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Framework of Evaluating E-Commerce Based on Business Process

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***Abstract*-Since E-Commerce (EC) is rapidly emerging in different industries with various forms, A comprehensive and efficient evaluation criterion is necessary for comparison and improvement of EC. This paper develops a conceptual framework and quantitative method for evaluating web-based EC applications. First, Based on work flow of EC, it establishes a specified four-part model which consists of sellers, transaction platform, logistics and buyers. Then the key factor in each part is critically examined in terms of factual conditions. Second, a research method, which can convert qualitative analysis into quantitative index, is invited for further constructing evaluation framework. Third, the conceptual framework of evaluating e-commerce is built on the basis of former key factor analysis, which includes three levels from the top to the bottom, namely objective level, evaluating level and factor level. Accompany with the method invited, A comprehensive and measurable model is established for evaluating EC. Finally, it concludes how to evaluate the web-based EC and discusses the key factor varies with different EC forms.**

Keywords: e-commerce, business process, Analytic Hierarchy Process, evaluation framework

I. Introduction

Electronic Commerce (EC), which involves carrying out commerce on the Internet and breaks barriers of the traditional commerce, enhances the management of information flow, currency flow and goods flow. The implementation of ecommerce promotes the efficiency of the commerce, reduces the time of business transactions and enlarges the profits of the enterprises. With the rapid growth and wide use of e-commerce, It is becoming crucial to analyze the EC vertically from market vision to individual scope. Through the comparison analysis, we are able to objectively and comprehensively learn the situation of enterprise e-commerce, find out the advantages of it and diagnose the existing problems, which would make a great influence on the further development of EC. On the basis of a resent research on the development of enterprises, this paper is organized as follows. The first section builds a business process model to outline the major factors that influence EC. Next, which describes a quantitative evaluation method with its former analysis? In the subsequent section, there establishes a model of evaluating EC with the invited method accompany with conceptual framework established. The concluding section provides main ideas of this paper and recommendations for further development.

II. Business Process Analysis

To consider the key factors which influence evaluation, we reorganize e-commerce work process into a simplified and highly generalized business process model which adapt to most of the cases in E-commerce including B2C, C2C and so forth. The process is composed of four entities, namely sellers, logistics and buyers. Information, goods and capital flow, as virtual individual, transfer from one side to another. No matter which kind of flow and which direction of flow, transaction platform, however, is the cross or center of flow all along. On the whole, the process operates starting from sellers to buyers with delivery of logistics as well as convey of information and capital by use of transaction platform. In the literature, most of the evaluation systems pay attention to satisfaction of certain part in the process or simply focus on technique application on EC. Although such focused model brings a framework of evaluating for development, it cannot make a measure on a comprehensive level for satisfying all parties involved. From the view of whole business process, redesigning and improving the EC structure, we develop a simplified business process model for analyzing the related factors (Figure 3-1).

A. Key Factors on Sellers

From the view of business operation, sellers locate on the source in the process of goods flow. So the goods sellers provide is sensitive to other parts of the flow. Thus evaluation on sellers is evaluation on goods itself. The property of goods including sort, price and quality becomes measurement of sellers in the flow. Otherwise, credit, which is not belong to property of goods, act as more important role for improve transaction and should be added to the measurement.

B. Key Factors on Transaction Platform

Basically, the measurement of Transaction Platform is divided into three sections, namely browsing section, transaction section and extra service section. For the browsing section, the key factors influence the transaction is appearance of websites as well as the navigating function for makes buyers getting convenient service with perfect feeling. As to transaction section, payment means is crucial for both sellers and buyers. Additionally, the security of payment is even more significant. Finally, After Service will gain satisfaction of buyers and sellers to make up for the defect on the business process. Otherwise, the profitability of platform which is the output of total wok fixes measurement according to the factual situation.

C. Key Factors on Logistics

The logistics provides service with different ways to buyer varies from the different E-commerce Model (B2B, B2C and etc.). The property of logistics service, like security, speed and price, makes up the key elements for platform operation.

D. Key Factors on Buyers

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No matter traditional business or e-commerce, flow of customers always is key factor for bargain. The more customers one EC attracts, the more opportunities for potential transaction in business. So, first , quantity of customer is key factor. Second, rate of active customers on the total is another factor for measuring EC's continuing attraction. Otherwise the satisfaction of customers which is helpful for the growth of transaction should be added to key factor.

III. Research Method

The Analytic Hierarchy Process (AHP) is a structured technique for dealing with complex decisions. Rather than prescribing a "correct" decision, the AHP helps the decision makers find the one that best suits their needs and their understanding of the problem. The AHP provides a comprehensive and rational framework for structuring a decision problem, for representing and quantifying its elements, for relating those elements to overall goals, and for evaluating alternative solutions.

Step1: For using the AHP, first decompose their decision problem into a hierarchy of more easily comprehended sub-problems, each of which can be analyzed independently. The elements of the hierarchy can relate to any aspect of the decision problem—tangible or intangible, carefully measured or roughly estimated, well- or poorly-understood—anything at all that applies to the decision at hand.

