Available online www.jocpr.com

Journal of Chemical and Pharmaceutical Research, 2014, 6(4):474-480

Research Article

ISSN : 0975-7384
CODEN(USA) : JCPRC5

Research on evaluating B2C shopping platform

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ABSTRACT

In recent years B2C E-commerce has been developed greatly with the fantastic development of the internet. The paper based on user experience theory utilizing the method of content analysis, analytic hierarchy process and multi-level fuzzy comprehensive evaluation method tries to construct the evaluation index system of B2C enterprises and to help consumers make decisions. Firstly, the paper constructs the evaluation index system for B2C E-commerce platform after analyzing selected samples, computing index weight in AHP method and consistency testing. Thereafter, the paper compares and evaluates synthesized competitiveness of Z website and D website by demonstration analysis.

Keywords: B2C, AHP method, evaluation index

INTRODUCTION

It is a new and high-developing period for Chinese internet applications in recent years. There are 618 millions net citizens and 302 millions internet shopping users in China by the end of December 2013. [1]E-commerce website evaluation not only develops itself but also improves the overall level and quality of E-commerce websites by evaluation activities, which promotes the healthy development of E-commerce.

With the development of internet shopping B2C development ushered in bran-new opportunities: the first group of B2C enterprises which had been managed nearly 20 years also ushered in going public in 2013,as well the service capacity and the influence power of E-commerce enterprises had been upgraded further. How to and from what aspects to evaluate have become a practical problem before people. The evaluation results are helpful for internet retailers making services better and for consumers making decisions to buy.

The paper based on user experience theory utilizing the method of content analysis, analytic hierarchy process and multi-level fuzzy comprehensive evaluation method tries to construct the evaluation index system of B2C enterprises and to help consumers make decisions.

1. Determination the Mode of Evaluation B2C E-commerce Websites

1.1 Bring Forward the Question of Researching

The first step of internet shopping is to browse the WebPages of the brand website. It's the first experience to the logged users that if the design of the website is beautiful; if the product classification is clear; if the pictures of the products attract the user's eyeballs; if the shopping process is simple and convenient. The first experience

good or not directly influences the users to buy or not. After the users submitting the order they concern more on the speed of the Logistics and distribution and the quality of the products, which is subsequent experience of the internet shopping. The user's experienceruns through the whole process of E-commerce.

This paper selects 2 B2C websites that are E-commerce enterprises possessing large market shares in this vocation Z and D to research. There is high comparability between these two websites aiming at the research content of this paper for their scale are close, they have long history, their actual strength matches each other, and their management contents are near.

1.2. Data Samples

1.2.1 Selecting Samples

This paper regards the comments on these 2 B2C websites Z and D as analysis units, Z and D as main bodies researched. We also research the content from the comment sections of the third website. Our selected data are from 3 types of websites including professional comment websites (dianping.com, koubei.com, 55bbs.com, E3131.com), rebate websites (egou.com, 51fanli.com, xungou.com) in which is the comment sections, and consumer's website (12315. com).

1.2.2 Collecting Data

The paper collected the user's comments in every target website from November 2012 to October 2013 aiming to website Z and D. The relatively all-sided comments were reserved and the comments that did not fit the need of the paper were eliminated[2]. Finally there were 1225 effective consumer's comments brought into the subsequent coding and data analysis after a series of data filtrating. Different users had different attention rate to every index, please see the following form 1 frequency number distribution form.

Form 1 frequency number distribution form

Dimension	*Index*	*Frequency number*	*Proportion*	*Sort*
Comm-odity index	Commodity category	170	13.84%	6
	Commodity price	431	35.14%	1
	Commodity quality	267	21.80%	2
	Commodity packing	114	9.31%	8
	Refresh rate	230	18.73%	3
	Subtotal	1211	98.82%	-
Traing index	Guide ystem	6	0.49%	20
	Search function	20	1.59%	17
	Payment pattern	213	17.39%	5
	Order traced online	68	5.51%	10
	Order processing speed	147	12.00%	7
	Distribution service	225	18.37%	4
	Subtotal	746	60.86%	-
Custo-ization index	Account management	60	4.90%	11
	Custom service	17	1.35%	18
	After-sale service	89	7.22%	9
	Change or return products	57	4.65%	12
	Promotion activities	45	3.67%	13
	Subtotal	267	21.80%	-
Mutual index	Query and feedback	33	2.69%	14
	Live support	24	1.96%	15
	Interface friendship	12	0.98%	19
	Privacy security	23	1.84%	16
	Subtotal	92	7.47%	-

