An Empirical Study on the Influencing Factors of Interconnected Costs between Organizations

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ABSTRACT

With the development of the times, the competition between enterprises and enterprises in the traditional mode has been transformed into competition between the supply chain and other supply chains, and enterprises are increasingly focusing on cooperation with other companies in the supply chain. And to be able to cooperate better, organizations and organizations have to consider the cost, especially the cost of the problem after the cooperation.

How to define and reduce this cost is an important factor for the organization to achieve higher returns in the supply chain. Based on this problem, this paper focuses on the definition of interorganizational interconnection costs and its influencing factors, and conducts relevant empirical analysis.

Key word: Supply chain; Cooperation; Interconnectedness; Cost

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How to cite this article:
1. Introduction
Cooperation is the key to organizational growth and mutual benefit in the supply chain. From the perspective of improving the overall efficiency of the supply chain, interorganizational interconnection is a very important factor. If we only emphasize competition, we do not know how to use the cooperation effect of the organization in the supply chain, which will definitely affect the efficiency of the entire supply chain. Therefore, organizations should understand the superior resources of other organizations in the supply chain, integrate them and use them to become their own resources, and use these resources to create the greatest profits for each other.

When considering cooperation issues between organizations and organizations, the first thing that comes to mind should be the cost of cooperation. Li Nan(2009) proposed that the cost of network cooperation between Internet operators should be put into the general organization to see the interconnection costs between organizations. Due to the size of the supply chain, the differences in management models and culture between organizations will inevitably affect the size of this interconnection cost. Current scholars have less research on the cost of interconnection between organizations, or just focus on the definition of interconnected cost, and rarely focus on the influencing factors of interconnected cost.

In view of this, this paper takes the interconnected cost of interorganization as the research object, and divides the interconnected cost into three parts: initial cost, transmission cost and feedback cost. Through empirical analysis, it discusses several factors affecting the interorganizational interconnection cost. And the extent of its impact, in order to provide the necessary theoretical support for the formation of effective interconnection between cooperative organizations in the supply chain.

2. The concept of interconnected cost
The interconnection cost was first quoted in the Internet industry. We use the research model of the Internet industry to extend the concept of interconnected cost to the general industry chain, and divide the interconnected cost into initial cost, transmission cost of interorganizational interconnection, and feedback cost.

2.1 Initial cost
The initial cost mainly refers to the cost of the information exchange and transmission facilities between the leading organizations and the establishment of related systems in order to achieve effective interconnection between multiple organizations. For example, a platform for information sharing must be established between interconnected organizations: a financial information sharing platform and a warehouse information sharing platform. Correspondingly, more channels need to be allocated to adjust this information so that it can adapt to the needs of both parties and even multiple parties.

2.2 Transmission cost
Transmitting costs, when a certain resource information of an organization has been generated and published through the information sharing platform, it is necessary to form a transmission mechanism to transmit the information of the organization to the corresponding supply chain that needs this information. Other organizations, the cost of this process. If the information is sent and received between the interconnected organizations for a short period of time and accuracy, the cost is naturally less. Conversely, if this information is transmitted for a long time and the demanding organization cannot quickly identify and respond to this information, it will naturally cause a time lag in the information.

2.2 Feedback cost
The cost of feedback, when the demand side of the information receives the information transmitted by the information publisher, how to match and modify the content of this information with what it needs, and then on the basis of what it needs or modify. After the information is fed back to the publisher, the cost of this process. Li Juan, Huang Peiqing (2007) believes that the efficiency of the organization in the feedback of
information depends more on the size of the organization itself and the integrity of the information released.

3. Factors Influencing Interconnection Cost

3.1 Factor assumptions affecting initial costs

The initial cost investment is mainly determined by the number of organizations in the supply chain and the size of the organization (Neeru Sharma, 2000)\(^4\) when the supply involves a small number of organizations and organizations, and the degree of interconnection between organizations and organizations. It is relatively low, and business transactions between each other are relatively infrequent, so the initial cost of input is less.

At the same time, the size of the transaction between the organization and the organization is also an important factor affecting the initial cost. When the transactions of the two organizations are large, organizations are more willing to invest in the cost of establishing links with each other to facilitate better transactions. Therefore, the paper makes the following assumptions:

- **H1**: There is a positive relationship between the size of the organization and the initial cost.
- **H2**: The transaction size has a positive relationship with the initial cost.

