A study on the determinants of e-commerce customer satisfaction

Xinling Du[1, 2], Lingyi Meng[1*], Yujian Wu[1]

[1]*School of Management, Beijing Normal University Zhuhai Campus, Zhuhai 519087, China*

[2]*School of Humanities and Economic Management, China University of Geosciences (Beijing), Beijing 100083, China*

Received 6 June 2014, www.tsi.lv

Abstract

Based on existing research, a model and evaluation index systems are developed for assessing e-commerce satisfaction of customers. We centralizes associated questionnaires for six topics, namely, convenient operation for online shopping, product information, distribution service, safety and reliability of the system, handling of customer complaints, and staff services, that are administered among college students in Guangdong Province of China who have experienced purchasing items online. The proposed model explores the factors that affect customer satisfaction. The effects of these factors are then analysed using descriptive statistics and factor analysis method to verify the accuracy of the model and to draw Safety and reliability of the system has the highest correlation coefficient with customer satisfaction, different gender and grade factors significantly affect customer satisfaction.

Keywords: e-commerce, customer satisfaction, factor analysis model, evaluation index system

1 Introduction

With its new web-based economic role, e-commerce has become a new part of the lives of the people. The improvement of customer satisfaction to promote the development of e-commerce poses a challenge and has a higher requirement for corporate marketing. The number of Internet users and online shoppers increased to 564 and 242 million, respectively, by the end of 2012 [1]. Online transactions in China have rapidly amounted to 1.304 trillion Yuan [2]. Online shoppers are primarily composed of young people, particularly college students and white collar workers. Students have become the main force and the potential consumers of online stores. Therefore, the online shopping behaviours of college students must be investigated, and the factors that influence their satisfaction must be determined. This paper selects six dimensions with 30 factors that may affect the E-Commerce Customer Satisfaction.

2 Summary of customer satisfaction

Cardozo (1965) introduced the concept of customer satisfaction in the marketing field and argued that the willingness of customers to purchase more products in the future could be easily predicted if their satisfaction is positive [3]. Westbrook (1981) described satisfaction as an emotional state that could evaluate the interaction between customers and staff members [4]. Oliver (1981) defined customer satisfaction as the psychological reaction that customers feel whenever they evaluate the realization of a service against a certain standard [5]. Tse and Wilton (1988) argued that customer satisfaction arises from the gap between the expectations and the realizations of customers [6]. Fornell (1992) defined customer satisfaction as the general evaluation of a purchased product or service [7]. Athanassopoulos (2000) defined customer satisfaction as satisfying the expectations of customers [8]. Woodruff (1997) defined customer satisfaction as the result of comparing product attributes with product performance and the expectations of the customer [9]. This paper discusses the factors that affect college students' online shopping satisfaction.

3 E-commerce customer satisfaction evaluation index system and measurement model

3.1 E-COMMERCE CUSTOMER SATISFACTION MEASUREMENT MODEL

This paper generates an e-commerce customer satisfaction model (Figure 1) based on the customer satisfaction theory, the Swedish Customer Satisfaction Index Model (SCSB) [10], the American Customer Satisfaction Index Model (ACSI) [11], the European Customer Satisfaction Index Model (ECSI) [12], and other scientific customer satisfaction index models that can be integrated with the actual situation in China. The following hypotheses are proposed based on the model illustrated in Figure 1:

* ***Corresponding author*** e-mail: 15919151886@163.com

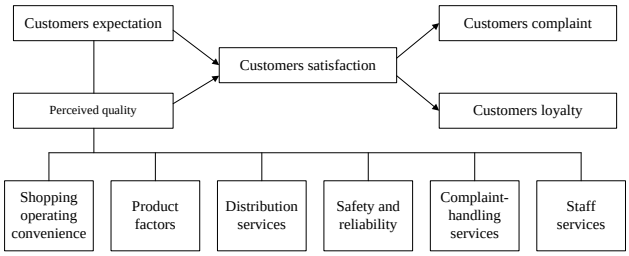

FIGURE 1 Online shopping satisfaction measurement model

H1: Shopping operating convenience has a significant effect on online shopping satisfaction;
H2: Product factors have a significant effect on online shopping satisfaction;
H3: Distribution services have a significant effect on online shopping satisfaction;
H4: Safety and reliability of the system have a significant effect on online shopping satisfaction;
H5: Complaint-handling services have a significant effect on online shopping satisfaction;
H6: Staff Services have a significant impact for online shopping satisfaction;
H7: Gender has no significant effect on online shopping satisfaction; and
H8: Grades have no significant effect on online shopping satisfaction.

