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Comprehensive Ability Evaluation of Cold Chain Emergency Logistics of Anhui Dazhong Company

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Abstract

Cold chain logistics industry is the product of social and economic development, cross-regional transportation demand, is to maintain the low temperature environment as the core requirements, to maintain product quality, reduce product loss for the purpose of the system engineering. Cold chain logistics has high requirements for timeliness, safety, reliability and technical stability. However, China's cold chain logistics started late. In the early stage of development, many enterprises do not have the concept of "cold chain logistics", cold chain facilities and equipment are generally missing and backward, and the development of cold chain logistics is in the stage of resource shortage. This article focuses on the research object of Anhui Dazhong Cold chain Logistics Company, focuses on the company's emergency measures capability, and finds that the emergency logistics capacity of Anhui Dazhong cold chain logistics needs to be upgraded. In recent years, major public health events have occurred frequently, and Volkswagen lacks systematic evaluation in the implementation of emergency measures. According to the above problems, based on the public emergency logistics process management build public company cold chain emergency logistics ability evaluation index system, the hierarchical analysis and entropy method integrated empowerment of evaluation index, and use multi-level fuzzy comprehensive evaluation method for comprehensive evaluation, finally get the public emergency logistics level.

Keywords

Cold Chain Logistics; Emergency Logistics; And Evaluation System.

1. Establishment of the Evaluation Index System

Based on the public emergency logistics process management, find out the key indicators of emergency logistics ability, build public company cold chain emergency logistics ability evaluation index system, the hierarchical analysis and entropy method of evaluation index integrated empowerment, and use multi-level fuzzy comprehensive evaluation method, analyze the evaluation results, provide the basis for improving the public cold chain emergency logistics management.

Based on the study of emergency logistics evaluation at home and abroad, using the key index method, based on the process management from the hardware and software level, early warning stage of risk identification ability, response stage of response ability and the summary analysis ability, and the service quality five aspects to build the evaluation index system based on process management, the index as shown in Table 1.

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Table 1. Evaluation index system of cold chain emergency logistics capacity of Volkswagen Company

Target layer	The standard layer	Index layer	attribute
The cold-chain emergency logistics capability of Volkswagen Company	Software and hardware level C_1	Cold chain logistics facilities and equipment level P_1	Qualitative indicators
		Information System Reliability P_2	Qualitative indicators
		Degree of logistics visualization: P_3	Qualitative indicators
		Information technology personnel quality P_4	Qualitative indicators
		Equipment degree of automation P_5	Qualitative indicators
	Risk management capability C_2	Risk identification capability: P_7	Qualitative indicators
		Risk early-warning capability P_8	Qualitative indicators
		contingency plan P_9	Qualitative indicators
	Coping ability C_3	Command and coordination level P_{10}	Qualitative indicators
		Fast-response capability: P_{11}	Qualitative indicators
		Data handover accuracy P_{12}	Quantitative indicators
		Emergency cost P_{13}	Quantitative indicators
	Summarize the analytical capability of C_4	Plan revision P_{14}	Qualitative indicators
		Emergency Incident Summary P_{15}	Qualitative indicators
	quality of service C_5	Customer satisfaction P_{16}	Quantitative indicators
		Customer order Delay rate P_{17}	Quantitative indicators
		Rate of cargo damage: P_{18}	Quantitative indicators
		Order satisfaction rate P_{19}	Quantitative indicators

In this evaluation index system, the target layer is Volkswagen cold chain emergency logistics capability A; the criterion layer includes hardware and software level, risk management capability, in-process response capability, summary and analysis capability and service quality composition; the criterion layer is further refined into 19 evaluation indexes to form the index layer.

2. Evaluation of the Model Construction

2.1. Determination of the Index Weight

Weight refers to the quantitative calculation of the importance of the evaluated object, and the accuracy of the evaluation results depends on the reasonable weight of the evaluation index. In order to make the index weight more reasonable, the hierarchical entropy analysis method is adopted to conduct comprehensive integration empowerment, and take into account the subjective and objective influencing factors are used to obtain the weight of the emergency logistics index system.

2.1.1. Subjective Empowerment is Conducted based on the Hierarchical Analysis Method of Expert Group Decision-Making

(1) Determine the degree of expert authority

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In the expert scoring method, it is necessary to select multiple experts to implement quantitative evaluation on the evaluation object. Therefore, the expert set should be selected first: $E=[E_1,E_2,\cdots,E_n]$.

If the authority of the expert relative to the expert, the standard of expert authority is listed in Table 2.

