

Research on Coordinate Degree Evaluation among Organizations of B2B EC based on the Model of Bayes Attribute Synthetic Evaluation

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Abstract—In the era of network, Electronic Commerce (EC) has become the development mainstream of future business, and become one of major reasons for economic gaps between developed country and developing country. Therefore, to shorten economic gaps between developed country and developing country as quickly as possible, developing country must develop EC energetically by the situation of a country, especially EC of small-medium enterprises. But there still exist lots of problems in the coordination among organizations of B2B EC, which hinders the running of B2B EC smoothly. Therefore, the paper analyzes the impacting factors in the coordinate among organizations of B2B EC in details, and realizes the evaluation to the coordinate degree among organizations of B2B EC by introducing the model of attribute synthetic evaluation, then revises the model of attribute synthetic evaluation by Bayes theory, which makes the appraise results accord with facts much more, and provides quantitative gist for the coordinate among organizations of B2B EC. At last, the paper provides the lacks of research and future research orientations.

Keywords—*Bayes ; Attribute synthetic evaluation model ; B2B EC ; Coordinate degree.*

I. INTRODUCTION

IN the era of networks, Electronic Commerce (EC) has become the development mainstream of future business. However, more and more enterprises enter into the B2B market, 80% EC belong to electronic business trade among enterprises approximately. But the successful EC enterprises are some magnate companies in developed country. Such as Microsoft, IBM, Yahoo, AOL, eBay, Sears Roebuck etc, this increases the economic gaps between developed country and developing country continuously. To shorten economic gaps between developed country and developing country as quickly as possible, developing

Manuscript received September 17, 2007. Revised received Dec. 17, 2007. This research was supported by the National Natural Science Foundation of China under Grant 70372070 and 70771088 and by China Postdoctoral Science Foundation and by China NCET 0000-X07173

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country must develop EC energetically by the situation of a country. The continuance and fast development of EC depend on the participation of plentiful small-medium enterprises (especially plentiful small-medium traditional enterprises). How to hasten small-medium enterprises to join EC are problems which need to be explored^[1]. Especially, EC among enterprises differ from the information management system in enterprise, EC among enterprises span multi-enterprises to establish and apply information system among enterprises, therefore, there exist multi-participator, and they locate the equally status, no one enterprise can lead or control other enterprise, and exist plentiful coordination work among B2B enterprise, the system and involved technology are more complex the information management system in enterprise far^[2]. However, the academy lack of the research about the coordination degree among organization in B2B EC at present. This makes against the development of small-medium enterprise EC healthily. Therefore, the subject is selected to study and is affluent in correlative theoretic.

II. ANALYSIS ON IMPACTING FACTORS IN THE COORDINATION AMONG ORGANIZATIONS OF B2B EC

The factors to impact the coordination among organizations of B2B EC are various, they are as following:

(1) Coordination cost. WANG Xuan, ZHONGWei-jun, MEI Shu-e (2005) indicate that coordination cost impact the buying motive of purchaser and total costs of supplier in B2B EC. Which impact the coordination among organizations of B2B EC directly^[3].

(2) Credit. B2B is a mixed coordination mechanism between market coordination and hierarchy coordination. Information asymmetry is seriously. Therefore, credit is thought an importance impacting factor for the coordination among organizations of B2B EC^[4].

(3) Negotiate mechanism. The runnings of B2B EC need the negotiation among distinct enterprises constantly. Therefore, differ scholars design multi-negotiate mechanisms for EC^[5]. Obviously, Negotiate mechanism can impact the coordination among organizations of B2B EC.

(4) Network. Safety. Network Safety has become an

importance factor to impact the development of EC. In B2B EC, Network Safety will bring many serious threats. Such threats include financial damages, privacy invasion, or security attacks)^[4]. Sometimes, Network Safety will result the leakage of core knowledge and core competence of EC enterprises^[6].

(5) Opportunistic behavior. Andrew Lancaster, Luis Filipe Lages (2006) use a sample of nearly 400 SMEs' purchasing managers to better understand cooperation determinants from the buyers' perspective. The research indicates that opportunistic behavior negatively affects the coordination among organizations of B2B EC^[7].

(6) Cooperation performance. The major purpose for enterprise to participate in B2B EC is to improve enterprise performance by making use of social resource to expiate enterprise's limitation. Obviously, cooperation performance impacts the coordination among organizations of B2B EC.

