constant,  $\beta_1 - \beta_6$  for the regression coefficients,  $\varepsilon$  for the disturbance term. Based on the validation of the reliability and validity of the variable, the extraction component values are preserved, which are applied for multivariate linear regression analysis to test the hypotheses. By the regression in enter method with probability  $F = 0.05$  entering, we get the results as shown in Table 5.

The regression results show that customer's perceived online customer service quality are positive correlated with accessibility, reliability, ease-of-use/availability, interactivity, responsiveness/efficiency, and security/privacy (The regression coefficient is positive, and Sig. equal 0), so the hypotheses of H1–H6 have been verified.

## 5 Conclusions

With the development of information and communication technology, customers can obtain a large number of new services by Internet [34]. The former studies of customer services is mostly based on the SERVQUAL model, the traditional perceived service quality is mainly establish face-to-face communication between service provider and customer. When we come to online customer services, the perceived service quality is established between the customers and the user interface, so its impact factors are also

**Table 3** Reliability and validity test

	CPV $\alpha = 0.879$	PA $\alpha = 0.914$	RE $\alpha = 0.922$	EOU $\alpha = 0.903$	INT $\alpha = 0.930$	EFF $\alpha = 0.887$	PRI $\alpha = 0.934$
CPV1	0.861						
CPV2	0.834						
CPV3	0.827						
CPV4	0.858						
PA1		0.897					
PA2		0.891					
PA3		0.895					
PA4		0.895					
PA5		0.895					
PA6		0.917					
RE1			0.902				
RE2			0.895				
RE3			0.901				
RE4			0.896				
EOU1				0.877			
EOU2				0.848			
EOU3				0.858			
INT1					0.920		
INT2					0.916		
INT3					0.916		
INT4					0.916		
INT5					0.915		
INT6					0.918		
EFF1						0.890	
EFF2						0.830	
EFF3						0.858	
EFF4						0.840	
PRI1							0.922
PRI2							0.918
PRI3							0.919
PRI4							0.915
PRI5							0.920

show different characteristics. According to the characteristics of online service, and the previous studies, we modified the SERVQUAL scale, and get six dimensions (accessibility, reliability, ease-of-use/availability, interactivity, responsiveness/efficiency, security/privacy). We hope to find the perceived service quality of online customers and its influencing factors. This study finds that the six factors have significant positive influence on perceived customer services. And the model also explains 77.483% of perceived customer service quality.

It is worth mentioning that, we have had an addition survey to the acceptance of real time online customer services. The result shows that 700 people who welcome real-time online customer services, accounted for 65.67%,

318 people don't care about that, accounted for 29.83%, 48 people object to that, accounted for 4.5%. In fact, real-time online customer services can improve the interactivity and responsiveness, and increase the ease-of-use to a certain extent, so it will significantly improve perception level of customer service quality.

Most operators of online shopping web site think that, online customer services, especially pre-transaction service and post-transaction service are not essential, or just a means of personalized customer service package to attract customers. But we believe that the accessibility, reliability, ease of use/availability, interactivity, responsiveness/efficiency, security/privacy during the whole transaction process will significantly influence the perceived customer

**Table 4** Rotated component matrix with varimax rotation

Items	Factors						
	1 INT	2 PRI	3 PA	4 EOU	5 CPV	6 RE	7 EFF
CPV1					0.608		
CPV2					0.659		
CPV3					0.772		
CPV4					0.758		
PA1			0.717				
PA2			0.767				
PA3			0.733				
PA4			0.721				
PA5			0.615				
PA6						0.660	
RE1						0.532	
RE2							
RE3						0.568	
RE4						0.612	
EOU1				0.730			
EOU2				0.659			
EOU3				0.643			
INT1	0.567						
INT2	0.587						
INT3	0.694						
INT4	0.730						
INT5	0.725						
INT6	0.678						
EFF1							0.603
EFF2							0.614
EFF3							
EFF4							0.547
PRI1		0.712					
PRI2		0.736					
PRI3		0.771					
PRI4		0.753					
PRI5		0.717					

Extraction method: principal component analysis; rotation method: orthogonal rotation method with Kaiser standardization; n = 694

Rotation converged in six iterations

service quality. So the operators should strengthen them to pave the way for customers' repurchase. Secondly, with the development of technology, real-time online customer services has no technical barriers, online shopping site that launches real-time online customer services, may have a big Competitive Advantage to attract customers.

This study is contrast with other research, we verify the perceived service quality of online customers and its influencing factors through the survey and empirical

**Table 5** Regression analysis

Factors	Factor meaning	$\beta$	Sig.
PA	Accessibility	0.276	0.000
RE	Reliability	0.180	0.000
EOU	Ease of use	0.237	0.000
INT	Interactivity	0.212	0.000
EFF	Efficiency/responsiveness	0.167	0.000
PRI	Privacy/security	0.296	0.000

analysis. This will provide a basis for the theoretical and academic, it will also provide a practical value to the companies.

The main limitation of the study is that the samples concentrate from the three provinces Hubei, Guangdong, Gansu. That may lead to some geographic restrictions. What's more, personalization is also one of the important factors which will affect the perceived online customer service quality. Further empirical study may target on that.

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