Table 2. Expert authority comparison assignment criteria

order number	Authority contrast	Authority
1	E_m E_n Experts are more absolutely authoritative than experts	$e_{mn}=4+4, e_{nm}=4-4$
2	E_m E_n There are more experts than experts	$e_{mn}=4+3, e_{nm}=4-3$
3	E_m Experts are more authoritative than experts E_n	$e_{mn}=4+2, e_{nm}=4-2$
4	E_m Experts are better qualified than experts E_n	$e_{mn}=4+1, e_{nm}=4-1$
5	E_m E_n Experts are as authoritative as experts	$e_{mn}=e_{nm}=4$

The authoritative judgment matrix can be obtained from the above: $E=(e_{mn})_{k\times k}$.

Through the matrix P, the decision weight of the experts is calculated: E_m.

$$\varepsilon_m=\sum_{n=1}^{k} e_{mn}, m=1,2,\cdots,k$$

$$\omega_m=\varepsilon_m/\sum_{m=1}^{k}\varepsilon_m, m=1,2,\cdots,k$$

n Thus, the weight vector of each expert is obtained: $\omega=(\omega_1,\omega_2,\cdots,\omega_k)^T$.

(2) Construct the judgment matrix

The pairwise comparison method and level 9 scale method are adopted by experts, and the significance of numerical value is shown in Table 3.

Table 3. determines the meaning of the matrix

scale	To characterize the meaning
$a_{ij}=1$	Both indicators are of equal importance
$a_{ij}=3$	Compared with the two indicators, the indicators are slightly more important than the indicators i j
$a_{ij}=5$	Compared with the two indicators, indicators are more important than indicators i j
$a_{ij}=7$	Compared with the two indicators, indicators are very important than indicators i j
$a_{ij}=9$	Compared with the two indicators, indicators are more important than indicators i j
$a_{ij}=2,4,6,8$	Between the middle value of the two neighbors mentioned above
$a_{ji}=1/a_{ij}$	The importance of the two indicators j i

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All of the comparison results are expressed as the judgment matrix A:

$$A=(a_{ij})_{n\times n}, a_{ij}>0, a_{ji}=1/a_{ij}, (i,j=1,2,\cdots,n)$$

(3) The maximum eigenvector of the eigenvector of the judgment matrix should be satisfied A^k $\lambda_{\max}^{(k)}$ $\lambda_{\max}^{(k)}$

$$A^{(k)}\omega^{(k)}=\lambda_{\max}^{(k)}\omega^{(k)}$$

(4) Conformity judgment
Calculate the consistency index, C.I.:

$$C.I.=\frac{\lambda_{\max}^{(k)}-\mathrm{n}}{n-1}$$

Calculate the consistent proportion of C.R.:

$$C.R.=CI/RI$$

The size of the average random consistency index RI (Random Index) is related to the dimension of the judgment matrix, as shown in Table 4.

Table 4. 1-10 dimensions

dimension m	1	2	3	4	5	6	7	8	9	10
RI	0.00	0.00	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49

The weight vector of the first expert was obtained by the consistency test as: m

$$\alpha_m=(\alpha_{m1},\alpha_{m2},\cdots,\alpha_{mn})$$

(5) Determine the weight of the indicators
According to the weight of each expert, the weight of the first index of emergency logistics is calculated. n

$$\alpha_n=\sum_{m=1}^{k}\omega_m\alpha_{mn}(n=1,2,\cdots)$$

Calculate the weights to get:

$$\alpha=(\alpha_1,\alpha_2,\cdots,\alpha_n)$$

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2.1.2. Entropy Method for Objective Empowerment

Entroropy method is to determine the weight of the index according to the size of the information contained in each index. More information, less uncertainty and less entropy; otherwise, less information, more uncertainty and more entropy.

k m n x_{ij} $1 \le i \le m, 1 \le j \le n$ For the first first-level index, there is an object to be evaluated, the second-level index, the index value is, so that the original index data matrix is formed. $X = (x_{ij})_{m \times n}$.