3.2 BUILD E-COMMERCE CUSTOMER SATISFACTION EVALUATION INDEX SYSTEM

Based on the e-commerce customer satisfaction model, this paper selects six dimensions with 30 factors that may affect the service quality of the e-commerce trading platform. These factors include online shopping environment, friendly interface and definition, reaction rate of interface, shopping convenience, comprehensive of the search function, product categories, product cost and performance, product quality, detailed instructions of products, product price, updating of product information, detailed description of products, consistent level of products, promotion measures and efforts, logistics, timeliness of product distribution, accuracy of delivery location, stability of website, safety of the website, safety of transaction process, convenience of online payments, security on the privacy of customers, fulfilment of commitments, returns rate of goods and refunds, valuation of customer perception, timeliness of handling complaints, after-sales services, patency of customer platform, communication skills of staff members, and attitude of staff members. These factors are denoted with the variables to and are arranged into six dimensions based on the following principles:

1) Operating convenience, which denotes how customers can easily shop on the e-commerce trading platform.

2) Product factors from which the customers can determine the price, classification, description, and other basic information of a specific product.

3) Distribution services, such as logistics, timeliness of distribution, and other services.

4) Safety and reliability of the system, which include on the privacy of the customer, safety and convenience of payment, and other issues that are related to how customers use the e-commerce trading platform to purchase products online.

5) Complaint-handling services, which focus on the timely response to customer reviews and complaints.

6) Staff services, which refers to the attitude of staff members when serving their customers and their ability to communicate with their customers.

4 Questionnaire design and data collection

4.1 QUESTIONNAIRE DESIGN

Following the evaluation index system, the questionnaire is divided into two parts. The first part collects the basic information of customers (i.e., college students), such as their gender, grade, and major, to determine their background and for the conduct of univariate analysis. The second part analyses the comments on and the satisfaction of students with online shopping. Using a five-point Likert (1932) scale, [13] the online shopping satisfaction of customers is rated on a scale ranging from 5 to 1, which respectively denotes completely satisfactory, satisfactory, average, dissatisfactory, and completely dissatisfactory.

4.2 DATA COLLECTION

College students in Guangdong Province of China with online shopping experience are selected for the survey. A total of 400 questionnaires are distributed, of which 373 are considered valid questionnaires. A total of 100 e-questionnaires are sent via e-mail to students from nine colleges, and 94 valid e-questionnaires are returned to the researchers. A total of 467 valid questionnaires are collected and a 93.4% response rate is achieved.

5 Empirical research and statistical analysis of the e-commerce customer satisfaction evaluation index system

5.1 DESCRIPTIVE STATISTICAL ANALYSIS

Descriptive statistical analysis is performed to analyse the gender, grade, and other variables of each respondent as well as those of the entire sample. A total of 467 students have participated in the survey, and the ratio of males to females is approximately 4:6. Given the online shopping experience of the participants who range from freshman to senior students, they can clearly evaluate their online shopping satisfaction. The sample is primarily composed of junior students, who account for 37.9% of the entire sample. Seniors account for 26.8% of the sample, while the freshmen and sophomores have a relatively small ratio in the entire sample.

The minimum and maximum values of the index are set to 1 and 5, respectively, which demonstrate the wide distribution of the data. The mean value of the variables is between 3.0 and 4.0, with only three variables having values that are less than 3.0. This observation demonstrates that the respondents are generally satisfied with the factors in the scale and that the sample structure is ideal. The standard deviation is one of the most common quantized forms that can reflect the discreteness level and accuracy of the data. The standard deviation of the survey data ranges from 0.6 to 1.1, which indicates that the survey data have a certain discrepancy and a relative discreteness. In accordance with our expectations, these results also show that the satisfaction of the respondents depends on various factors. Corresponding to the measure metrics, the mean value of overall customer satisfaction is 3.46, which indicates the satisfaction of the college students with their previous online shopping experience. However, this result does not indicate that the students are very satisfied with their online shopping experience. This limited degree of satisfaction may be attributed to several factors present during online shopping.

