

Operation risk and control strategy of international freight forwarder

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Abstract

In the process of international freight forwarding operations, often because of internal or external causes of the freight forwarding industry exists many potential risks, these risks may lead to the loss of freight forwarders. In this paper, DEMATEL method is used to analyze the data. Then we analyse the research results, summarize the importance of the freight forwarder operational risk response strategy, evaluate the factors, and make recommendations.

Key words: *international freight forwarder; operational risk; dematel method; control strategy*

1 Introduction

The international freight forwarder in our country has a slower growth rate and a short history of development, but with the support of the country,¹ it develops faster. In order to obtain greater competitive advantage, in the face of market, legal, economic, political and other aspects at the same time, for China's international freight forwarding enterprises, various measures should be taken to reduce the losses caused by operational risk.

2 Research methods

2.1 Secondary data analysis

Citing the primary data collected by other previous studies as subjects of our own research data, such data is secondary.² Secondary data analysis methods include archival records research, content analysis, summary analysis and so on.

2.2 DEMATEL analysis

DEMATEL (Decision, Making, Trial, and, Evaluation, Laboratory), a laboratory for decision making experiments and evaluation, is a method of system factor analysis by means of graph theory and matrix tools.³ This method can judge whether there is any relationship between the elements and their strength.

3 Empirical research

3.1 Planes and guidelines

Through the analysis of literature data and Fujian Province logistics industry experts, this study suggests that the operational risk of international freight forwarding are from the internal and external of the enterprises, its influencing factors include four aspects, factors including personnel, system, external environment and material.

3.2 Questionnaire content

The contents of the questionnaire include the following three aspects: personal information (name, age, job title, seniority); importance evaluation (The five grades and eight standards were adopted by the experts interviewed to fill in the scoring grades of each problem,⁴ and they were divided into 5 grades, they are not important, very low important, low important, important, and highly important, extremely highly important); mutual impact assessment (by experts interviewed for the mutual influence of the relationship between the evaluation criteria, the rating is divided into 6 grades, 0 shows no effect, 1 means extremely low impact, 2 means low impact, 3 means moderate effect, 4 means high impact, and 5 means extremely high impact).

3.3 Questionnaire implementation

In this study, the research contents are collated and made into questionnaires. After practical consideration, this study decided that the subjects of this questionnaire were mainly logistics experts and teachers in Fujian province. The questionnaires mainly include questionnaires, expert interviews and e-mail.

3.4 Data analysis and main results

3.4.1 DEMATEL analysis steps

First, determine the degree of relevance of the criterion. According to the relation between the criterion and the criterion, the measure of the degree of influence is designed to explain the relation between them. The grades range from 0~5, are divided into 6 grades, which are used to evaluate the importance of each criterion.

Second, establish correlation matrix. The normalized direct relation matrix, the I-X matrix, the I-X inverse matrix and the total influence relation matrix are obtained sequentially from the initial matrix.

The initial matrix, characteristic factors, the relative influence to rating scale dual comparison, $n \times n$ direct relation matrix X , such as formula (1), and within the matrix for each value X_{ij} ($i = 1, 2, \dots, n; j = 1, 2, \dots, n$) indicate the direct relationship between factors i and j .

$$X = \begin{bmatrix} 0 & x_{12} & \dots & x_{1n} \\ x_{21} & 0 & \dots & x_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ x_{n1} & x_{n2} & \dots & 0 \end{bmatrix} \quad (1)$$

Suppose the study factor is H , and the expert opinion matrix is $X^k = [X_{ij}^k]$ ($1 \leq k \leq H$)

Integrate all expert opinions and get the average matrix $A = [a^{ij}]$, detailed formula (2)

$$a^{ij} = \frac{1}{H} \sum_{k=1}^H X_{ij}^k \quad (i = 1, 2, \dots, n; j = 1, 2, \dots, n) \quad (2)$$

In this study, we take the moment array and the largest one as the normalization benchmark, so as to S , such as formula (3), the average matrix A multiplied by S , we can obtain the normalized direct relational matrix N , such as formula (4).

$$S = \frac{1}{\max_{1 \leq i \leq n} \sum_{j=1}^n a_{ij}} \quad (3)$$

$$N = A \times S \quad (4)$$

After knowing the normalized direct relation matrix N , the total influence relation matrix T (or direct and indirect influence relation matrix) can be obtained by formula (5), in which I is the unit matrix.