3.2 Factor assumptions affecting transmission costs

The investment in transmission costs depends on the degree of mutual understanding between the organization and the organization in the supply chain. The exchange of information can be exchanged between organizations. Information sharing is the sharing of business, financial and strategic information, including each other, through formal and informal channels. Konsynski (1994)\(^5\) proposed that by sharing relevant information between organizations, a competitive advantage can be created. The two sides exchange their information through regular exchanges to deepen each other's relationship. Once the relationship is deepened, when one party has a transaction demand or transaction information is released, The other party is more likely to quickly establish a partnership with them, which shortens the time for information transfer and reduces the cost of transmission. In addition, companies that have large scale and high reputation in a supply chain often publish or receive information more quickly than smaller companies because they have a more complete management system and information channels. It is more efficient to send and receive some transaction information. Therefore, this paper makes the following assumptions:

- **H3**: There is a negative correlation between information sharing and transmission costs.
- **H4**: There is a negative correlation between information sharing and transmission costs.

3.3 Factor assumptions that affect feedback costs

In economic exchanges, as the time of interaction changes, the company's understanding of the partners will continue to increase. The partner experience is the recognition of the accumulation of behaviors, goals and values of both parties through long-term cooperation. The historical experience of cooperation between business partners is a key factor in determining whether a partner is trustworthy. Rousseau (1998)\(^6\) proposed that if the counterparty finds that the other party's behavior is the same, the goal is the same, and the values are similar, there will be a positive reaction, which will promote the company's attitude towards the partner's satisfaction and trust, and make the cooperation more for coordination. Generally speaking, the longer the cooperation time of the two parties, the more understandable and accurate the behavior of the other party, and the lower the risk of cooperation, especially the higher the return of benefits obtained in the past cooperation process, then the satisfaction of the partners. The higher.

In this case, the feedback cost will be lower. In addition, cultural differences between organizations can also bring varying degrees of feedback costs. Corporate culture is a combination of common management concepts, ways of thinking and behavioral norms formed by supply

chain enterprises in long-term management activities. Each organization has its own corporate culture, and different organizations have different corporate cultures. This inevitably leads to cultural differences, especially for some large multinational companies, which have great differences in cultural concepts. Differences lead to employees generating different opinions in dealing with the same thing, causing obstacles to communication among employees, which in turn leads to misunderstandings and conflicts between the cooperative enterprises, and makes the enterprise relationship in an unbalanced state.

The smaller the cultural differences between organizations, the higher the sense of identity, which is conducive to the cooperation between the two sides; on the contrary, the greater the cultural differences between organizations, the more difficult it is to form a common value, which is not conducive to the formation of cooperation. Therefore, this paper makes the following assumptions:

H5: There is a negative correlation between cooperation time and feedback cost
H6: There is a positive correlation between cultural differences and feedback costs.

4. Research methods
4.1 Research framework
This paper divides the interconnected cost into three parts: initial cost, transmission cost and feedback cost, and measures the interconnected cost from the six dimensions of organization size, transaction size, information sharing degree, organizational reputation, cooperation time and cultural difference.

4.2 Operational definition of variables and questionnaire design
4.2.1 Operational definition
According to the results of literature research, this paper organizes the operational definition of each variable and related references in Table 4-2-1.

<table>
<thead>
<tr>
<th>variable</th>
<th>Operational definition</th>
<th>Reference source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial cost</td>
<td>In order to achieve effective interconnection between multiple organizations, the cost of the information exchange and transmission facilities between the</td>
<td>Jie ErShi (2010)</td>
</tr>
</tbody>
</table>
leading organizations and the establishment of related systems.

When a certain resource information of an organization has been generated and published through the information sharing platform, it is necessary to form a transmission mechanism to transmit the information of the organization to other organizations in the supply chain that need this information. The cost of this process.

The cost of feedback, when the demand side of the information receives the information transmitted by the information publisher, how to match and modify the content of this information with what it needs, and then on the basis of what it needs or modifyAfter the information is fed back to the publisher, the cost of this process.

Li Juan, Huang Pei-Qing (2007)

Organization reputation
Performance evaluation of partners’ cooperation with other companies in the industry.

In the supply chain, the exchange of consultations and open communication between organizations and organizations.

Houston (2000)

Sharing degree
The number of people an organization has and the relationship between these people.

Holm (2006)

Transaction size
The total amount of transactions in a supply chain or a certain period of time in a certain industry.

Deming (2006)

Cooperation time
The time limit between the parties from the agreement to the termination of the agreement.

J.Cullen (2000)

The business culture of different companies differs greatly in the code of conduct that represents appropriate business rules. This difference leads to differences between different business practices, including business decisions, business negotiations, and business management.

