

Research on Competency Evaluation of Virtual Partners

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Abstract: Virtual enterprise is a new form of enterprise organization, which will become one of the main forms of cooperation and competition among enterprises in the 21st century. As a temporary enterprise and its unstable characteristics determine the difficult management of virtual enterprise, and partner selection itself is also a relatively complex process, because there are many factors affecting it, and even these factors may form a restrictive or dependent relationship with each other. Therefore, partner selection and capability evaluation are key issues in the process of virtual enterprise construction.

1. Introduction

The so-called virtual enterprise, also known as shadow company, refers to a temporary enterprise organization composed of two or more companies based on modern scientific and technological information and guided by market competition. It integrates the competitive advantages of different enterprises to form a mutually trusted cooperative enterprise. For the common interests, enterprises have taken a series of measures. The partner of virtual enterprise means that when establishing a virtual enterprise, the enterprise may face the invitation and participation of multiple partners, so it is necessary for the enterprise to screen among multiple candidate enterprises. Looking for the best partner to form a dynamic alliance enterprise. Economically, the state has changed the way of economic development, and its direct impact is to slow down economic development. Because it is difficult for enterprises to make optimal decisions on the changes of the market, the cooperation mode of virtual organization can realize the rational and optimal allocation of resources to improve economic benefits[1]. In terms of system, virtual organization alliance can make the management between companies transparent and information-based, reduce the time of information transmission, so as to improve the management efficiency of the company and realize the flat management mode. In terms of culture, with the change of people's concept of life, people also have their own preference for brands. Virtual companies can cater to people's views and produce a more open and competitive corporate culture. Therefore, the choice of alliance is directly related to whether the virtual company can achieve long-term stable operation.

2. Empirical Analysis on Partner Selection Factors of Virtual Enterprise

2.1 Questionnaire Survey on Competency Evaluation of Virtual Enterprise Partners

In this paper, we focus on people who have a certain understanding of virtual enterprises to participate in this questionnaire survey, conduct questionnaire survey and analysis through Richter scale, assign values to the influencing factors, then analyze their questionnaire results, finally quantify these influencing factors into tables, and summarize these factors with histogram, as shown in table 1.

Through the data, we can see that people's views on the partner selection of virtual enterprises mainly focus on three factors: total cost accounting, politics and core complementary ability. For the remaining influencing factors, people hold their own views, and on the whole, there is little difference between these factors[2].

2.2 Selection and Establishment of Virtual Enterprise Partner Competency Evaluation System

Step 1: determine indicators. Here, by consulting the literature and journals of scholars at home and abroad, a total of 11 relevant factors affecting the partner selection of virtual enterprises are listed, and the index content of partner selection is preliminarily established. On this basis, it determines that the survey objects of the sample are mainly middle and senior managers, and analyzes them through network consultation, expert evaluation, questionnaire survey and so on.

Step 2: assignment. Here, the influence degree between each indicator and partners is divided into five levels: very agree, agree, uncertain, disagree and very disagree, and quantified according to the value of 1-5 to improve the Richter scale, so that the respondents have a subjective score for different indicators.

Step 3: partner selection and establishment of competency evaluation system. According to the improved Richter scale and the detection and analysis of the questionnaire, it is concluded that the survey includes 3 primary index systems, 11 secondary index systems and 23 tertiary index systems, Let it represent the region ($= 1, 2, \dots, 3$), the index ($= 1, 2, \dots, 4$), X_i the index value of the first region, and X_{ij} the second level index value of the second region. The following is the effectiveness test to explain the relationship between (I) and (II), and establish partner competence through (II) (10) And test the correlation degree, and construct the competency evaluation system of virtual organization partners, as shown in Table 1.

Table 1 Competency Evaluation System of Virtual Organization Partners

Primary indicators and weights	Secondary indicators and weights	Tertiary indicators	Indicator description	
Market factor X1 0.73	Total cost X11 0.25	1. Cooperation cost	Operating costs of alternative partners	
		2. Cost minimization		
	product homogeneity X12 0.07	3. Product convergence	Approximate efficacy of products between alternative partners	
		4. Demand preference		
	Regionality X32 0.09	5. Influence of region on Culture	Geographic location of the candidate partner cost of obtaining information for the candidate partner	
		6. Geographical impact on information		
	Risk minimization X13 0.11	Risk minimization X13 0.11	7. Risks and benefits	Advantages and disadvantages of alternative partners operational risks of alternative partners
			8. Risk concentration	
	Agility X14 0.12	Agility X14 0.12	9. Grasp market opportunities	Response strategies of alternative partners to market opportunities

		10. Keen insight	Perception of market opportunities by alternative partners
	Partner reputation X33 0.10	11. Reputation impact	Reputation of candidate partners evaluation of cooperative relationship between candidate partners
		12. Cross platform cooperation	
	Mutual trust X22 0.09	13. Mutual trust	Integrity and credibility of alternative partners
		14. Interpersonal relationships	
	Complementary core competencies X23 0.17	15. Core strengths of the organization	Core key competencies of alternative partners core competitiveness of alternative partners core advantage resources of alternative partners
		16. Core competitive advantage	
		17. Complementary core resources	
Government factor x2 0.27	Fair distribution of benefits X31 0.35	18. Distribution of benefits	Economic benefits of alternative partners and benefit distribution mechanism of alternative partners
		19. Equitable distribution mechanism	
	Political influence X24 0.35	20. Political position	Compatibility of political culture of alternative partners Marketing activities and development of alternative partners
		21. State intervention	
	Goal consistency X21 0.10	22. Content consistency	Consensus of alternative partners
		23. Integrity of objectives	

2.3 Contribution Test of Competency Evaluation Factors of Virtual Enterprise Partners

The indicators of factor analysis include core competence complementarity factor (x23), risk minimization factor (x13), agility factor (x14), mutual trust factor (X22), total cost accounting factor (X11), partner reputation factor (x33), goal consistency factor (X21), political factor (x24), geographical factor (X32) and fair distribution of interests (X31). The indicators for factor analysis of product homogeneity factor (X12) are eleven secondary indicators. The basic utility value is listed according to the data to provide data for factor analysis. The correlation between variables can be seen from the correlation coefficient matrix based on the basic utility value (Table 2).

