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Partner Selection of Strategic Alliance in Shipping Enterprises

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Abstract. The Analytic Hierarchy Process (AHP) was chosen to solve partner issue of shipping enterprise strategic alliance in this paper, taking China Ocean Container Transportation Co. Ltd (COSCO Co., Ltd). As an example, firstly partner selection evaluation index were discussed, and then the structure diagram of strategic alliance partner selection and evaluation of the various elements of the design criterion layers was illustrated, and the weight of each index was calculated respectively, finally how to choose the best partner according to the weight was settled.

Introduction

COSCO Co., Ltd is a transnational enterprise group which operates shipping, logistics and other related business. It is now faced with the enormous competitive pressure from other international alliances of large transport companies [1]. Therefore the group decided to cooperate with several friendly logistics companies to form the vertical strategic alliance. So the analytic hierarchy process was used to confirm the weights of the 4 companies.

AHP Method is Used to Select Shipping Enterprise Strategic Partner

Determine the Partner Selection Evaluation Index

The selection evaluation index is shown in Table 1.

Table 1 Strategic partner selection evaluation index

The strategic partner selection evaluation index of shipping enterprises	Compatibility	Compatibility of strategic ideas
		Organization management structure
		Value creation potential
		Benefit and risk sharing
		Human resources
		Historical cooperation
	Ability	Operation ability
		Emergency response capability
		Internal coordination ability
		Core business
	Input	Asset scale
		Advanced transport equipment
		Information level
		personnel

If there were 4 shipping enterprises for the selection as objects, it could be seen as 4 options, the structure of the strategic alliance partner selection through the AHP hierarchy is shown through Fig. 1.