5.2 RELIABILITY ANALYSIS AND VALIDITY ANALYSIS

Reliability represents the consistency or stability of the scale as well as serves as an index for homogeneity testing. Cronbach's alpha coefficient is used in this paper to test scale reliability. The Cronbach's alpha coefficient is computed as follows:

$$\alpha = \frac{K}{K-1}1-\frac{\sum_{i=1}^{K}\sigma_{Y_i}^2}{\sigma_X^2}, \quad (1)$$

where σ_X^2 is the variance for the total sample and $\sigma_{Y_i}^2$ is the variance for the collected sample.

The statistical analysis software SPSS19.0 is used to analyse the reliability of the data. Table 1 shows the reliability of the entire scale and of each variable. α of the entire scale is 0.898, which indicates a favourable reliability by exceeding the 0.8 reliability threshold. α of each variable in the scale is greater than 0.7, which denotes the high reliability of the survey.

TABLE 1 Questionnaire reliability test

	N of Items	Cronbach's Alpha
Shopping operating convenience	5	0.743
Product factors	9	0.785
Distribution services	3	0.715
Safety and reliability of the system	6	0.782
Complaints services	4	0.738
Staff services	3	0.728
Total	30	0.898

Reliability and validity are two aspects of the questionnaire evaluation. Validity refers to the extent to which the tools can measure the psychological or behavioural traits of the measured object. A high validity suggests that the results can reflect the characteristics of the measured object more accurately. Validity is divided into construct validity, criterion-related validity, and content validity. Given that the criterion-related and content validities require expert qualitative research validity or an accepted criterion measure, they are difficult to be applied in practice. Therefore, the validity of the questionnaire is measured in this study by construct validity and factor analysis. The Kaiser–Meyer–Olkin (KMO) test and the Bartlett test of sphericity are performed to examine the suitability of the factor analysis for the sample data. The KMO value ranges from 0 to 1. A KMO value that is close to 1 indicates a large amount of common factors among variables and confirms the suitability of factor analysis for the data. According to Kaiser (1974), the KMO value should be larger than 0.6 before performing a factor analysis [14]. As shown in Table 2, the KMO value for this study is 0.844, which is larger than 0.6. Moreover, the approximate chi-square distribution of the Bartlett's test of sphericity is 5590.500 (df is 435), which is significant at a level of 0.000. Therefore, factor analysis is considered suitable for the sample data.

TABLE 2 Results of the KMO test and the Bartlett's test of sphericity

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.844
Bartlett's Test of Sphericity	Approx. Chi-Square	5590.5
	df.	435
	Sig.	0.000

5.3 FACTOR ANALYSIS MODEL AND APPLICATION

Factor analysis is a statistical method that divides variables into several groups based on the strength of their correlation. Variables within the same group have a high level of correlation, while the correlation of variables between groups is lower. Each group of variables represents a basic structure that is called a common factor.

The e-commerce satisfaction of customers is discussed in this paper. Each observed component is examined using the sum of a specific factor and the linear function with the unobservable factor of the least number.

Given n samples that observe p variables, the observed data are standardized by using the equation $zx_i = \left(x_i - \overline{x}_i\right)/s_i$, where zx_i is a standard index value, x_i is the initial index value, x_i is a mean value, s_i is a standard deviation, and zx_i is the new standard variable.

$zx = (zx_1, zx_2, zx_3, \cdots, zx_p)'$ is an observable random variable, whose covariance matrix is the same as its correlation matrix. $F = (F_1, F_2, F_3, \cdots, F_m)'$ is an unobservable vector where $m<p$, F_i and F_j are independent of $i \neq j$. $\varepsilon = (\varepsilon_1, \varepsilon_2, \varepsilon_3, \ldots, \varepsilon_p)'$ is also independent of F, ε_i and ε_j and of $i \neq j$. Therefore, the factor analysis model is constructed as follow:

$$zx_i = \alpha_{ij} F_j + \varepsilon_i, (i = 1,2,3,..., p; j = 1,2,3,..., m) . \quad (2)$$