III. RESEARCH ON THE BAYES ATTRIBUTE SYNTHETIC EVALUATION TO COORDINATE DEGREE AMONG ORGANIZATIONS OF B2B EC

A. Analysis of single index attributes measurement to coordinate degree among organizations in B2B EC

To realize the evaluation of coordinate degree among organizations of B2B EC by the model of attribute synthetic evaluation. By interrelated concepts and definition of attribute synthetic evaluation model, the paper makes the following symbol suppose: $F = \{\text{coordinate degree among organizations of B2B EC}\}$. The paper divides the assess scale of coordinate degree into five rankings: $C_1 = \{\text{lower}\}, C_2 = \{\text{low}\}, C_3 = \{\text{common}\}, C_4 = \{\text{high}\}, C_5 = \{\text{higher}\}, C_1 > C_2 > \dots > C_5$, $I = \{I_1, I_2, I_3, I_4, I_5, I_6\} = \{\text{Coordination cost } \mu_1, \text{Credit } \mu_2, \text{Negotiate mechanism } \mu_3, \text{Network. Safety } \mu_4, \text{Opportunistic behavior } \mu_5, \text{Cooperation performance } \mu_6\}$.

The paper adopts the attribute synthetic evaluation system that provided by the scholars of ZHANGYi etc^[8] to establish mathematics ways, which shown in Figure 1.

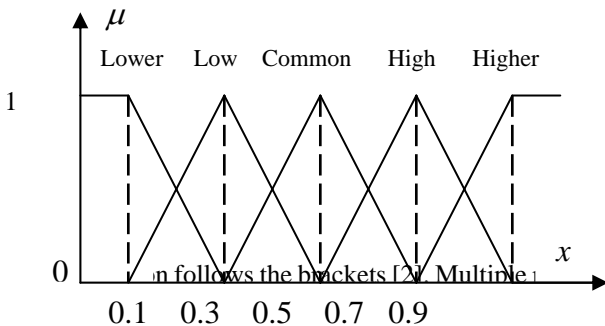


Figure 1

To realize coordination degree evaluation among organizations of B2B EC, at first, it must realize the evaluation of single impacting factor. Take the example of evaluation to coordination cost, coordination cost may

divide into five ratings {lower, low, common, high, higher}, the five ratings correspond to the data of (0.9, 0.7, 0.5, 0.3, 0.1). Supposing we invite ten experts to evaluate coordinate cost of certain B2B EC. The results are (0.7, 0.5, 0.5, 0.3, 0.9, 0.7, 0.7, 0.3, 0.9, 0.7). then, it can obtain their average is 0.62. which mean that experts think coordination cost locate between low and common.

By the computation ways of ZHANGYi etc^[8], it can conclude the results of $\mu_{12} = 0.4, \mu_{13} = 0.6$. With the same technique, it can obtain that $\mu_{23} = 0.55, \mu_{24} = 0.45$; $\mu_{34} = 0.3, \mu_{35} = 0.7$; $\mu_{43} = 0.6, \mu_{44} = 0.4$; $\mu_{52} = 0.7, \mu_{53} = 0.3$; $\mu_{63} = 0.65, \mu_{64} = 0.35$.

Therefore, it can obtain the following attribute measurement distribute matrix S of coordinate degree among organizations in B2B EC.

$$S = \begin{matrix} & C_1 & C_2 & C_3 & C_4 & C_5 \\ \begin{matrix} I_1 \\ I_2 \\ I_3 \\ I_4 \\ I_5 \\ I_6 \end{matrix} & \begin{bmatrix} 0 & 0.4 & 0.6 & 0 & 0 \\ 0 & 0 & 0.55 & 0.45 & 0 \\ 0 & 0 & 0 & 0.3 & 0.7 \\ 0 & 0 & 0.6 & 0.4 & 0 \\ 0 & 0.7 & 0.3 & 0 & 0 \\ 0 & 0 & 0.65 & 0.35 & 0 \end{bmatrix} \end{matrix}$$

B. Analysis of multi-indexes attribute measurement to coordination degree among organizations in B2B EC

In general, multi-indexes synthetic attribute measurement adopts ways of weigh sum. That is $\mu = \sum_{j=1}^m P_j \mu_{jk}$ $1 \leq k \leq n$. $\mu_{jk}(t)$ obtain from

the measurement analysis of single-index. p_j is referred to weigh of each single-index. But existing synthetic attribute evaluation model obtain weigh by surveying experts. Which makes ultimate weigh coming from experts evaluate exist systemic error. To overcome above lacks, in the evaluation of coordination degree among organizations in B2B EC, the paper confirms weigh by two steps; the first time is made out by personnel who are familiar with coordination situation among organizations in B2B EC in enterprise. The second time is made out by personnel who are familiar with coordination situation among organizations in B2B EC in the industry. Then, the paper obtain existing weigh coefficient when the impacting factors of coordination among organizations in B2B EC happen by the theory of Bayes

$$P(B_i|\mu_i) = \frac{P(B_i)P(\mu_i|B_i)}{\sum_{i=1}^k P(B_i)P(\mu_i|B_i)}, \text{ and } \sum_{i=1}^k P(B_i|\mu_i) = 1. \text{ Then,}$$

the paper draw the ultimate weigh of the *i*th impacting factor is

$P(B_i|A_j)$. Among, $P(B_i) = \omega_i^1$, $P(\mu_i|B_i) = \omega_i^2$, superscript 1 and 2 denote the first and the second investigation separately.

