

An Index System for Quality Synthesis Evaluation of BtoC Business Website

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ABSTRACT

It is important for successful electronic business to have a hi-quality business website. So we need an accurate and effective index system to evaluate and analyses the quality of the business website. In this paper, the evaluation index system following the 'grey box' principle is proposed which considers both efficiency of business website and performance of electronic business system. Using R-Hierarchical clustering method to extract the typical indexes from sub-indexes is theoretically proved to have a rationality and effectiveness. Finally, the evaluation method is briefly discussed.

Categories and Subject Descriptors

TP393.4

Keywords

Business website; Evaluation system; R-Hierarchical clustering; System performance

1. INTRODUCTION

Business website is an online media between buyer and seller. A hi-quality website is crucial to a company for a successful e-business. What is a hi-quality business website? In terms of maintaining the website, what do we focus on so that the quality meets the users' needs? Apparently, using click-through rate to assess the popularity cannot objectively and accurately evaluate the quality of the business websites. Instead, we need to rely on scientific evaluation index system and methods.

At present, there are many methods available for business website comparison or ranking, such as Usage Ranking, Purchase Comparison, Expert Opinion and Synthesis Evaluation etc. You can find both official authority and non-governmental organization that issue their power ranking. The former one is to monitor and regulate the market, such as CNNIC, which organized the competition for the Top Ten Websites in domestic. The latter one, such as Consumerreports (www.consumerreports.org), BizRate(www.bizrate.com), Forrester Research etc., is mainly to guide the web users' activity. These kinds of comparison or ranking have special value in getting reputation and increasing recognition of the business websites among the users, however, e-business enterprise can not improve the quality of their websites directly

based on the results of these kinds of assessments.

The main purpose of this paper is to develop an index system for quantitative evaluation of the BtoC websites, which dose not emphasize the income of the website but focus on evaluating of its synthesis quality. We hope that the applying of this index system will provide the technique developers and maintainers some references for designing, appraising and diagnosing their e-business system to improve its quality level, and to support managers to make decisions for operation of the websites.

2. OVERVIEW OF PREVIOUS STUDIES

Comparing to the fast growing of e-business websites in the world, currently we can rarely find the particular research on the evaluation index system of business website. QEM (The website quality evaluation method) proposed by Olsina and Godoy etc. in 1999 can be considered as one of the representative approaches. It based on the main factors to evaluate the quality of the websites, including functionality (global search, navigability, and content relativity), usability (website map, addresses directory), efficiency and reliability. In 2000, American researcher, Panla Solaman, presented e-SERVQUAL model based on the conventional service quality evaluation model SERVQUAL. It contains some factors like efficiency, deal completeness, reliability, privacy protection, responsiveness, recompense and contact etc. In the same year, another American researcher, Hauler, introduced an e-QUAL model which includes the factors of content, accessibility, navigability, design and presentation, responsiveness, background, personalization and customization, etc. In 2004, F.J. Miranda Gonzalez and T.M.Banegil Palacios developed an universal evaluation index system WIS (Web Assessment Index) that can be employed to assess websites by different organizations. It consists of four indexes of accessibility, navigability, speed and content.^[1] However, the universal index system cannot measure a website exactly and absolutely due to the industry specialty, organizational characteristics and different usages. One of the representative researches is Mr. ZhongHai Li's paper about ergonomics standard of online store. It assesses the business websites by testing if the design of the website coincides with the shopping process of online consumers. This standard has five factors, such as search and browse, merchandise information, shopping cart, register and pay, service and support.^[4] Another index system for small and medium business websites covers the factors of general features, design, promotion, information and the others.^[5]

Here we list our major findings from the previous researches:

2.1 Unreasonable Selection of the Index

Some research consider not only the original design but also the factors such as promotion and income of business website.

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Some evaluation systems have correlative or contradictive indexes. For example, it considers the download speed, at the same time, it requires the web designers not to excessively use flash and sounds to slow down the speed.

2.2 Unilateral Evaluation

Most of the research takes the users' view to evaluate the function and design of website. It treats the business system as a 'black box' and ignores the impact of system performance on the websites quality. But considering the factors of system performance alone is also not a complete evaluation for improving service quality of website.