This equation is expanded further as follow:

$$\begin{cases} zx_1 = \alpha_{11} F_1 + \alpha_{12} F_2 + \cdots + \alpha_{1m} F_m + \varepsilon_1 \\ zx_2 = \alpha_{21} F_1 + \alpha_{22} F_2 + \cdots + \alpha_{2m} F_m + \varepsilon_2 \\ \cdots \\ zx_p = \alpha_{p1} F_1 + \alpha_{p2} F_2 + \cdots + \alpha_{pm} F_m + \varepsilon_p \end{cases} . \quad (3)$$

The matrix of this factor analysis model can be described as follow:

$$zx = AF + \varepsilon , \quad (4)$$

where $zx = (zx_1, zx_2, zx_3, \cdots, zx_p)'$, $F = (F_1, F_2, F_3, \cdots, F_m)'$,

$$A = \begin{pmatrix} \alpha_{11} & \cdots & \alpha_{1m} \\ \vdots & \ddots & \vdots \\ a_{p1} & \cdots & a_{pm} \end{pmatrix} .$$

Here $F_1, F_2, F_3, \ldots, F_m$ are called latent factors, and $m < p$, $\varepsilon_1, \varepsilon_2, \varepsilon_3, \ldots, \varepsilon_p$ are called the specific factors or the special factors of zx_i as the component of zx . Matrix A is the factor loading matrix. Each α_{ij} in matrix $A = (\alpha_{ij})$ is called a factor loading, which is the correlation coefficient of zx_i and F_j .

Table 3 shows the cumulative variance devoting rates and the rotated loading matrix that is obtained by varimax rotation on all variables. Following the principle that the eigenvalues must be greater than 1, we select six common factors, and the sum of their cumulative variance devoting rates amounts to 55.67%. Factor analysis is then conducted based on the factor loading and the correlation coefficient of zx_i and F_j . A larger correlation coefficient indicates a larger amount of observable common traits between two variables, with zx_i as the most powerful coefficient. Table 3 shows all the correlation coefficients between the common factors that are drawn from the customer satisfaction evaluation indicators. These indicators are all higher than 0.5, which indicates that the six factors have a favourable explanatory index. That is, the six common factors, namely, shopping convenience, product factors, distribution services, safety and reliability of the system, complaint-handing services, and staff services, which are represented as $F_1, F_2, F_3, F_4, F_5, F_6$, can sufficiently explain the evaluation indicators, which is verified by the factor analysis.

TABLE 3 Factor loadings of the perception of customer satisfaction evaluation

	Component
	1
F1 Shopping operating convenience	0.711
F2 Product factors	0.574
F3 Distribution services	0.638
F4 Safety and reliability of the system	0.824
F5 Complaint-handing services	0.760
F6 Staff services	0.791

Extraction method: Principal component analysis. A) One extracted component.

Table 4 shows that the factor loadings of F_1 on zx_1 , zx_2 , zx_3 , zx_4 and zx_5 are 0.501, 0.592, 0.742, 0.788, and 0.409, respectively, which are also much greater than those of other indicators. F_1 reflects the meaning of these five indicators synthetically and is called "shopping operating convenience". The factor loadings of F_2 on zx_6 , zx_7 , zx_8 , zx_9 , zx_{10} , zx_{11} , zx_{12} , zx_{13} and zx_{14} are 0.428, 0.603, 0.579, 0.570, 0.485, 0.598, 0.609, 0.704, and 0.451, respectively, which are also much greater than those of other indicators. F_2 reflects the meaning of these nine indicators synthetically and is called "product factors". The factor loadings of F_3 on zx_{15} , zx_{16} and zx_{17} are 0.834, 0.760, and 0.557, respectively, which are also much greater than those of other indicators. F_3 reflects the meaning of these three indicators synthetically and is named as "distribution services". The factor loadings of F_4 on zx_{18} , zx_{19} , zx_{20} , zx_{21} and zx_{22} are 0.584, 0.760, 0.731, 0.421, and 0.512, respectively, which are much greater than those of other indicators. F_4 reflects the meaning of these five indicators synthetically and is called "safety and reliability of the system". The factor loadings of F_5 on zx_{23} , zx_{24} , zx_{25} , zx_{26} , zx_{27} and zx_{28} are 0.616, 0.673, 0.745, 0.684, 0.692, and 0.585, respectively, which are much higher than those of other indicators. F_5 reflects the meaning of these six indicators synthetically and is called "complaint-handling services". The factor loadings of F_6 on zx_{29} and zx_{30} are 0.534 and 0.537, respectively, which are also much greater than those of other indicators. F_6 reflects the meaning of these two indicators synthetically and is named as "staff services".