$X = (x_{ij})_{m \times n}$ (1) The decision matrix is standardized according to the linear proportion change, and the standardized matrix is obtained and normalized to obtain: $Y = (y_{ij})_{m \times n}$

$$P_{ij} = \frac{y_{ij}}{\sum_{i=1}^{m} y_{ij}}, 1 \le i \le m, 1 \le j \le n$$

j (2) Calculate the first index information entropy value: $e_j = -\lambda \sum_{i=1}^{m} P_{ij} \ln P_{ij}$.

j e_i (3) Calculate the difference coefficient of the first index. The larger the difference of the given index, the smaller the difference of the evaluation value of the index, the smaller the role of the index in the comprehensive evaluation, that is, the smaller the weight coefficient of the index; on the contrary, the greater the weight coefficient of the index. Therefore, the difference coefficient of the index can be defined as $h_j = 1 - e_j, 1 \le j \le n$.

k (4) Calculate the weight of the second level index under the first level index

$$\beta_k = (\beta_{k1}, \beta_{k2}, \cdots, \beta_{kn}), \beta_{kj} = h_j / \sum_{j=1}^{n} h_j$$

2.1.3. Comprehensive Integration of Subjective and Objective Weights

In order to fully reflect the importance of evaluation indicators, both the experience and ability of experts, but also objective evaluation criteria should be taken into account. Therefore, this paper adopts the subjective and objective integrated integration method and the multiplication combination method to combine each evaluation index. The specific empowerment formula is as follows: $\lambda_i = \frac{\alpha_i \beta_i}{\sum_{i=1}^{n} \alpha_i \beta_i}$.

2.2. Multi-level Fuzzy Comprehensive Evaluation

The evaluation index system of the cold chain emergency logistics capacity of Volkswagen company has both qualitative indicators and quantitative indicators, which has a certain ambiguity, and it itself is a multi-level and multi-factor system. At the same time, the experts of the evaluation subject also have some ambiguity. In order to make the evaluation results closer to the real situation, this paper adopts the multi-level fuzzy comprehensive evaluation method to carry out the comprehensive evaluation. The specific evaluation steps of the multi-level fuzzy comprehensive evaluation method of Volkswagen emergency logistics are as follows.

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2.2.1. Determine the Index Set of the Evaluation Objects

Determine the index set of Volkswagen cold chain emergency logistics capability, and divide all indicators into five subsets, recorded as, which meet the following conditions: I_1, I_2, I_3, I_4, I_5 $I = \{I_1, I_2, I_3, I_4, I_5\}, I_m \cap I_n = \varnothing$.

$I_m = \{I_{m1}, I_{m2}, \cdots, I_{mn}\}, m = 1, 2, \cdots, 5.$ Where; m is the number of elements. I_m.

2.2.2. Determine the Evaluation Set

In the performance evaluation of emergency logistics operation, experts or managers use their own experience and knowledge to set the comments set on the total evaluation status of the evaluation object, which is used to describe the m status standard of each evaluation index, where m is the number of comments in the vector V $V = \{v_1, v_2, \cdots, v_m\}$ $V = \{\text{excellent}, \text{good}, \text{general}, \text{poor}, \text{bad}\}$.

2.2.3. Determine the Weight of Indicators

Give the weight of each index in the evaluation of the emergency logistics capacity, and meet it $I_m \ \lambda = \{\lambda_1, \ \lambda_2, \ \lambda_3, \cdots, \ \lambda_n\} \ \sum_{m=1}^{n} \lambda_m = 1$.

2.2.4. Establish a One-factor Evaluation Matrix

Through expert scoring, judge the evaluation object from a single factor, obtain the evaluation set data, comprehensive treatment can get the single factor evaluation set, and finally get the single factor evaluation matrix:

$$B = \lambda R = (\lambda_1, \ \lambda_2, \ \lambda_3, \cdots, \ \lambda_n)\left[R_1, R_2, \cdots, R_m\right]^T = (b_1, b_2, \cdots b_n)$$

$b^* = \max(b_1, b_2, \cdots b_n)$ According to the principle of maximum membership and the formula, the evaluation results of the cold chain emergency logistics capacity of Anhui Dazhong Company are obtained.

3. Comprehensive Capability Evaluation of the Cold-chain Emergency Logistics of the Volkswagen Company

From the perspective of quantitative analysis, the cold chain emergency logistics capacity of Volkswagen company is investigated, so as to find out the weak links of Volkswagen company in each link of logistics, and give suggestions for improvement. First, the weight of the comprehensive capacity evaluation index of Volkswagen emergency logistics is determined, and then the multi-level fuzzy comprehensive evaluation model is used to comprehensively evaluate each evaluation index and emergency logistics capability, the evaluation results are analyzed, and targeted improvement suggestions are put forward.

3.1. Determination of the Index Weight

3.1.1. Determination of Subjective Weights

(1) Determine the expert weight

The evaluation of Volkswagen's cold chain emergency logistics capability mainly selects the company's deputy manager in charge E_1, logistics center manager E_2, delivery department director E_3,warehousing department director E_4, and industry experts E_5 to form an expert group. Calculate the degree of authority of experts according to the above formula.