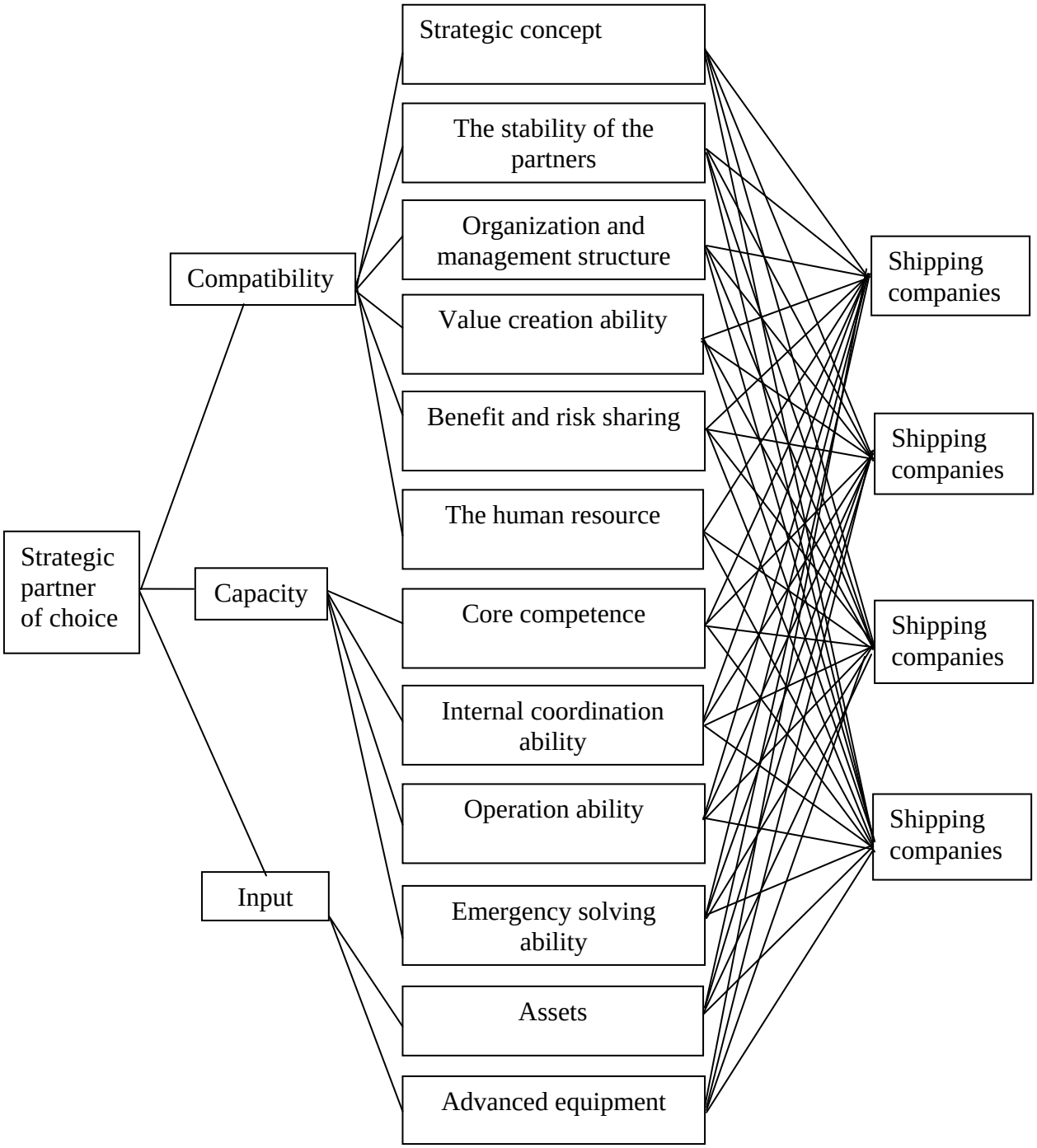

Fig. 1 Choice of enterprise hierarchy

One expert group of the design criteria for the evaluation of the elements was organized to evaluate every factor. Then get the results, it is shown in Table 2.

Table 2 Evaluation criteria layers table of the elements

	Compatibility	Ability	Input
Compatibility	1	3	5
Ability	1/3	1	3
Input	1/5	1/3	1
Total	23/15	13/3	9

After normalizing the judgment matrix of the criterion layer, the weights of each criterion were obtained, as shown in Table 3.

Table 3 The normalized weight

	Compatibility	Ability	Input	Weight
Compatibility	15/23	9/13	5/9	0.663
Ability	5/23	3/13	3/9	0.261
Input	3/23	1/13	1/9	0.106
Total				1.000

$$AW = \begin{pmatrix} 1 & 3 & 5 \\ 1/3 & 1 & 3 \\ 1/5 & 1/3 & 1 \end{pmatrix} \cdot \begin{pmatrix} 0.663 \\ 0.261 \\ 0.106 \end{pmatrix} = \begin{pmatrix} 1.946 \\ 0.790 \\ 0.320 \end{pmatrix} \tag{1}$$

$$\lambda = (1.946/0.633 + 0.790/0.261 + 0.320/0.106)/3 = 3.04,\ RI = 0.52,$$

$CI = (\lambda - n)/(n-1) = 0.03$, $CR = CI/RI = 0.038 < 0.1$, complying with the consistency check.

The weights of each criterion layer were determined and then check the consistency. The weight of each sub criterion layer under the principle of computational compatibility was listed [2].The primary data were shown in Table 4 and the normalized data is shown in Table 5.

Table 4 Evaluation of the sub criterion under the compatibility guideline

	Strategic concept	Partner stability	Organization management structure	Value creation ability	Benefit and risk sharing	Human resources
Strategic concept	1	1/3	1/2	1/4	1/5	1/4
Partner stability	3	1	2	1/2	1/3	1/2
Organization management structure	2	1/2	1	1/3	1/4	1/3
Value creation ability	4	2	3	1	1/2	1
Benefit and risk sharing	5	3	4	2	1	3
Human resources	4	2	3	1	1/2	1
Total	19	53/6	27/2	61/12	167/60	61/12

Table 5 The weights of each index

	Strategic concept	Partner stability	Organization management structure	Value creation ability	Benefit and risk sharing	Human resources	Weight
Strategic concept	1/19	2/53	1/27	3/61	12/167	3/61	0.050
Partner stability	3/19	6/53	4/27	6/61	20/167	6/61	0.123
Organization management structure	2/19	3/53	2/27	4/61	15/17	4/61	0.076
Value creation ability	4/19	12/53	2/9	12/61	30/167	12/61	0.205
Benefit and risk sharing	5/19	18/53	8/27	24/61	60/167	24/61	0.341
Human resources	4/19	12/53	2/9	12/61	30/167	12/61	0.205
Total							1.000

$$AW = \begin{pmatrix} 1 & 1/3 & 1/2 & 1/4 & 1/5 & 1/4 \\ 3 & 1 & 2 & 1/2 & 1/3 & 1/2 \\ 2 & 1/2 & 1 & 1/3 & 1/4 & 1/3 \\ 4 & 2 & 3 & 1 & 1/2 & 1 \\ 5 & 3 & 4 & 2 & 1 & 2 \\ 4 & 2 & 3 & 1 & 1/2 & 1 \end{pmatrix} \cdot \begin{pmatrix} 0.05 \\ 0.123 \\ 0.076 \\ 0.205 \\ 0.341 \\ 0.205 \end{pmatrix} = \begin{pmatrix} 0.300 \\ 0.744 \\ 0.459 \\ 1.255 \\ 2.084 \\ 1.255 \end{pmatrix} \tag{2}$$

$\lambda = (0.3/0.05 + 0.744/0.1230 + 0.459/0.076 + 1.255/0.205 + 2.084/0.314 + 1.255/0.205)/6 = 6.074$

$RI = 1.26$, $CI = (\lambda - n)/(n-1) = 0.015$, $CR = CI/RI = 0.012 < 0.1$, complying with the consistency check.