Table 4-2-1

4.2.2 Questionnaire design
This paper takes the manufacturing industry as the research parent. The survey targets mainly the food industry, textile industry, automobile industry, equipment industry, home appliance industry, equipment and other types of enterprises in the manufacturing industry. The scope of investigation is Zhenjiang City. A total of 200 questionnaires were distributed and 84 were recovered. The recovery rate was 42%, of which 69 were valid questionnaires. According to the age of the respondents, 81.2% of them are over 30 years old. In terms of employment positions, the procurement and finance department personnel are the main respondents; in terms of education level, they are all college education or above, and the understanding of the questionnaire is accessible. The answer can be judged according to its perception.

In the design of the questionnaire, according to the research framework shown in Figure 4-1, the initial cost, transmission cost, and feedback
cost are the research objects, and a total of 13 items are set. Among them, there are 4 items to measure the initial cost, and there are 2 evaluation aspects of the organization scale, which are the market share of the organization and the total number of employees (Song Yongtao)[7], codenamed; there are 2 evaluations to measure the scale of the transaction. In terms of terms, annual sales and annual sales are coded as. There are five publicly-recognized items that measure the cost of transmission. There are two evaluation aspects of sharing, including financial information sharing and job information sharing (Kumar,1997)[8], code-named; three evaluation aspects of measuring organizational reputation, They are brand, word of mouth, and popularity (Yang Jing, 2006)[9], codenamed. There are four items to measure the cost of feedback. Two of the evaluations that measure the time of cooperation are to have a higher understanding of the way the supplier handles the problem and a longer and more extensive cooperation with the supplier. Experience (Kwon, 2004)[10], code-named; there are two evaluation aspects of measuring cultural differences, which are similar in terms of employee behavioral norms and the same values of member companies in the supply chain (Lee, 1998)[11], codenamed. Each item is scored using the Likert 5-point scale.

4.3 Data Processing
The conceptual model established in this paper is mainly analyzed by SPSS and structural equation modeling. Firstly, SPSS is used to test the reliability and validity of the measurement model, then the correlation analysis and regression analysis are performed on each variable. Finally, the conceptual model is used by Amos. A confirmatory analysis of the relationships between the variables.

4.3.1 Validity and reliability test
Reliability analysis refers to the stability or consistency of the measurement results. That is to say, when multiple measurements are repeated on the same thing, whether the consistency result can be obtained. If the result is consistent, the better the reliability is. In the reliability test, the Cronbach's a value is mainly used for testing. It is generally considered that the Cronbach's a value is between (0, 1), and if it is between 0.7 and 0.8, it is a high confidence value, if it is lower than acceptable. When the minimum value is 0.6, it is rejected. It can be seen from Table 4-3-1 that the Cronbach's a value of the internal reliability measurement index of this measurement scale is greater than 0.7, indicating that each variable has good reliability.

Commonly used validity is content validity and structural validity. The content validity reflects whether the content in the measurement table conforms to the theme, and the structural validity is to verify whether the measurement table can truly measure the expected variable. Structural validity is primarily measured by factor load values and reliability combination (CR) values. The factor load value (KMO) is mainly to measure the relativity between each latent variable and its measurement item A. Kraiser (1974)[12] believes that when KMO>=0.5, there are more common factors between the projects, which is suitable for doing. Factor analysis, conversely, KMO <0.5 is not suitable for factor analysis. Structural validity is further divided into convergence validity and discriminant validity. The convergence validity is tested by AVE value (average extraction variance) to test the correlation degree of the measurement items of the same latent variable. The larger the AVE value, the more the index variable can explain the latent variable, the better the convergence validity, 0.5 is the critical point of AVE. It can be seen from Table 4-3-1 that the AVE values re all in compliance with the standard greater than 0.5, and the combined reliability CR values are also in compliance with the standard greater than 0.7, indicating that the scales have high convergence validity.
<table>
<thead>
<tr>
<th>variable</th>
<th>Question</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Factor load</th>
<th>Combination reliability</th>
<th>Cronbach’s $\alpha$</th>
<th>AVE</th>
<th>CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>The initial cost</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organization size</td>
<td>$Q_1$ $Q_2$</td>
<td>2.947</td>
<td>1.320</td>
<td>0.697</td>
<td></td>
<td>0.822</td>
<td>0.6149</td>
<td>0.8258</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.201</td>
<td>1.361</td>
<td>0.751</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transaction size</td>
<td>$Q_3$ $Q_4$</td>
<td>2.822</td>
<td>1.475</td>
<td>0.667</td>
<td></td>
<td>0.812</td>
<td>0.775</td>
<td>0.7826</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.087</td>
<td>1.422</td>
<td>0.667</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sharing degree</td>
<td>$Q_5$ $Q_6$</td>
<td>2.928</td>
<td>1.308</td>
<td>0.685</td>
<td></td>
<td>0.804</td>
<td>0.5112</td>
<td>0.8060</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.111</td>
<td>1.391</td>
<td>0.639</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The cost of transport</td>
<td>$Q_7$ $Q_8$</td>
<td>3.438</td>
<td>1.565</td>
<td>0.765</td>
<td></td>
<td>0.794</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organizational reputation</td>
<td>$Q_9$</td>
<td>2.995</td>
<td>1.476</td>
<td>0.718</td>
<td></td>
<td>0.776</td>
<td>0.6160</td>
<td>0.8250</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.404</td>
<td>1.465</td>
<td>0.722</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The cost of feedback</td>
<td>$Q_{10}$ $Q_{11}$</td>
<td>3.125</td>
<td>1.275</td>
<td>0.718</td>
<td></td>
<td>0.809</td>
<td>0.5569</td>
<td>0.7891</td>
</tr>
<tr>
<td>Cooperation time</td>
<td></td>
<td>3.168</td>
<td>1.280</td>
<td>0.722</td>
<td></td>
<td>0.762</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cultural difference</td>
<td>$Q_{12}$ $Q_{13}$</td>
<td>3.010</td>
<td>1.445</td>
<td>0.735</td>
<td></td>
<td>0.819</td>
<td>0.6586</td>
<td>0.7935</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.039</td>
<td>1.516</td>
<td>0.828</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4-3-1