2.3 Lack of a Complete Set of Quality Synthesis Evaluation System

A complete set of tool to evaluate the websites must include the following important elements: categories, factors, weights, rankings standard and assessment model. So far, we have not seen any literature discussing complete set of evaluation index system aiming at the quality of BtoC websites.

3. PRINCIPLE FOR THE QUALITY SYNTHESIS EVALUATION

First, the three fundamental principles we need to follow are to be comprehensive, to be scientific and to be feasible. We should evaluate all the facets of the website from different dimensions and avoid missing value of important factors. Moreover, the definition of the evaluation index should be accurate, objective and logical so it can eliminate the impact on the evaluation result brought by the correlative indexes. Concurrently, we need reduce the quantity of indexes or adopt the simple ones which data is easier to be collected, and prevent from complicated calculation due to the excessive indexes.

The main purpose of improving business websites is to serve the users better. They are concerned only about the websites' external attributes, such as content, function, presentation and browse speed, etc. So, evaluating only by taking their views cannot directly guide to develop, maintain and administrate the website. Just like treating the patient's symptom but not the disease itself, the technique developer or maintainer cannot radically improve the quality of their websites by correcting system structure and web design according to the evaluation result. Only after we adopt the 'grey box' index system that considers both efficiency of business website and performance of e-business system, we can establish a quality synthesis evaluation index system to benefit the management of BtoC websites.

4. QUALITY EVALUATION INDEXES FOR BUSINESS WEBSITE

Selection of index items lays down the foundation for constructing evaluation index system. After we thoroughly analyze the evaluation objectives based on the characteristics of business website, we propose an initial index system includes 5 categories and totally 28 index items shown in the following Table 1.

Table 1 Quality evaluation indexes for business websites

Categories	Indexes
Function Effectiveness	1 Integrative Function
	2 Interactive Function
	3 Convenience
	4 Service Personalization
	5 Website Credibility
	6 Business Authorization
Business Information	7 Accuracy
	8 Authoritativeness
	9 Variety in Type
	10 Inclusiveness
	11 Uniqueness
	12 Orderliness
	13 Timeliness
	14 Variety in Search Method
	15 Search Effectiveness
	16 Version Internationalization
Website Design	17 User Interface Friendliness
	18 Development Standardization
	19 Website Uniqueness
	20 Columns Originality
	21 Website Structure Clarity
	22 Page Style Consistency
	23 Harmonization
System Usability	24 System Stableness
	25 Compatibility
	26 System Security
	27 Self-adaptability
System Efficiency	28 System Speediness

Website self-adaptability refers to capability of e-business system intelligently providing personalized service and dynamic optimizing system performance. System Efficiency refers to the ability that the system response quickly to the requests of numbers of web users. It can be measured through values of some quantitative indexes, such as response time, throughput or utilization rate, etc.

5. OPTIMIZING THE EVALUATION INDEXES

It is necessary for our initial evaluation system to optimize if it can be applied in practice. First, the indexes are more or less correlative which will affects the objectiveness of the evaluation. Second, there are too more indexes that will result in lower efficiency. Therefore, we try to extract and simplify the indexes by using R-Hierarchical clustering method.

Generally, R indicates the coefficient of correlation between two items. R-Hierarchical clustering method is usually applied to cluster the indexes. The steps are described as following.

5.1 Calculate Coefficient of Correlation and Clustering

It firstly treats every index as one cluster. So, we have 28 clusters. Then, coefficient of correlation is calculated between every two clusters by minimum-distance method. Next, the two clusters with the maximal coefficient of correlation are clustered into a new one. The same process is repeated until all the indexes are clustered into one.

5.2 Analyze the Clustering Process and Determine Clusters

We analyze the variation of minimum coefficient of correlation during the clustering process to find the leap points. According to the number of leap points and the knowledge of special field, we can eventually determine how many clusters we need. The whole process is illustrated in the following Figure 1.