Note: proportion=Frequency number/total(1225)

According the form above, there are 1211 comments related to "commodity index" out of 1225 comments in total, the proportion is 98.85%;there are 746 comments related to "trade index", the proportion is 60.90%; there are 267 comments related to " customization index", the proportion is 21.80%; there are 92 comments related to " mutual index", the proportion is 7.51%. The difference of the frequency number distribution among these 4 dimensions is very obvious, which make it clear that the consumers have high attention rate to some sides of B2C website, but have low attention rate to other sides. [3]

According to form 1 it is easy to understand that the proportion of every index and the user's attention rate is

positive corelation, which incarnates the importance of every tache for E-commerce websites from users' point of view. For example, there are 431 comments out of total 1225 comments related to "commodity price", so the frequency number of the index is 431,the proportion is 431/1225=35.18%, the mentioned number is most in all indexes, the sort is 1st. We have to pay more attention to that the frequency number has no additivity, namely the sum of all frequency numbers does not equal 1225 for every comment may be related to multiple indexes.[4]

2.Constructing B2C E-commerce Websites Evaluation System

The paper finished constructing the index system using evaluation elements educed in above paragraphs in analytic hierarchy process method.

2.1Utilizing AHP Method to Calculating Index Weight

2.1.1The Principle of Customization Index

The paper educes evaluation index weight in AHP method and tries best to avoid the randomness and the subjectivity of marking by experts.5 standards: equal, omitted important, important, very important and extremely important were adopted to differentiate relative importance between 2 indexes. [5]According to the frequent numbers educed from every index in paragraphs above and regarding a certain element of class 1 in evaluation index system as evaluation principle the importance and unimportance is compared between every 2 indexes which are all indexes in a same hierarchy in the target tree according to an index's repeatability relative to the index in the upper hierarchy. Using marking standard to do a judgement and make judgement matrix of the indexes. Finally we will get the index weight by computing the judgement matrix.[5]

2.1.2The actual application of analytic hierarchy process

The actual application of analytic hierarchy process will be demonstrated following considering commodity index A1 as an example. The calculating course of other indexes will be seen at the second part of the paper. The evaluation index as form 2 displayed.

Form 2 B2C E-commerce Website Evaluation System

Dimension	***Evaluation index***
Commodity index(A1)	Commodity category (B1 Commodity price (B2) Commodity quality(B3) Commodity packing(B4) Refresh rate(B5)
Trade index(A2)	Guide system (B6) Search function(B7) Payment pattern(B8) Order traced online (B9) Order processing speed (B10) Distribution service (B11)
Customization index(A3)	Account management (B12) Custom service (B13) After-sale service (B14) Change or return products (B15) Promotion activities (B16)
Mutual index(A4)	Query and feedback (B17) live support (B18) Interface friendship (B19) Privacy security (B20)

2.1.3 Index Weight Calculating

The information basement of AHP is the judegment matrix, utilizing sorting principle we can get the priority vector then the weight coefficient of every index comes into being[6]. Any systems analysis bases on some information; the information basement of AHP is mainly people's judgement to the relative importance of every element in each hierarchy, these judgements expressed with numerical value and wrote as matrix format are matrix. The judgement matrix is the starting point of job AHP, constructing judgement matrix is a key step for AHP[7].The information basement of AHP method is judgement matrix,Calculating step as below:

$M_i = \prod_{j=1}^{n} b_j$,i=1,2,3…n (1)

Calculating the Nth root of M_i in every row :

$\overline{W_i} = \sqrt[n]{M_i}$,i=1,2,3…n in this formula, n is matrix order (2)

Normalizing the vector $\left(\overline{W_1}, \overline{W_2}, \cdots, \overline{W_n}\right)^T$,then the calculating formula is:

$$W_i = \overline{W_i} \Big/ \sum_{j=1}^{n} W_j$$

W_i is the requested matrix coefficient of every index (3)

2.1.3.1Constructing Judgement Matrix

The paper puts forward an indirect conversion method of constructing judgement, the characteristic of which is: nine scales judgement which is difficult given by people accurately will be replaced by three scales judgement which is easy given by people, when the importance of two elements is compared. We take the first dimension indexes as an example basing on the research in content analysis method; we can get to know that for two-hierarchy indexes Commodity index (A1) is important than Trade index (A2), it is very important than Customization index(A3), and it is extremely important than Mutual index(A4).