		X11	X24	X23	X13	X14	X31	X33	X22	X32	X12	X21
Sig.	X11		.094	.009	.136	.310	.449	.004	.023	.262	.145	.372
	X24	.094		.346	.463	.023	.266	.422	.109	.234	.234	.034
	X23	.009	.346		.085	.208	.014	.078	.216	.357	.236	.000
	X13	.136	.463	.085		.113	.221	.056	.453	.126	.018	.094
	X14	.310	.023	.208	.113		.004	.001	.066	.011	.016	.162
	X31	.449	.266	.014	.221	.004		.104	.500	.388	.192	.017
	X33	.004	.422	.078	.056	.001	.104		.098	.398	.417	.001
	X22	.023	.109	.216	.453	.066	.500	.098		.002	.301	.139
	X32	.262	.234	.357	.126	.011	.388	.398	.002		.477	.005
	X12	.145	.234	.236	.018	.016	.192	.417	.301	.477		.446
	X21	.372	.034	.000	.094	.162	.017	.001	.139	.005	.446	

From the kmo and Bartlett test results in Table 2, although the value of kmo is $0.467 < 0.5$, considering that the principal component analysis method is used to further test the factor contribution in this paper[3]. Principal component analysis does not look at kmo value. Kmo less

than 0.5 is just not suitable for factor analysis. In addition, SIG If this value is less than 0.05, the original hypothesis is rejected. Through qualitative and quantitative analysis, it is finally considered suitable for factor analysis.

Table 3 kmo and Bartlett's inspection		
Kaiser Meyer Olkin measure of sampling adequacy.		
Bartlett's sphericity test	Approximate chi square	137.275
	df	55
	Sig.	.000

The total variance of interpretation is the contribution rate of factors to variable interpretation (it can be understood as how many factors are needed to express the variable as 100%). In this table, the column of initial eigenvalue represents the contribution rate. We only need to look at one column. Here, we need to select 5 common factors cumulatively. The cumulative contribution rate of these 5 common factors expresses the variable to 55%, and the effect of factor analysis is still ideal. See Table 4 for the specific results.

Table 4 total variance explained									
Ingredients	Initial eigenvalue			Extract sum of squares load			Rotation sum of squares loading		
	total	Variance %	accumulate %	total	Variance %	accumulate %	total	Variance %	accumulate %
1	1.456	13.240	13.240	1.456	13.240	13.240	1.395	12.683	12.683
2	1.295	11.768	25.008	1.295	11.768	25.008	1.227	11.154	23.837
3	1.163	10.569	35.577	1.163	10.569	35.577	1.216	11.052	34.889
4	1.127	10.245	45.821	1.127	10.245	45.821	1.147	10.432	45.321
5	1.084	9.859	55.680	1.084	9.859	55.680	1.140	10.359	55.680
6	.979	8.899	64.580						
7	.912	8.294	72.873						
8	.898	8.164	81.037						
9	.801	7.278	88.315						
10	.692	6.292	94.607						
11	.593	5.393	100.000						

3. Suggestions on Virtual Enterprise Partner Evaluation

By summarizing the research and summary of virtual enterprises by scholars in various fields in recent five years, this paper makes a literature review, and uses the six-point Likert scale questionnaire to assign values to the eleven influencing factors of virtual organization partner selection, assign values to the consumption table of these influencing factors, and then quantify them into a table, and then use SPSS software to conduct factor analysis on the table data. In the process of dimensionality reduction, the original results are analyzed by kmo and Bartlett's sphericity test and significance level. Then the principal component analysis is selected in the extraction method and the maximum variance method is selected in the rotation process[4]. Then select the method of saving variables and selecting regression in the factor score, and select the display factor score coefficient matrix. Finally, the final comprehensive score is calculated and ranked through the score of coefficient matrix. The following suggestions are put forward:

3.1 Suggestions for the Enterprise Itself

Because the virtual company itself is formed by enterprise organizations with different advantages and no corporate culture, whether the production after cooperation has differentiation is

an important factor affecting the cooperation. In addition, the cost of cooperation and other factors must also be considered, because in the market competition, the direct purpose of enterprises is to obtain benefits.

3.2 Recommendations to the Government

Virtual companies do not have advantages in market competition. The government should give these companies full support and attention, and properly use macro-control means to support the development of virtual organizations under the decline of economic situation or the impact of foreign enterprises[5]. At the same time, due to the lack of corresponding laws and regulations, there are some loopholes in the establishment of virtual companies, which may lead to the loss of benefit distribution. Therefore, the government should strengthen the relevant laws and regulations of virtual organizations and realize the fair distribution of benefits.

4. Conclusion

Based on the previous studies on the factors that should be considered in the selection of partners for virtual enterprises, this paper lists and analyzes the main views of predecessors in detail, and carries out factor analysis and verification by means of an actual questionnaire, all of which are to help virtual enterprises make the best decision in the selection of partners. In addition, this paper also provides some open ideas for the efficient operation of virtual enterprises, and provides a reference for subsequent research.

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