The weight of each sub criterion index in the ability criterion was listed [3].The primary data are shown in table 6 and the normalized data is shown in table 7.

Table 6 The evaluation of raw data

	Core competence	Internal coordination ability	Operation ability	Emergency response capability
Core competence	1	2	4	3
Internal coordination ability	1/2	1	3	2
Operation ability	1/4	1/3	1	1/2
Emergency response capability	1/3	1/2	2	1
Total	25/12	23/6	10	13/2

Table 7 The normalized weights of each index

	Core competence	Internal coordination ability	Operation ability	Emergency response capability	Weight
Core competence	12/25	12/23	4/10	6/13	0.466
Internal coordination ability	6/25	6/23	3/10	4/13	0.277
Operation ability	3/25	2/23	1/10	1/13	0.096
Emergency response Capability	4/25	3/23	2/10	2/13	0.161
Total					1.000

$$AW = \begin{pmatrix} 1 & 2 & 4 & 3 \\ 1/2 & 1 & 3 & 2 \\ 1/4 & 1/3 & 1 & 1/2 \\ 1/3 & 1/2 & 2 & 1 \end{pmatrix} \cdot \begin{pmatrix} 0.460 \\ 0.277 \\ 0.096 \\ 0.161 \end{pmatrix} = \begin{pmatrix} 1.887 \\ 1.120 \\ 0.385 \\ 0.647 \end{pmatrix} \tag{3}$$

$\lambda = (1.887/0.466 + 1.120/0.277 + 0.385/0.096 + 0.674/0.161)/4 = 4.03$, $RI = 0.89$,

$CI = (\lambda - n)/(n-1) = 0.01$, $CR = CI/RI = 0.011 < 0.1$, complying with the consistency check. The weights of sub criteria under the input criteria were listed. The primary data were shown in table 8 and the normalized data were shown in table 9.

Table 8 The evaluation of primary data

	Asset scale	Advanced transport equipment
Asset scale	1	2
Advanced equipment	1/2	1
Total	3/2	3

Table 9 The normalized weights of each index

	Asset scale	Advanced transport equipment	Weight
Asset scale	2/3	2/3	0.667
Advanced equipment	1/3	1/3	0.333
Total			1.000

$$AW = \begin{pmatrix} 1 & 2 \\ 1/2 & 1 \end{pmatrix} \cdot \begin{pmatrix} 0.667 \\ 0.333 \end{pmatrix} = \begin{pmatrix} 1.333 \\ 0.667 \end{pmatrix} \tag{4}$$

$\lambda = (1.333/0.667 + 0.667/0.333)/2 = 2$, $CI = (\lambda - n)/(n-1) = 0$, $CR == 0 < 0.1$, comply with the consistency check.

Strategic Partner Selection

Absolute evaluation weight alternatives were obtained by using the formula of normalized weights (see table 10), 5 standards were used to valuating the system from 1-5 (representing very weak, weak, good, very good) [4]. The sorting job was done by expert scoring, then scores of the final four candidates as shown in Table 10.

Table 10 Candidate ratings

Factor	Weight	Shipping enterprise1	Shipping enterprise2	Shipping enterprise3	Shipping enterprise4
F1	0.032	2	2	3	2
F2	0.078	4	3	3	4
F3	0.048	4	3	2	3
F4	0.130	4	3	3	4
F5	0.216	3	4	4	3
F6	0.130	4	4	3	4
F7	0.122	3	2	3	3
F8	0.072	3	3	2	4
F9	0.025	2	3	3	3
F10	0.042	3	4	4	3
F11	0.071	4	3	3	3
F12	0.035	3	3	4	4
Total		3.403	3.237	3.176	3.416

As seen from table 10, shipping enterprise 4 got the highest score by the comprehensive evaluation which is 3. 416. Theoretically, shipping enterprise 4 is the candidate.

Summary

In this paper, takes COSCO Group Co., Ltd as a case study, and makes a research on the combination of qualitative analysis and quantitative analysis. The using AHP model for the selection of shipping strategic partners is the main feature of the paper. In order to improve the competitiveness of shipping logistics and improve profits, the AHP method to select good partners is strongly recommended. It could make the overall functions of shipping logistics to minimize the risk, rationalize the operation and maximize the benefits.

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