The rest can be deduced from this class 1 index judgement matrix is constructed, please see form 3.

Form 3 class 1 index matrix

-	***B1***	***B2***	***B3***	***B4***
B1	1	3	4	5
B2	1/3	1	3	4
B3	1/4	1/3	1	2
B4	1/5	1/4	1/2	1

This judgement matrix can be simplified as: $B=\begin{bmatrix} 1 & 3 & 4 & 5 \\ 1/3 & 1 & 3 & 4 \\ 1/4 & 1/3 & 1 & 2 \\ 1/5 & 1/4 & 1/2 & 1 \end{bmatrix}$

get: M_1=60, M_2=4, M_3=1/6, M_4=1/40,calculating by formula(1)

get:: $\overline{W_1}$=2.783, $\overline{W_2}$=1.414, $\overline{W_3}$=0.639, $\overline{W_4}$=0.398,calculating by formula(2)

W_1=0.53, W_2=0.27, W_3=0.12, W_4=0.08 is the weight of every index calculated by formula(3) using the method above.

The most latent root λ_{max}=4.1145

2.1.3.2consistency testing

After constructing judgement matrix and calculating the relative weight of each element in a certain principle hierarchy, the consistency testing should be carried out[8]. The judgement strayed from the consistency too far is not permitted, although the judgements are not requested to have consistency when constructing the judgement matrix, so the consistency testing to the judgement matrix is needed. RI is an average random consistency index which is an average value of consistency indexes got by calculating random judgement matrixes many enough.

Form 4 The value of RI

n	1	2	3	4	5	6	7	8	9	10
RI	0.00	0.00	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49

Commonly CI smaller the consistency of a judgement matrix is better. Usually we think a judgement matrix with a satisfied consistency when CI<0.1. The following is the calculating on consistency testing.

Consistency index $CI = \frac{\lambda_{\max} - n}{n-1} = \frac{4.1145 - 4}{4-1} = 0.038$

The proportion of random consistency $CR = \frac{CI}{RI} = \frac{0.038}{0.9} = 0.042 < 0.1$

It indicates the judgement matrix with a satisfied consistency and the weight without logic errors.

2.1.4 Draw a Conclusion

Please see the results in form 5 after a series of calculating.

Form 5 B2C E-commerce websites evaluation system

Class 1 index	*Class 2 index*	*Synthetically weight*
A1 commodity index(0.53)	B1 Commodity category (0.12)	0.064
	B2 Commodity price (0.46)	0.244
	B3 Commodity quality (0.18)	0.095
	B4 Commodity packing (0.07)	0.037
	B5 Refresh rate (0.17)	0.090
A2 trade index(0.27)	B6 Guide system (0.08)	0.022
	B7 Search function (0.07)	0.019
	B8 Payment pattern (0.28)	0.076
	B9 Order traced online (0.09)	0.024
	B10 Order processing speed (0.17)	0.046
	B11 Distribution service (0.31)	0.084
A3 Customization index (0.12)	B12 Account management (0.20)	0.024
	B13 Custom service (0.07)	0.008
	B14 After-sale service (0.34)	0.041
	B15 Change or return products (0.22)	0.026
	B16 Promotion activities (0.17)	0.020
A4 Mutual index (0.08)	B17 Query and feedback (0.36)	0.029
	B18 live support (0.27)	0.022
	B19 Interface friendship (0.11)	0.009
	B20 Privacy security (0.26)	0.021

Note: the composed weight is the product of the relevant index weight in each class.
We get B2C E-commerce websites evaluation system and each index weight.

3.The Demonstration Analysis to B2C E-commerce Websites Evaluation System

The paper taking B2C E-commerce website D and Z as example compared their synthesized competitiveness in multi-level fuzzy comprehensive evaluation method according to evaluation index system constructed in paragraphs above[9].The evaluation method is: first we carry out fuzzy comprehensive evaluation in the lowest hierarchy, so does it to a higher hierarchy after getting the evaluation results of the lowest, then so does it to every hierarchy from bottom to top in this method, finally we can get a overall comprehensive evaluation result of the system. The final result got in multi-level fuzzy comprehensive evaluation method is usually an alternative assembles composed by various general evaluation results that the valuators may appraise.

In this paper the final result is an alternative assemble (very good, good, medium, bad, very bad). In my view the alternative assemble is an assemble of different evaluation opinions.