With the effects of specific factors disregarded, the factor analysis model can be expressed as follows:

$$\begin{cases} zx_1 = 0.501F_1 + 0.089F_2 - 0.115F_3 + 0.201F_4 + 0.200F_5 + 0.384F_6 \\ zx_2 = 0.592F_1 + 0.069F_2 + 0.070F_3 + 0.097F_4 + 0.308F_5 + 0.201F_6 \\ \cdots \\ zx_{30} = -0.097F_1 + 0.005F_2 + 0.295F_3 + 0.242F_4 + 0.490F_5 + 0.537F_6 \end{cases} \quad (5)$$

TABLE 4 Factor loading matrix and the cumulative variance contribution rate

	Component					
	F_1	F_2	F_3	F_4	F_5	F_6
zx_1 Online shopping environment	0.501	0.089	-0.115	0.201	0.200	0.384
zx_2 Friendly interface and definition	0.592	0.069	0.070	0.097	0.308	0.201
zx_3 Reaction rate of interface	0.742	0.124	0.093	0.184	0.150	-0.070
zx_4 shopping Convenience	0.788	0.054	0.126	0.149	0.047	-0.052
zx_5 Comprehensiveness of the search function	0.409	0.008	0.189	0.326	0.104	0.349
zx_6 Product categories	0.352	0.428	0.099	0.191	-0.202	0.512
zx_7 Product cost-performance	0.249	0.603	-0.021	0.234	0.012	0.418
zx_8 Product quality	0.143	0.579	-0.060	0.118	0.335	0.209
zx_9 Detailed instructions of products	0.250	0.570	0.085	0.216	0.204	0.178
zx_{10} Product price	0.181	0.485	-0.050	0.086	-0.170	-0.157
zx_{11} Updating rate of product information	-0.122	0.598	0.168	0.053	0.035	-0.059
zx_{12} Detailed description of products	-0.023	0.609	-0.017	0.041	-0.004	-0.120
zx_{13} Consistency of products	0.107	0.704	0.116	-0.081	0.035	0.112
zx_{14} Promotion measures and efforts	-0.061	0.451	0.172	0.118	0.315	0.181
zx_{15} Logistics	0.164	0.154	0.834	0.031	0.182	0.047
zx_{16} Timeliness of product distribution	0.158	0.146	0.760	0.107	0.247	-0.037
zx_{17} Accuracy of delivery location	-0.100	-0.044	0.557	0.440	0.013	0.315
zx_{18} Stability of the website	0.256	0.104	0.219	0.584	0.157	0.165
zx_{19} Safety of the website	0.263	0.117	0.008	0.760	0.291	0.075
zx_{20} Safety of transaction process	0.218	0.117	0.032	0.731	0.250	0.120
zx_{21} Convenience of the online payment	0.365	0.114	0.043	0.421	0.018	0.165
zx_{22} Security on the privacy of customers	-0.055	0.254	0.177	0.512	0.411	-0.256
zx_{23} Fulfillment of commitments	0.164	0.160	-0.021	0.328	0.616	-0.065
zx_{24} Speed of the return of goods and refund	0.149	0.035	0.103	0.142	0.673	0.008
zx_{25} Valuation of customer perception	0.087	0.024	-0.012	0.082	0.745	-0.139
zx_{26} Timeliness of handling complaints	-0.018	0.014	0.104	0.106	0.684	0.172
zx_{27}After-sales services	0.172	0.043	0.136	0.120	0.692	0.094
zx_{28} Potency of customer platform	0.223	0.059	0.362	-0.001	0.585	0.177
zx_{29}Communication skills of staff members	0.095	-0.014	0.124	0.132	0.529	0.534
zx_{30} Attitude of staff members	-0.097	0.005	0.295	0.242	0.490	0.537
Eigenvalues	7.994	2.760	1.972	1.569	1.235	1.171
% of Variance	26.647	9.200	6.575	5.229	4.116	3.903
Cumulative %	26.647	35.847	42.422	47.651	51.767	55.670

5.4 CORRELATION ANALYSIS

The Pearson correlation coefficient and the two-tailed test analysis are conducted in this study to examine the correlation of each factor with customer satisfaction. The results are shown in Table 5.