4.3.2 Correlation analysis

Correlation analysis measures the closeness of a simple linear relationship between variables, usually expressed in terms of Pearson coefficients. Usually the coefficient has a value range of (-1, 1). When the correlation coefficient is > 0, it indicates a positive correlation. When the correlation coefficient is <0, it indicates a negative correlation. We use SPSS software to measure the correlation between supply chain enterprise connectivity costs and several influencing factors. The correlation coefficient between the two pairs is shown in Table 4-3-2.
It can be seen from Table 4-3-2 that there is a significant positive correlation between organizational size and transaction size and initial cost, and there is a significant negative correlation between sharing degree and organizational reputation. There is a negative correlation between cooperation time and feedback cost. There is a positive correlation between sex, cultural difference and feedback cost, so it is assumed that H1, H2, H3, H5, and H6 are all supported.

4.3.3 Regressive analysis

The SPSS was used to analyze the regression of the three aspects of interconnected cost and its corresponding influencing factors. The following table is drawn:

<table>
<thead>
<tr>
<th>model</th>
<th>Non-standard coefficient</th>
<th>Standardization coefficient</th>
<th>T value</th>
<th>Sig,</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>1.978</td>
<td>6.413</td>
<td>0.0000</td>
<td></td>
</tr>
<tr>
<td>Influencing factor Organiza-</td>
<td>0.050</td>
<td>0.050</td>
<td>2.348</td>
<td>0.02</td>
</tr>
<tr>
<td>tion size</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transaction size</td>
<td>0.042</td>
<td>0.042</td>
<td>2.353</td>
<td>0.02</td>
</tr>
<tr>
<td>Sharing degree</td>
<td>0.034*</td>
<td>-0.138*</td>
<td>-0.128*</td>
<td>-0.201*</td>
</tr>
<tr>
<td>Organization reputation</td>
<td>0.027*</td>
<td>-0.215*</td>
<td>-0.201*</td>
<td>0.109</td>
</tr>
<tr>
<td>cooperation time</td>
<td>0.018*</td>
<td>-0.117*</td>
<td>-0.229*</td>
<td>0.231</td>
</tr>
<tr>
<td>Cultural difference</td>
<td>0.036</td>
<td>0.225</td>
<td>0.301*</td>
<td>0.020</td>
</tr>
</tbody>
</table>

Note: "*" means p<0.05, "**" means p<0.01 (two-tailed test) Table 4-3-2

Dependent variable: initial cost  F value: 7.417  \( R^2 = 0.067 \)  After adjustment  \( R^2 = 0.058 \)
It can be seen from the above three regression analysis tables that the Sig value of the initial cost and the transaction size is less than 0.05, and the normalization coefficients are 0.05 and 0.042, respectively, which are significantly positively correlated; The sharing degree and organizational reputation have a Sig value of less than 0.01 for the transmission cost, and the normalization coefficients are -0.132 and -0.210, respectively. Significant negative correlation; cooperation time and cultural difference have a Sig value of less than 0.01 for feedback cost, and the normalization coefficients are -0.225 and 0.295, respectively, a significant positive correlation and a significant negative correlation.