3.1. Collecting Data

First we set the alternative assemble in five species: very good, good, medium, bad, and very bad. 30 users of dangdang.com and 30 users of amazon.com selected to vote according to the actual status of these two websites.

3.2. Demonstration Analysis

The numbers in the form are the numbers of voters. Firstly, fuzzy comprehensive evaluation is carried out in second hierarchy;secondly, the judgement result of the second hierarchy constructs the fuzzy matrix of the first hierarchy, and then does fuzzy comprehensive evaluation to the first hierarchy. Finally the result of multi-level fuzzy comprehensive evaluation can be got. The following is the calculating in detail. We take the class 2 factor of commodity index as an example according to form 5 the statistical result of dangdang.com and the weight value (0.12,0.46,0.18,0.07,0.17) of 5 class 2 factors B1,B2,B3,B4,B5, then we can get the alternative assemble of commodity index A1.

$$(r_{11}, r_{12}, r_{13}, r_{14}, r_{15}) = (0.12,0.46,0.18,0.07,0.17)\begin{bmatrix} 15/30 & 8/30 & 5/30 & 2/30 & 0 \\ 7/30 & 14/30 & 6/30 & 3/30 & 0 \\ 15/30 & 7/30 & 6/30 & 2/30 & 0 \\ 6/30 & 10/30 & 10/30 & 2/30 & 2/30 \\ 16/30 & 11/30 & 2/30 & 1/30 & 0 \end{bmatrix}$$

=(0.362,0.374,0.183,0.076,0.005)

In this method we can compute the alternative assemble of the rest 3 class 1 factor to get fuzzy matrix of the indexes in the second hierarchy.

$$R = \begin{pmatrix} 0.362 & 0.374 & 0.183 & 0.076 & 0.005 \\ 0.167 & 0.494 & 0.241 & 0.077 & 0.022 \\ 0.096 & 0.387 & 0.360 & 0.149 & 7.333\times10^{-3} \\ 0.361 & 0.372 & 0.246 & 0.021 & 0.090 \end{pmatrix}$$

According to the weight of A1,A2,A3,A4 in form 5, we can get the final fuzzy comprehensive evaluation result.

$$B = A \bullet R = (0.53,0.27,0.12,0.08)\begin{pmatrix} 0.362 & 0.374 & 0.183 & 0.076 & 0.005 \\ 0.167 & 0.494 & 0.241 & 0.077 & 0.022 \\ 0.096 & 0.387 & 0.360 & 0.149 & 7.333\times10^{-3} \\ 0.361 & 0.372 & 0.246 & 0.021 & 0.090 \end{pmatrix} = (0.277,0.408,0.225,0.081,0.016)$$

In the synthesized competitiveness evaluation result of D website: 27.7% users comment "very good"; 40.8% users comment "good"; 22.5% users comment "medium"; 8.1% users comment "bad"; 1.6% users comment "very bad". The favorable comment rate is 68.5% (comment "good" and "very good"). $(0.383,0.345,0.169,0.098,5.0\times10^{-3})$ is the result of website Z.

38.3% users comment "very good"; 34.5% users comment "good"; 16.9% users comment "medium"; 9.8% users comment "bad"; 1.6% users comment "very bad".

According to the results above in the aspect of the users' experience the synthesized competitiveness of website Z is a little higher than that of website D.

CONCLUSION

With the popularization of the internet, the number of net citizen in our country increases every year. More and more net citizens participate in E-commerce activities, and more and more commerce activities are carried out via internet. only further improving their service capacity and influence power can E-commerce enterprises attract client to trade with them and enhance their competitive ability. Now, the net consumers visit E-commerce websites not only to search information like some common net citizens but also to do goods transaction, to pay money, to comment the goods and to finish good interaction with the enterprises, which decreases the potential risk in traditional commerce

because of information asymmetry, and make buying risk as low as possible. For these reasons above, the common consumers and B2C platform are getting increasingly connected, so we should perfectly analyze the characteristic and mutual activities of website, which will make the research on evaluating E-commerce website more pertinence.

The paper adopting content analysis method in the course of the research constructs B2C E-commerce website evaluation index, then integrating AHP constructs E-commerce website evaluation system based on users, finally using multi-level fuzzy comprehensive evaluation method which belongs to fuzzy logic synthetized compare website D and Z according this evaluation system. Maybe there are some shortage for sample quantity and inquiry method this paper used, so we have to continue to work harder on this research.

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