$$T = N (I - N)^{-1} \quad (5)$$

Calculation (D+R) centrality and (D-R) cause degree

Let r be the total influence relationship matrix T for the column and column sum r^i (6). And

let c be a T representative, can also be combined for c^j (7).

$$r = \begin{bmatrix} t_1 \\ \vdots \\ t_n \end{bmatrix} ; \quad r_i = \sum_{j=1}^n t_{ij} \quad (i = 1, 2, \dots, n) \quad (6)$$

$$c = [t_1 \quad \dots \quad t_n] ; \quad c_j = \sum_{i=1}^n t_{ij} \quad (j = 1, 2, \dots, n) \quad (7)$$

R_i : Factor i gives the sum of other factors, direct and indirect effects.

C_j : Factor j is subject to other factors, the sum of direct and indirect effects.

When $i=j$, $(r_i + c_j)$ is called the correlation degree, which is given and by the sum of the value of the i, the greater of the value, the greater the factor I is an important factor in the overall problem; the ranks of the poor $(r_i - c_j)$ is known as the reason, and give the difference, if the positive value indicates that the grant is greater than the receipt, the factor i is biased to influence the other factors, which can be classified as the cause of the overall problem. If negative, it means that the given is less than received, and the factor I is biased into the category affected by other factors, which can be classified as a result of the overall problem.

Third, draw causal graphs. The four quadrants of a causal map represent different meanings. The first quadrant is the core factor of the center said, it is high, and is the key reason for the high degree of influence on the research subject of factor; the second quadrant is the driving factors, its centre degree is low, cause degree is high, with independent and other factors will affect the minority; the third quadrant is independent factor, its center degree is low, cause degree is low, and the other factor interaction is low, single management control factor in this area can be said to be the fourth quadrant; impact factor, its center degree is high, reason is low it is a factor, are in urgent need of management, but not directly improve, need to manage the first quadrant and second quadrant factor can improve the area factor.

Fourth, screen important criteria. With the help of causal maps, decision makers can make appropriate decisions based on the influence category or affected class in the guidelines, which can be more convenient and intuitive to filter out important criteria.

3.4.2 Importance evaluation analysis

From the importance evaluation analysis we can see that the important factors influencing the international freight forwarding operations risk. But it is impossible to see the cause and effect relationship among these factors. DEMATEL questionnaire was used in this study, to find out whether the causal relationship is exit between the guidelines and their influence. This part, using the DEMATEL method of analysis steps, and now the results will be collated as Table1~Table8:

Table 1 –Initial matrix

Initial	F1	F2	F3	F4	F5	F6	F7	F8
F1	0	3.57	3.71	3	3	3.14	3.43	3.57
F2	4.14	0	2.57	2.57	2.29	2	2.86	3
F3	3.29	2.57	0	3.43	3.43	2.71	2.71	3.57
F4	2.43	2	3.86	0	2.71	1.71	3.43	3.71
F5	2.14	1.86	3.14	3	0	3.57	2.86	3.14
F6	2.14	1.71	3.14	2.43	3.57	0	2.43	2.86
F7	2.86	2.43	3.29	3.29	3.43	2.71	0	3.86
F8	3	2.71	3	3.57	3.29	2.57	3.71	0

Table 2 –Normalized matrix

Normalized	F1	F2	F3	F4	F5	F6	F7	F8
F1	0	0.152434	0.158412	0.128096	0.128096	0.134073	0.146456	0.152434
F2	0.176772	0	0.109735	0.109735	0.09778	0.085397	0.122118	0.128096
F3	0.140478	0.109735	0	0.146456	0.146456	0.115713	0.115713	0.152434
F4	0.103757	0.085397	0.164816	0	0.115713	0.073015	0.146456	0.158412
F5	0.091375	0.079419	0.134073	0.128096	0	0.152434	0.122118	0.134073
F6	0.091375	0.073015	0.134073	0.103757	0.152434	0	0.103757	0.122118
F7	0.122118	0.103757	0.140478	0.140478	0.146456	0.115713	0	0.164816
F8	0.128096	0.115713	0.128096	0.152434	0.140478	0.109735	0.158412	0

