Industry Competitiveness Evaluation Index System of Regional E-commerce Based on AHP

Xinchun Wang[1,2] ,Jiang Yubo[3]

[1]Research Department of Jinan Vocational College, Jinan, China

[2]College of Management & Economics, Shandong Normal University, Jinan, China

[3]Computer Department of Shandong Jianzhu University, Jinan, China

KEYWORD: Business ecosystem; Evaluation index; Industry Competitiveness; Regional e-commerce

ABSTRACT: This article analyzes the factors of industry competitiveness of regional e-commerce from the perspective of business ecosystem, builds the evaluation index system, and determines the weight coefficients of each index by using the method of analytic hierarchy process (AHP). The thesis could provide decision-making basis for relevant government departments, as well as theoretical guidance and practical path for the of development regional e-commerce industry.

Introduction

Premier Li Keqiang clearly states that " ... make the ' Internet +' action plans to promote e-commerce ... healthy development." in the 2015 Government Work Report, which means it would foster more new industries and new business modality, and promote deep integration of traditional industries and Internet, and promote the rapid development of industry. China's express delivery business amounted to 14 billion in 2014, an increase of 52 percent, ranking first in the world. Some analysts believe that by 2018, China's electronic business market scale will be greater than the sum of all other countries around the world. With the rapid development of e-commerce, many provinces and cities take the e-commerce industry as a key development industry, the related research of e-commerce industry has caused widespread concern in academic circles, especially analyzing competitiveness from the overall height of the industry is becoming a new hot spot. Wang (2014), Che(2013), Xu(2012), respectively from different angles studied on the e-commerce industry competitiveness evaluation index system. However, relatively few research are about the regional e-commerce industry competitive. Based on business ecosystem theory, this paper analyses Jinan e-commerce industry, Studies industrial competitiveness model, and construct the evaluation index system of regional e-commerce industry competitiveness by using AHP, so as to provides theoretical support and practical path for the development regional e-commerce industry.

The Conceptual Model of E-commerce Business Ecosystem

From the ecological point of view, Moore (1993) first proposed the concept of "Business Ecosystem" thought enterprises should take themselves as part of the business ecosystem just as the relationship between biological organisms and ecological systems. Moore (1996) argued that business ecosystem is a consortium based on the interaction between organizations and individuals, which includes not only their own , but also need to cover a large number of participants , such as customers, suppliers , governments and other stakeholders community and so on.

According to the definition of business ecosystem, this article applies the theory and results of business ecosystem to the area of e-commerce industry, and builds the e-commerce ecosystem conceptual model shown in Figure 1. The model consists of core layer, support layer and the external environment system, and experiences four stages of evolution, namely exploit, development, coordination and evolution (Hu,2009). In this evolutionary process, how to correctly face the developing opportunities and changes of E-commerce industry, so as to evolve into a new

business system better and faster, is affected by many factors. The interaction of these factors eventually form development competitiveness of regional e-commerce industry (Xu,2012).

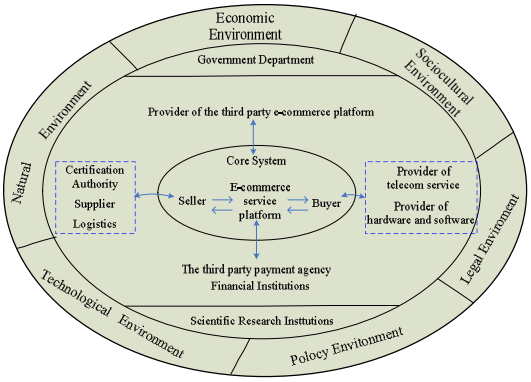

Figure 1. The conceptual model of e-commerce business ecosystem

Industry Competitiveness Evaluation Index System of Regional E-commerce Based on AHP

AHP is a multi-criteria decision-making approach combining qualitative and quantitative analysis, which was put forward by T.L.Satty--a famous America operational research experts in 1970s. After analysis of the nature of complex problem, the influencing factors and inherent relations, it could build a hierarchy structure model, and then mathematize the decision-making process by using less quantitative information, so as to solve the multi objective, multi- criteria or no structural characteristics of complex decision problems and provide a simple decision method, as well as a quantitative basis for analysis, decision making, forecasting or control.

Evaluation Index System

Industry competitiveness evaluation of regional e-commerce is the detailed and objective evaluation for each of the members in the e-commerce ecosystem, thereby enabling industries, enterprises and departments target to the development of e-commerce industry, and provide basis for decision making. The system should be considered from many aspects, multi-angle and multi-level, meanwhile, the principle of Purposiveness, systemic and appropriateness should be followed in establishing evaluation index system.

According to the above purpose and principle, this article decomposes the industrial competitiveness evaluation factors of regional e-commerce AHP: (1) 4 first class indicators. Core environmental factors, supporting environmental factors, external environmental factor and technological innovation incubator environmental factor; (2) 17 second class indicators. The buyer and the seller, electronic business service platform, etc. It also build the competitiveness evaluation index system of regional e-commerce, shown in Figure 2.