TABLE 5 Correlations between influence factors and customer satisfaction

		Customer satisfaction
F1 Shopping operating convenience	Pearson Correlation	0.714**
	Sig. (2-tailed)	0.000
	N	467
F2 Product factors	Pearson Correlation	0.701**
	Sig. (2-tailed)	0.000
	N	467
F3 Distribution services	Pearson Correlation	0.608**
	Sig. (2-tailed)	0.000
	N	467
F4 Safety and reliability of the system	Pearson Correlation	0.797**
	Sig. (2-tailed)	0.000
	N	467
F5 Complaints service	Pearson Correlation	0.753**
	Sig. (2-tailed)	0.000
	N	467
F6 Staff services	Pearson Correlation	0.670**
	Sig. (2-tailed)	0.000
	N	467

**. Correlation is significant at the 0.01 level (two-tailed).

As can be seen in Table 5, shopping operating convenience, product factors, distribution services, safety and reliability of the system, complaint -handing services, and staff services are positively correlated with customer satisfaction at significant level of 0.01.

The factor on safety and reliability of the system has the largest correlation coefficient with customer satisfaction of 0.830. This value indicates the presence of a strong linear relationship between these two factors as well as demonstrates that safety and reliability of the system has the most powerful influence on customer satisfaction. Therefore, H4 is verified.

The correlation coefficients of shopping convenience, product factors, complaint-handing services, and staff services with customer satisfaction are approximately 0.7, which exceeds the significance level. Therefore, H1, H2, H5, and H6 are verified.

Lastly, the correlation coefficient between distribution services and customer satisfaction is 0.608, which indicates a positive correlation at a relatively significant level. Therefore, H3 is verified.

5.5 ANALYSIS OF VARIANCE (ANOVA)

ANOVA is performed to examine whether a control variable has a significant effect on the observed variables. Gender and grade are used as control variables in this paper.

TABLE 6 ANOVA results of different genders satisfaction

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.356	1	2.356	13.398	0.000
Within Groups	81.783	465	0.176		
Total	84.139	466			

Table 6 shows the ANOVA result of gender on customer satisfaction. The sum of square deviation of gender from customer satisfaction is 84.139. When only the effect of gender is considered, gender can explain 2.356 of the variance within the sum of square deviation, and the 81.783 variance is caused by the sampling. The mean square errors of these variances are 2.356 and 0.176, respectively. Correspondingly, the F statistic is 13.398 and the P value is 0. The null hypothesis H7 is rejected when the significance level α is 0.05 and when the P value is less than the significance level α. Therefore, gender has a significant effect on customer satisfaction. As shown in Table 7, the ANOVA result of grade on customer satisfaction is similar to that of gender on customer satisfaction. The sum of square deviation of the grade is 84.139. When only the effect of the grade is considered, 2.453 of the variance can be explained within the sum of square deviation, while the variance of 81.687 is caused by the sampling. The mean square errors of these variances are 0.818 and 0.176, respectively. Accordingly, the F statistic is 4.634 and the corresponding P value is 0.003. Given that the significance level α is 0.05, the null hypothesis H8 is rejected. Therefore, customer satisfaction is highly affected by grade.

TABLE 7 ANOVA results of different grades satisfaction

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.453	3	0.818	4.634	0.003
Within Groups	81.687	463	0.176		
Total	84.139	466			

6 Conclusion

A survey is administered among college students to examine their online shopping satisfaction using the e-commerce customer satisfaction evaluation model. The conclusions are listed as follows:

First, online shopping satisfaction can be affected by six factors, namely, shopping convenience, product factors, distribution services, safety and reliability of the system, complaint-handing services, and staff services.

Second, the hypotheses that are formulated based on the customer satisfaction evaluation model are all verified. Shopping operating convenience, product factors, distribution services, safety and reliability of the system, complaint-handing services, and staff services are all positively and significantly correlated with online shopping satisfaction. Safety and reliability of the system has the highest correlation coefficient with customer satisfaction, indicating that a high level of safety and reliability of the system leads to a high level of customer satisfaction.

Third, the descriptive statistical analysis shows that the overall online shopping satisfaction of college students is still in the middle level and is far from satisfactory. Given the rapid development of the cyber economy, all e-commerce trading platforms must strive to improve the quality of their services to attract more consumers and to maintain their status in the market.