Table 3 –I-X matrix

I-X	F1	F2	F3	F4	F5	F6	F7	F8
F1	1	-0.15243	-0.15841	-0.1281	-0.1281	-0.13407	-0.14646	-0.15243
F2	-0.17677	1	-0.10974	-0.10974	-0.09778	-0.0854	-0.12212	-0.1281
F3	-0.14048	-0.10974	1	-0.14646	-0.14646	-0.11571	-0.11571	-0.15243
F4	-0.10376	-0.0854	-0.16482	1	-0.11571	-0.07301	-0.14646	-0.15841
F5	-0.09137	-0.07942	-0.13407	-0.1281	1	-0.15243	-0.12212	-0.13407
F6	-0.09137	-0.07301	-0.13407	-0.10376	-0.15243	1	-0.10376	-0.12212
F7	-0.12212	-0.10376	-0.14048	-0.14048	-0.14646	-0.11571	1	-0.16482
F8	-0.1281	-0.11571	-0.1281	-0.15243	-0.14048	-0.10974	-0.15841	1

Table 4 –I-X inverse matrix

(I-X) inverse	F1	F2	F3	F4	F5	F6	F7	F8
F1	1.966363	0.966698	1.225749	1.149098	1.163137	1.022852	1.164767	1.265273
F2	0.979049	1.715979	1.031255	0.984869	0.986512	0.853659	0.997132	1.083118
F3	1.025234	0.878715	2.019726	1.097181	1.109907	0.950761	1.074967	1.192607
F4	0.934386	0.805231	1.090467	1.903427	1.018084	0.85715	1.031527	1.124512
F5	0.905764	0.783753	1.048293	0.997554	1.897596	0.905775	0.993357	1.085034
F6	0.853801	0.734005	0.989402	0.922878	0.973564	1.725561	0.922974	1.014556
F7	1.016711	0.878653	1.149374	1.099441	1.116991	0.956414	1.977438	1.209369
F8	1.020922	0.88753	1.139194	1.107419	1.110859	0.950353	1.113598	2.066923

Table 5 –Total influence matrix

Total	F1	F2	F3	F4	F5	F6	F7	F8
F1	0.966363	0.966698	1.225749	1.149098	1.163137	1.022852	1.164767	1.265273
F2	0.979049	0.715979	1.031255	0.984869	0.986512	0.853659	0.997132	1.083118
F3	1.025234	0.878715	1.019726	1.097181	1.109907	0.950761	1.074967	1.192607
F4	0.934386	0.805231	1.090467	0.903427	1.018084	0.85715	1.031527	1.124512
F5	0.905764	0.783753	1.048293	0.997554	0.897596	0.905775	0.993357	1.085034
F6	0.853801	0.734005	0.989402	0.922878	0.973564	0.725561	0.922974	1.014556
F7	1.016711	0.878653	1.149374	1.099441	1.116991	0.956414	0.977438	1.209369
F8	1.020922	0.88753	1.139194	1.107419	1.110859	0.950353	1.113598	1.066923

Table 6 –Value of centrality of operational risks of international freight forwarders (D+R) and
Cause degree

Evaluation criteria	D+R	D-R
F1	16.62617	1.221706
F2	7.631573	0.981007
F3	8.349098	-0.34436
F4	7.764785	-0.49708
F5	7.617128	-0.75952
F6	7.136741	-0.08578
F7	8.40439	0.128631
F8	8.396798	-0.64459

Table 7 –Sort of D+R

Sort	Evaluation criteria	D+R
1	F1	16.62617
2	F7	8.40439
3	F8	8.396798
4	F3	8.349098
5	F4	7.764785
6	F2	7.631573
7	F5	7.617128
8	F6	7.136741

The greater the D+R value, the greater the importance of this criterion in the overall

evaluation factor, and the greater the impact on other criteria.

Table 8 –Sort of D-R

Sort	Evaluation criteria	D-R
1	F1	1.221706
2	F2	0.981007
3	F7	0.128631
4	F6	-0.08578
5	F3	-0.34436
6	F4	-0.49708
7	F8	-0.64459
8	F5	-0.75952

When the value of D-R is greater, it indicates that this criterion directly affects other factors; and when the negative value of D-R is greater, it indicates that this criterion is affected by other factors. For the main impact of the relationship between the guidelines, that is, D-R is positive project, the main impact of international freight forwarders operational risk criteria for F1, F2, F7. The criteria for the impact of the relationship, that is, D-R negative value of the project, the criteria for F6, F3, F4, F8, F5, as Fig. 1.