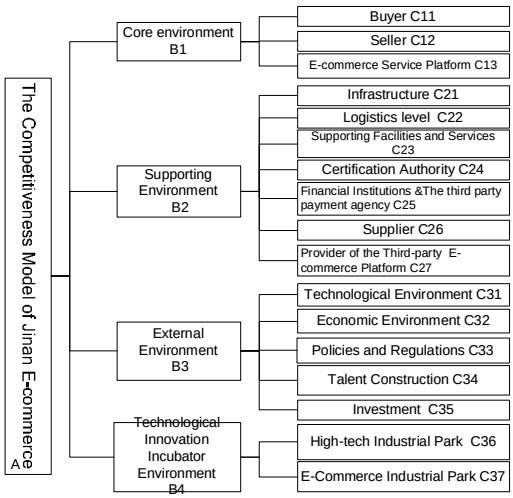

Figure 2. Industry competitiveness evaluation index system of regional e-commerce

Determination of Index Weight

According to the competitiveness evaluation index in Figure 2, as well as personal experience, managers of e-commerce enterprise fill out the survey questionnaire. Based on the research results, the experts construct the judgment matrix after comprehensive analysis, and obtain the weights of each factor indexes, the maximum characteristic root, deviation consistency index of judgment matrix CI, average random consistency index of judgment matrix RI, random consistency ratio CR(see Table 1, Table 2, Table 3, Table 4 and Table 5).

Table 1. The judgment matrix of layer A and hierarchy single taxis

A	B1	B2	B3	B4
B1	1	1/4	1/5	3
B2		1	2	2
B3			1	2
B4				1
Single weight	0.1011	0.4278	0.3198	0.1512
Note: λmax=4.1673； CR=0.0627				

Table 2. The judgment matrix of layer B1 and hierarchy single taxis

B1	C11	C12	C13
C11	1	4	2
C12		1	2
C13			1
Single weight	0.4000	0.4000	0.2000
Note: λmax =3.000； CR=0.0000			

Table 3. The judgment matrix of layer B2 and hierarchy single taxis

B2	C21	C22	C23	C24	C25	C26	C27
C21	1	1	2	1	2	1/4	5
C22		1	5	5	4	1	2
C23			1	1	3	1/2	1
C24				1	1	1/4	2
C25					1	1/5	2
C26						1	3
C27							1
Single weight	0.1507	0.2553	0.0913	0.0862	0.0667	0.2893	0.0604
Note: λmax =7.68776； CR=0.0843							

Table 4. The judgment matrix of layer B3 and hierarchy single taxis

B3	C31	C32	C33	C34	C35
C31	1	1/3	1/2	1/2	1
C32		1	1	2	2
C33			1	2	3
C34				1	3
C35					1
Single weight	0.1098	0.2966	0.2966	0.1957	0.1012
Note: λmax =5.1242； CR=0.0277					

Table 5. The judgment matrix of layer B4 and hierarchy single taxis

B4	C41	C42
C41	1	1
C42		1
Single weight	0.5000	0.5000
Note: λmax =2.000； CR=0.0000		

From the above analysis, we make consistency checks for the above judgment matrices and corrections to obtain the total level of sorting table as shown in Table 6.

Table 6. The total level of sorting

Index	Weight WBi	Sub- index	Weight WCij	$w_{ij} = \sum_{j=1} B_j C_{ij}$
A1	0.1011	C11	0.4000	0.0405
		C12	0.4000	0.0405
		C13	0.2000	0.0202
A2	0.4278	C21	0.1507	0.0645
		C22	0.2553	0.1092
		C23	0.0913	0.0391
		C24	0.0862	0.0369
		C25	0.0667	0.0285
		C26	0.2893	0.1238
		C27	0.0604	0.0259
A3	0.3198	C31	0.1098	0.0351
		C32	0.2966	0.0949
		C33	0.2966	0.0949
		C34	0.1957	0.0626
		C35	0.1012	0.0324
A4	0.1512	C41	0.5000	0.0756
		C42	0.5000	0.0756

Results analysis

From the above analysis, we know that it not only should pay attention to the comprehensive evaluation of the competitiveness, but also should highlight the key indexes and set priorities in the development of regional e-commerce industry. In this paper, the AHP method is applied to the study the industry competitiveness evaluation index system of regional e-commerce reflecting the objectivity of AHP method. In the 17 indexes such as buyer and seller, the indexes of “Supplier” and “Logistics level” of the support the environment are particularly important, followed by "economic environment" and "Policy and Regulations" of the external environment.

Conclusions

The comprehensive assessment of e-commerce industry is very complex problem, especially the establishment of evaluation index system and the determination of index weight coefficient. The competitiveness evaluation index system and the index weight coefficients vary according to the different regions. When using the AHP method in comprehensive evaluation, we should combined with the actual situation of this region to construct the evaluation index system meeting to its own characteristics. During the expert judgment, we should ask the opinion of other experts as much as possible so as to avoid affecting by a few people's subjective preference for the accuracy of the results. Only in this way can we assist decision-makers through AHP, and keep the consistency of the thinking process and the principle decision.

References

[1] Che Jiu-jun . 2013 , Research on Fuzzy Comprehensive Evaluation System of Tourism E-commerce Industry Competitiveness[J]. *Tourism Economy*.(5).

[2] Hu Gang lan & Lu Xiang hua & Huang Lihua. 2009. An Essay on E-business Ecosystem and Its Evolutionary Path[J]. *Economic Management Journal,* (6).

[3] Moore, J.F. 1999. The Death of Competition - Leadership and Strategic in the Age of Business Ecosystem [M]. *Beijing: Beijing publishing house*:20.

[4] Wang Yi & Liu Xiao-yun. 2014. He Jun. Research on Evaluation of Electronic Business Service Platform Competitiveness Based on Commercial Ecology Perspective [J]. *Information Science,* Vol.32, No.6 .

[5] Xu Wei.2012. Research on Regional E-commerce Industry Competitiveness Evaluation Index System [J] *Industrial & Science Tribune,* (11).14.
[6] The work plan of construction of thse national e-commerce demonstration city built in Jinan, 2014.9.12. *http://xxgk.jinan.gov.cn/xxgk/jcms_files/jcms1/web3/site/art/2014/9/12/art_12382_76590.html*.