Step2: Once the hierarchy is built, the decision makers systematically evaluate its various elements by comparing them to one another two at a time. In making the comparisons, the decision makers can use concrete data about the elements, or they can use their judgments about the elements' relative meaning and importance. It is the essence of the AHP that human judgments, and not just the underlying information, can be used in performing the evaluations.

Step3: The AHP converts these evaluations to numerical values that can be processed and compared over the entire range of the problem. A numerical weight or priority is derived for each element of the hierarchy, allowing diverse and often incommensurable elements to be compared to one another in a rational and consistent way. This capability distinguishes the AHP from other decision making techniques.

Step4: In the final step of the process, numerical priorities are calculated for each of the decision alternatives. These numbers represent the alternatives' relative ability to achieve the decision goal, so they allow a straightforward consideration of the various courses of action.

IV. E-commerce Evaluating Framework

Based on the former research method and business process analysis, we establish the key factor to a system with three level from A to C (Figure 4-1) , namely objective level, evaluating level and factor level. Objective level is ultimate measurement function and index, and evaluating level is segregated into four related measurement parts and each has key factors on the level C.

1. After the construction of evaluation tree, evaluation factors set are as follows.

$$B= \{B1, B2, B3, B\mu\} \quad (1)$$

Judgment matrix is as follows.

$$T = \begin{pmatrix} u_{11} & \cdots & u_{1n} \\ \vdots & \ddots & \vdots \\ a_{m1} & \cdots & a_{mn} \end{pmatrix} \quad (2)$$

2. Each element in judgment matrix μij means degree of importance Bi to Bj. We divide the degree into 2.1,3,5,7,9 five level. Additionally, figures like 2,4,6,8 is the medium of 1~3, 3~5, 5~7, 7~9.

With the value assignment rule, each element in judgment matrix T gets specific value. Calculate maximum characteristic root λmax and the relevant characteristic vector of judgment matrix T. Since that, characteristic vector should be unitized. The result, weighting vector is written below.

$$W= (w_1, w2\ldots w_m)^t \quad (3)$$

3. Once weighting vector is confirmed, consistency check of judgment matrix should be put on the board to ensure the rationality of weighting. First, calculate consistency index

$$CI= (\lambda_{max}-m)/ (m-1) \quad (4)$$

Second, calculate the average random consistency index RI. If CR=CI/RI<0.1,it satisfies the requirement of consistency. Else, readjust the value of element in judgment matrix as to get satisfaction index CR.

4. In level A, objective evaluation formula is linear function of indexes in Level C; the upmost evaluation index y is as follows.

$$y=k_{11}S_1+,\ldots,k_{14}S_4+K_{21}TP_1+,\ldots,k_{26}TP_6+k_{31}L_1+k_{33}L_3+,\ldots, +k_{41}B_1+,\ldots,k_{43}B_3 \quad (5)$$

In the function formula , kij is product between weighing of Bi in level B and weighting of Cij (includingS1,…S4,TP1,…,TP6,L1,…,L3,B1,…,B3)in level C.

V. Conclusions

According to the characteristics and actual condition of e-commerce, it is necessary to construct an objective and systematic evaluation criterion and a comprehensive evaluation method to evaluate and analyze e-commerce. This paper outlines an evaluation-factor system and a three level model including all key factors in e-commerce business process. For a specified and highly generalized business process model, we divide evaluating level into four parts. And then find out the key elements which organize the factor level that influence the total process in each part. With method of AHP, It become reality to evaluate different EC forms on the same criterion. The results can be applied to assist obtaining insights into the real benefits, success and risks of EC investment for business from both business and customer viewpoints.

The research was carried out on a specific e-commerce model, and factors selected based on the factual condition. However, it is essential to alter factors and relevant weightings in terms of different EC models.

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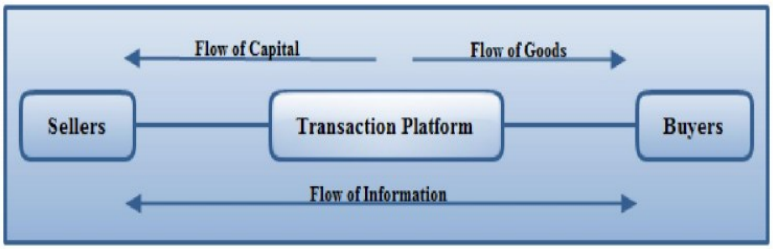

Figure 3-1

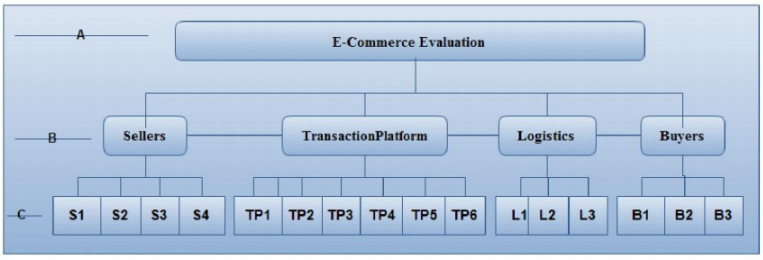

Figure 4-1