Finally, the ANOVA results reflect that different gender and grade factors significantly affect customer satisfaction.

This empirical research involved only college students as the sample. This limited scope may affect the generalization of the research results. Several other issues also need further studies and discussions.

Acknowledgments

The authors would like to acknowledge the financial support provided by the National Statistics Research Projects of China under Grant 2012LY086 for this research. We also express our gratitude to the Soft Science Projects in Guangdong Province, China for their valuable research findings and our professor, Gao Yongduan, for her insightful comments.

References

[1] China Internet Network Information Center (CNNIC) 2013 *33th Statistical Report on Internet Development in China*. http://www.cnnic.net.cn/hlwfzyj/hlwxzbg/hlwtjbg/201301/t20130115_38508.htm / 29 May 2014

[2] iResearch 2013 *The Scale of market transactions is more than 130 million* http://ec.iresearch.cn/shopping/20130125/192011.shtml / 1 June 2014

[3] Cardozo R N 1965 An Experimental Study of Consumer Effort, Expectation and Satisfaction *Journal of Marketing Research* **2**(3) 244-249

[4] Westbrook R A 1981 Sources of Consumer Satisfaction with Retail Outlets *Journal of Retailing* **57**(3) 68-85

[5] Oliver R L, Linda G 1981 Effect of Satisfaction and its Antecedents on Consumer Preference and Intention *Advances in consumer research* **8**(1) 88-93

[6] Tse DK, Wilton P C 1988 Models of Consumer Satisfaction Formation: An Extension *Journal of Marketing Research* **25**(2) 204-12

[7] Fornell C 1992 A National Customer Satisfaction Barometer: The Swedish Experience *Journal of Marketing* **56**(1) 6-21

[8] Athanassopoulos A D 2000 Customer satisfaction cues to support market segmentation and explain switching behaviour *Journal of Business Research* **47**(3) 191-207

[9] Woodruff R B 1997 Customer Value: The Next Source for Competitive Advantage *Journal of the Academy of Marketing Science* **25**(2) 139-153
[10] Johnson M D, Fornell C 1991 A framework for comparing customer satisfaction across individuals and product categories *Journal of Economic Psychology* **12**(2) 267-86
[11] Fornell C, Johnson M.D, Anderson E W, Cha J, Bryant B E 1996 The American customer satisfaction index: nature, purpose, and findings *Journal of Marketing* **60**(4) 7-18
[12] Kristensen K, Martensen A, Gronholdt L 2000 Customer satisfaction measurement at Post Denmark: results of application of the European Customer Satisfaction Index methodology *Total Quality Management* **11**(7) 1007-15
[13] Likert R 1932 A Technique for the Measurement of Attitudes. *Archives of Psychology* **22**(140) 5-55
[14] Kaiser H F 1974 An index of factorial simplicity *Psychometrika* **39**(1) 31-6.
[15] Wu M 2010 *SPSS Operation and Application the Practice of Quantitative Analysis of Questionnaire Data* Chongqing: Chongqing University Press 216-257
[16] He X 2011 *Multivariate Statistical Analysis (3rd edition)* Beijing: China Renmin University Press 110-45

Authors

Xinling Du, born in October, 1971, Zhuhai City, Guangdong Province, P.R. China

Current position, grades: vice associate professor of School of Management, Beijing Normal University Zhuhai Campus, China.
University studies: B.Sc. in Statistics at Lanzhou University of Finance and Economics in China. M.Sc. in Statistics at Renmin University of China.
Scientific interest: survey and statistical analysis, statistical assessment.
Publications: more than 30 papers.
Experience: Teaching experiences of 20 years, 20 scientific research projects.

Lingyi Meng, born in March, 1993, Zhuhai City, Guangdong Province, P.R. China

Current position, grades: student at the School of Management, Beijing Normal University Zhuhai Campus, China.
University studies: Beijing Normal University Zhuhai Campus.
Scientific interest: survey and statistical analysis, statistical assessment.

Yujing Wu, born in June, 1992, Zhuhai City, Guangdong Province, P.R. China

Current position, grades: student at the School of Management, Beijing Normal University Zhuhai Campus, China.
University studies: Beijing Normal University Zhuhai Campus.
Scientific interest: survey and statistical analysis, statistical assessment.