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Table 5. Expert authority comparison matrix and expert weight

	E_1	E_2	E_3	E_4	E_5	μ_j	w_j
E_1	4	5	6	7	6	28	0.28
E_2	3	4	6	7	4	24	0.24
E_3	2	2	4	5	2	15	0.15
E_4	1	1	3	4	2	11	0.11
E_5	2	4	6	6	4	22	0.22

To get the expert weight vector: $\omega^{(E)} = (0.28, 0.24, 0.15, 0.11, 0.22)^T$.

(2) Construct the judgment matrix

E_1 According to the above formula, take experts as an example, judge the importance of each index in the target layer-criterion layer and the index layer of the index system, and get the judgment matrix, corresponding weight and consistency results of A-C of cold chain emergency logistics capacity and C-P of Volkswagen, as shown in Table 6 to 11.

Table 6. A-C judgment matrix and weight calculation results

evaluating indicator	Judgment matrix					weight.	consistency check
Software and hardware level	1.000	2.000	1.000	3.000	2.000	0.294	CR=0.0552<0.1
Risk management ability	0.500	1.000	1.000	2.000	3.000	0.223	
Response ability in the event	1.000	1.000	1.000	3.000	3.000	0.278	
Summary and analysis ability	0.333	0.500	0.333	1.000	0.333	0.081	
quality of service	0.500	0.333	0.333	3.000	1.000	0.125	

Table 7. C1-P judgment matrix and weight calculation results

evaluating indicator	Judgment matrix					weight.	consistency check
Level of cold-chain logistics facilities and equipment	1.000	0.333	0.500	0.500	0.333	0.098	CR=0.0938<0.1
Information system reliability	3.000	1.000	0.500	1.000	2.000	0.225	
Degree of logistics visualization	2.000	2.000	1.000	3.000	1.000	0.270	
Equipment operation reliability	2.000	1.000	0.333	1.000	3.000	0.187	
Quality of information technology personnel	3.000	0.500	1.000	0.333	1.000	0.159	
Degree of equipment automation	0.333	0.250	0.333	0.500	0.333	0.061	

Table 8. C2-P judgment matrix and weight calculation results

evaluating indicator	Judgment matrix				weight.	consistency check
Risk identification ability	1.000	3.000	2.000	0.528	3.000	CR=0.0516<0.1
Risk warning ability	0.333	1.000	0.333	0.140	1.000	
contingency plan	0.500	3.000	1.000	0.333	3.000	

Table 9. C3-P judgment matrix and weight calculation results

evaluating indicator	Judgment matrix					weight.	consistency check
Command and coordination level	1.000	3.000	2.000	4.000	0.476	1.000	CR=0.0596<0.1
Rapid response ability	0.333	1.000	2.000	3.000	0.256	0.333	
Data handover accuracy	0.500	0.500	1.000	1.000	0.152	0.500	
Emergency costs	0.250	0.333	1.000	1.000	0.116	0.250	

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Table 10. C4-P judgment matrix and weight calculation results

evaluating indicator	Judgment matrix		weight.	consistency check
Summary of emergency response	1.000	2.000	0.667	CR=0.0<0.1
Preplan revision	0.500	1.000	0.333	

Table 11. C5-P judgment matrix and weight calculation results

evaluating indicator	Judgment matrix				weight.	consistency check
Customer satisfaction	1.000	3.000	3.000	3.000	0.486	CR=0.0596<0.1
Customer order delay rate	0.333	1.000	0.333	2.000	0.146	
Order satisfaction rate	0.333	3.000	1.000	2.000	0.253	
Incidence of cargo damage	0.333	0.500	0.500	1.000	0.115	

Similarly, the index weight assigned by other experts can be obtained, and according to the weight of the previous experts, the weight of the subjective evaluation method can be obtained, as shown in Table 12.