$P(B_i)$ is referred to the weigh of the *i*th impacting factor expressed by project expert; $P(\mu_i|B_i)$ is referred to adjust coefficient of the *i*th impacting factor that obtain from project expert by the experience of industry expert.

For example, by investigating ten people who are familiar with coordination situations among organizations in B2B EC in enterprise. The paper obtain the following weigh: $P(B_1)=0.15$, $P(B_2)=0.05$, $P(B_3)=0.20$, $P(B_4)=0.15$, $P(B_5)=0.3$, $P(B_6)=0.15$. At the same time, the paper investigate other ten industry experts, and obtain the following ultimate weigh: $P(\mu_1|B_1)=0.2$, $P(\mu_2|B_2)=0.25$, $P(\mu_3|B_3)=0.15$, $P(\mu_4|B_4)=0.1$, $P(\mu_5|B_5)=0.15$, $P(\mu_6|B_6)=0.15$.

Then, by the theory of Bayes, the paper draws the following results: $P(B_1|\mu_1)=0.193$, $P(B_2|\mu_2)=0.081$, $P(B_3|\mu_3)=0.193$, $P(B_4|\mu_4)=0.098$, $P(B_5|\mu_5)=0.29$, $P(B_6|\mu_6)=0.145$.

Finally, the paper obtains coordination degree vector among organizations in B2B EC by attribute synthetic evaluation model as following:

$$\mu = \sum_{j=1}^6 P_j \mu_{jk}$$

$$= (0.193, 0.081, 0.193, 0.098, 0.29, 0.145) \begin{pmatrix} 0 & 0.4 & 0.6 & 0 & 0 \\ 0 & 0 & 0.55 & 0.45 & 0 \\ 0 & 0 & 0 & 0.3 & 0.7 \\ 0 & 0 & 0.6 & 0.4 & 0 \\ 0 & 0.7 & 0.3 & 0 & 0 \\ 0 & 0 & 0.65 & 0.35 & 0 \end{pmatrix}$$

$$= (0, 0.2802, 0.4004, 0.1843, 0.1351)$$

C. Attribute evaluation of coordination degree among organizations in B2B EC

Obtaining coordination degree vector among organizations in B2B EC, then, the paper may evaluate the coordination degree among organizations in B2B EC. By distinct attribute discriminating ways^[9], the

paper can conclude various evaluation results. For example, by the principle of confidence, assuming $\lambda = 0.7$, then it can conclude that the coordination degree among organizations in B2B EC is high (as $0+0.2802+0.4004=0.6806 < 0.7$, however $0+0.2802+0.4004+0.1843=0.8649 > 0.7$); if the paper takes the principle of smallest expense, then it can conclude that the coordination degree among organizations in B2B EC is lower (as lower=0); if the paper takes the principle of biggest member measure, then it can conclude that the coordination degree among organizations in B2B EC is common (as common=0.4004 is the biggest). The results are various by differ attribute identity ways, but the results provide quantitative gist for the coordinate among organizations of B2B EC. This is conducive to take corresponding countermeasures to spur the running of B2B EC healthily.

IV. CONCLUSION

Based on existing research, the paper realizes the evaluation to coordination degree among organizations in B2B EC by attribute synthetic evaluation model. And revise weigh which obtain from expert investigation by the theory of Bayes. Which makes the appraise results accord with facts much more. Of course, there exist some lacks in the research, they are as following: (1) the paper doesn't improve the comment of experts, which exist bigger gaps compared with the fuzzy when experts make comment. (2) In the attribute evaluation of coordination degree among organizations in B2B EC, the paper lists three attribute identify way, but which the way is the best, the paper doesn't make argumentation. (3) The conclusions drawn from above research aren't validated from the angel of demonstration; it should validate the research by case study or large-scale questionnaires further.

ACKNOWLEDGMENT

This research was supported by the National Natural Science Foundation of China under Grant 70372070 and 70771088 and by China Postdoctoral Science Foundation and by NCET 0000-X07173.

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