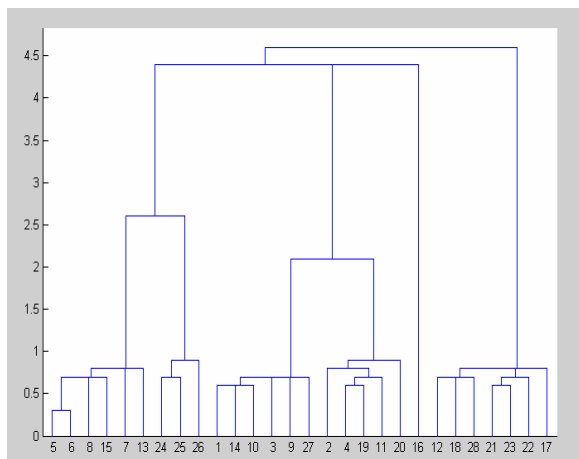


Figure 1 The process of R-Hierarchical clustering

Following the principle of simplification and feasibility and considering the characteristics of BtoC website, we cluster the 28 index items into 10. The precision rate is over 0.75.

5.3 Calculate Correlation Index and Extract the Representative Indexes

First, we calculate the correlation index that is the average of R between one index and every other index in the same cluster.

$$\overline{R}_j^2 = \frac{\sum r^2}{m_j - 1}$$

m_j in this formula is the number of the indexes in the cluster that index X_j belongs to.

Then, we select the index with the maximal correlation index in the total 10 clusters individually and identify 10 of them as the most representative indexes.

Finally, the weights of the indexes are derived by the expert grade method. The final indexes and their weights are shown in the following table 2.

Table 2 The final indexes and their weights

Category	Weight	Index	Weight
Function Effectiveness	0.22	1.1 Service Personalization	0.10
		1.2 Website Credibility	0.12
Business Information	0.18	2.1 Information Inclusiveness	0.10
		2.2 Version Internationalization	0.08
Website Design	0.28	3.1 Columns Originality	0.09
		3.2 Website Structure Clarity	0.10

		3.3 Harmonization	0.09
System Usability	0.22	4.1 System Stableness	0.10
		4.2 System Security	0.12
System Efficiency	0.10	5.1 System Speediness	0.10

6. CONCLUSION

In this paper, we have proposed an index system for quality synthesis evaluation and diagnosis of the BtoC websites following the 'Grey Box' evaluation principle, and scientifically determined and simplified the index items.

Usually, factor analysis or principal component analysis is used to solve the problem of common-factor and multiple indexes. But these methods are only suitable for the quantitative indexes, and the evaluation process is not truly simplified. Because the new index is the linear function of some original ones, it still needs to calculate the value of new indexes by collecting all the values of the original ones.

In our index system, most of index is descriptive one. So we have finalized the indexes by using the R-Hierarchical clustering method. It really has reduced the number of the evaluation indexes without losing the major information from the original indexes. Furthermore, it has effectively avoided the impact of common-factors on the evaluation result.

Only the index of system efficiency can be measured through quantitative sub-indexes such as response time, etc. Most of depictive indexes are subjective and fuzzy. In view of this, we should use fuzzy comprehensive analysis method to evaluate to get more efficiency result.

In our future work we are intended to propose an evaluation model and conduct evaluation to some famous domestic BtoC websites to prove if this index system is scientific and feasible. Moreover, we will improve this set of index system including evaluation model to make the whole set of index system more feasibility.

7. REFERENCES

- [1] F.J. Miranda Gonzalez, T.M. Banegil Palacios, Quantitative evaluation of commercial web sites: an empirical study of Spanish firms, *International Journal of Information Management*, 24(2004): 313-328
- [2] Chang Liu, Kirk P. Amett, Exploring the factors associated with Web site success in the context of electronic commerce, *Information & Management*, 38 (2000): 23-33
- [3] Evans, J. R., & King, V. E.. Business-to-business marketing and the World Wide Web: Planning, managing and assessing web sites. *Industrial Marketing Management*, 28(1999): 343 - 358
- [4] Zhonghai Li, Jianqiao Liao, Hui Xiao; the analyze of work efficiency on webshop design in China; human work efficiency; 4(2002) : 43-45
- [5] Research a index system for evaluation of on enterprise website, <http://www.365un.com/xmb/viewthread.php?tid=1998>