4.3.4 Structural equation model test

In order to test whether the theory proposed in this paper is adaptive, the structural model (SEM) is used to verify the theoretical model and hypothesis of this paper. Therefore, this paper uses linear structural structure analysis (LSREL) to test two or more related correlations, and also to understand the causal relationship of the overall model. In this paper, the maximum likelihood method is used for parameter estimation. The obtained parameter estimates and model path diagram are shown in Table 4-3-4-1:
In verifying the model’s basic fitness index, Bogozi and Yi (1998) pointed out that the factor load between each potential variable and its corresponding observed variable is preferably between 0.50 and 0.95. In addition, all error variations of the estimated parameters must reach a significant level (T value) > 1.96, as shown in Table 4-3-1. The factor load value between each potential variable and its observed variable in this paper is greater than 0.50, less than 0.95, and the T value is greater than 1.96, that is, the error variation reaches a significant level, and the measurement error has no negative value. This indicates that the rational model proposed in this paper is generally in line with the basic fitting criteria.

The overall fitness of the model is used to test the degree of fit between the hypothetical model and the data. Whether the overall fitness conforms to the standard is usually judged from the absolute adaptation index, the incremental adaptation index, the simple adaptation index and the residual analysis. This paper mainly uses $\chi^2$/df, GFI, AGFI, RMR, RMSEA, IVFI, IFI, GFI and other indicators to evaluate the fit of the model. In general, the chi-square $\chi^2$/df is between 1 and 3, which means that the fit of the model is good, the stricter ratio is between 2 and 2; the fit index GFI is between 0 and 1. The general criterion is that GFI is greater than 0.90; AGFI is the adjusted fitness index, and its evaluation standard is the same as GFI; the RMR value is below 0.05, which is acceptable. The smaller the value, the better; the reasonable range of RMSEA is 0.05 to 0.08. In between, it means that the fit of the model is acceptable. If the value is less than 0.05, it means that the model fit is very good. For NFI, IFI, CFI and other indicators, the acceptable range of values is between 0 and 1, the closer to 1 means the better the fit of the model.

<table>
<thead>
<tr>
<th>Matching index</th>
<th>$\chi^2$/df</th>
<th>GFI</th>
<th>AGFI</th>
<th>RMR</th>
<th>RMSEA</th>
<th>NFI</th>
<th>IFI</th>
<th>CFI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate detection value</td>
<td>1.154</td>
<td>0.921</td>
<td>0.901</td>
<td>0.901</td>
<td>0.027</td>
<td>0.854</td>
<td>0.978</td>
<td>0.977</td>
</tr>
</tbody>
</table>

Table 4-3-4

In this paper, the maximum likelihood estimation method is used to obtain the fitting indexes of the measurement model, as shown in Table 4-3-4. $\chi^2$/df = 1.154, between 1 and 2, GFI = 0.921, greater than 0.90, AGFI = 0.921, greater than 0.9, Explain that the fit of the model to the sample data is very good; RMR = 0.091, indicating that the overall fit of the model is not good, but very close to the standard value of 0.05; RMSEA = 0.027, indicating that the model fit is very good. NFI = 0.854 is close to 0.09, IFI = 0.978 is greater than 0.9 close to 1, and CFI = 0.977 is greater than 0.9 close to 1. The above-mentioned fitness index has reached the standards recommended by relevant researches at home and abroad. Therefore, there is a high degree of fit between the theoretical model and the data in this study.

4 Conclusion.

By summarizing the research contents of relevant experts and scholars at home and abroad, this paper summarizes the inter-organizational interconnection costs into initial cost, transmission cost and feedback cost, and divides the factors affecting these three costs into organizational scale, transaction scale and information according to expert opinions. The six dimensions of sharing degree, organizational reputation, cooperation time and cultural difference degree, and using relevant quantitative analysis, it is concluded that the organizational scale and
transaction size are significantly positively correlated with the initial cost; sharing degree and organizational reputation are significantly negatively correlated with transmission cost; Cooperation time and cultural differences have a significant positive correlation with feedback costs, a significant negative correlation. On this basis, regression analysis is used to calculate the correlation coefficient between each dimension and its corresponding cost more accurately. It can reduce the operating costs and improve the efficiency of the entire supply chain for the organization in the future through more effective interconnection.

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Fund project: Research on Open Accounting and Trust and Control Interconnection Based on Inter-Organization Cost Management (10YJA630027), Ministry of Education Humanities and Social Sciences General Project.