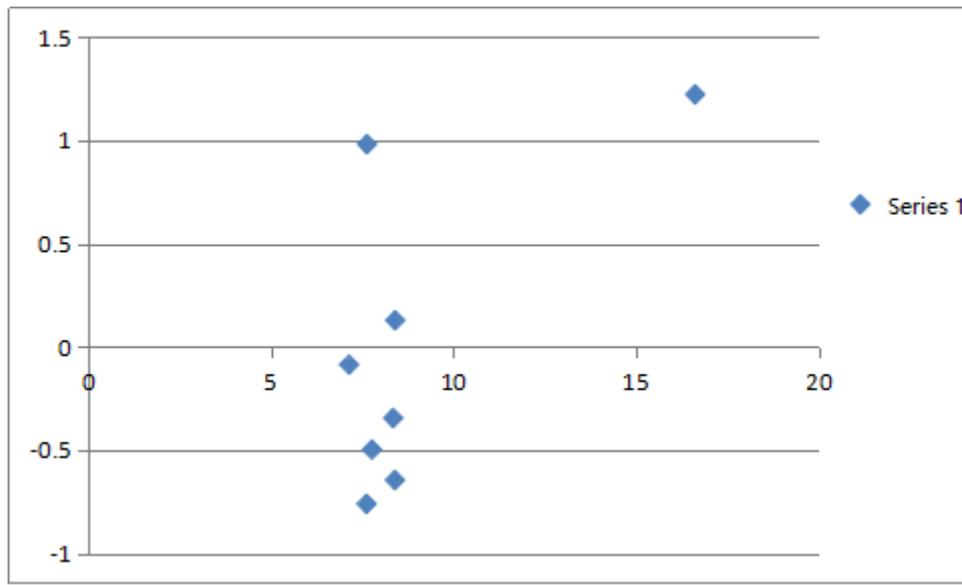


Fig. 1 –A causal coordinate diagram that affects the operational risks of international freight forwarders

The causality diagram is analyzed: the center of the F1 degree and the reason is the highest, as the key factors to solve the theme of this study, should be listed as the object of priority; F2 and F7 are of low centrality, high degree of cause and independence, they also effect a few other factors. The rest of the F6, F3, F4 F8, F5 are of both low centrality and degree of cause, they have less influence on other factors.

4 Conclusions

According to the analysis of DEMATEL empirical results, the following conclusions are made:

First, the internal personnel is the most important evaluation factor that affects the international freight forwarder operational risk response strategy,⁵ meanwhile, the promotion of the overall quality of employees is the most important factor.

Second, school and enterprise cooperation to training the logistics talents, can enhance the market competitiveness of enterprises. Exchanges and cooperation between schools and enterprises can strengthen the training of professionals and the degree of accuracy.

Third, strictly distinguish and control the goods, to establish and perfect the internal system, operation process, risk management system, establish and improve the customer credit management system, improve the core competitiveness to win a stable customer base, the rational allocation of logistics resources.⁶

Fourth, this study adopts DEMATEL method to analyze the results as follows: factors affecting the response strategy of international freight forwarder operation risk including enhance the overall quality of the staff, the cooperation strengthen training of logistics personnel. Therefore, enterprises should consider the importance evaluation factors in order to avoid or reduce the operational risks of international freight forwarders, and give secondary consideration to the remaining guidelines.

References

1. *Lingqi Wang*, Analysis and Prevention of Operational Risk in International Freight Forwarding, *J. Modern Business*, **3** (2016) 142-143.
2. *Jianqun Xu*, Research on Risk Prevention of International Freight Forwarders, *J. Journal of Changsha University*, **11** (2016) 27-29.
3. Cui Cui, Reflections on the Coping Strategies of Financial Risks in Current International Freight Forwarding Enterprises, *J. Modern State Owned Enterprises Research*, **20** (2017) 21.
4. Xiumei Wang. Challenges and Innovative Development Path of Chinese International Freight Forwarding Enterprises, *J. Reform and Strategy*, **33** (2017) 144-146.
5. Lingqi Wang, Jian Guan, Risk Identification and Response Analysis of International Freight Forwarding Enterprises, *J. Modern Commerce*, **4** (2016) 142-143.
6. Jing Sun, Xiaoyu Sun, Ping Ju, Problems and Countermeasures of the Development of Shandong Province International Freight Forwarding Enterprises, *J. Shopping Mall Modernization*, **17** (2016) 205-206.