Table 12. Subjective weight results of expert experts

	Specialist 1 (0.28)		Specialist 2 (0.24)		Specialist 3 (0.15)		Specialist 4 (0.11)		Specialist 5 (0.22)		The final weight	
	Bureau weight	Plenipotentiary	Bureau weight	Plenipotentiary	The authority of the witch	Plenipotentiary	Bureau weight	Plenipotentiary	Bureau weight	Plenipotentiary	Bureau weight	Plenipotentiary
P_1	0.098	0.029	0.096	0.028	0.113	0.035	0.109	0.035	0.117	0.027	0.105	0.03
P_2	0.225	0.066	0.174	0.051	0.206	0.064	0.267	0.085	0.209	0.048	0.212	0.06
P_3	0.27	0.079	0.316	0.093	0.247	0.o77	0.198	0.063	0.224	0.052	0.261	0.074
P_4	0.187	0.055	0.136	0.04	0.163	0.051	0.131	0.041	0.126	0.029	0.153	0.044
P_5	0.159	0.047	0.219	0.065	0.206	0.064	0.238	0.075	0.269	0.062	0.211	0.06
P_6	0.061	0.018	0.059	0.017	0.065	0.02	0.056	0.018	0.056	0.013	0.06	0.017
P_7	0.528	0.118	0.493	0.11	0.614	0.148	0.528	0.126	0.594	0.265	0.556	0.154
P_8	0.14	0.031	0.311	0.069	0.117	0.028	0.14	0.033	0.249	0.111	0.209	0.058
P_9	0.333	0.074	0.196	0.044	0.268	0.065	0.333	0.08	0.157	0.07	0.286	0.065
P_{10}	0.476	0.132	0.454	0.126	0.122	0.029	0.481	0.109	0.401	0.052	0.406	0.095
P_{11}	0.256	0.071	0.262	0.073	0.422	0.102	0.291	0.066	0.275	0.036	0.29	0.068
P_{12}	0.152	0.042	0.156	0.043	0.251	0.061	0.131	0.03	0.176	0.023	0.169	0.04
P_{13}	0.116	0.032	0.127	0.035	0.205	0.05	0.097	0.022	0.148	0.019	0.135	0.032
P_{14}	0.667	0.054	0.8	0.064	0.8	0.064	0.5	0.044	0.5	0.032	0.67	0.052
P_{15}	0.333	0.027	0.2	0.016	0.2	0.016	0.5	0.044	0.5	0.032	0.33	0.026
P_{16}	0.486	0.061	0.381	0.048	0.105	0.013	0.486	0.063	0.312	0.04	0.365	0.046
P_{17}	0.146	0.018	0.11	0.014	0.285	0.036	0.146	0.019	0.168	0.022	0.163	0.021
P_{18}	0.253	0.032	0.298	0.037	0.446	0.056	0.253	0.033	0.41	0.053	0.328	0.042
P_{19}	0.115	0.014	0.211	0.026	0.164	0.021	0.115	0.015	0.11	0.014	0.144	0.018

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3.1.2. Determination of the Comprehensive Weight

Table 13. Objective weight matrix of Volkswagen's emergency logistics capacity

	C_1	C_2	C_3	C_4	C_5
H_k	0.077	0.056	0.07	0.056	0.064
$\sum_{k=1}^{5} H_j$	0.324				
weight β	0.238	0.174	0.216	0.174	0.198

This paper adopts the comprehensive weight calculation method of subjective and objective weight multiplication to realize the determination of the comprehensive weight. The above mentioned formula is used to calculate the comprehensive weight of the primary and secondary evaluation indicators of the emergency logistics capacity of Volkswagen Company respectively, as shown in Table 14 and 15.

Table 14. The comprehensive weight matrix of the index layer indicators

	P_1	P_2	P_3	P_4	P_5	P_6	P_7	P_8	P_9	
Subjective weight	0.105	0.212	0.261	0.153	0.211	0.06	0.556	0.209	0.286	
Objective weight	0.148	0.148	0.148	0.123	0.148	0.285	0.25	0.5	0.25	
Comprehensive weight	0.102	0.205	0.253	0.123	0.205	0.112	0.442	0.332	0.227	
	P_{10}	P_{11}	P_{12}	P_{13}	P_{14}	P_{15}	P_{16}	P_{17}	P_{18}	P_{19}
Subjective weight	0.406	0.29	0.169	0.135	0.67	0.33	0.365	0.163	0.328	0.144
Objective weight	0.254	0.268	0.163	0.314	0.5	0.5	0.219	0.342	0.219	0.219
Comprehensive weight	0.412	0.31	0.110	0.169	0.670	0.330	0.335	0.233	0.301	0.132

Table 15. Comprehensive weight matrix of criterion layer indicators for Volkswagen's cold chain emergency logistics capacity

	C1	C2	C3	C4	C5
Subjective weight	0.285	0.277	0.234	0.078	0.127
Objective weight	0.238	0.174	0.216	0.174	0.198
Comprehensive weight	0.33	0.235	0.246	0.066	0.123

In summary, the final determination of the weight of the evaluation index of the cold chain emergency logistics capacity of Volkswagen Company is shown in below 16.

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Table 16. Comprehensive weight of the evaluation index of the cold chain emergency logistics capacity of Volkswagen Company

Target layer	The standard layer	weight	Index layer	weight
Emergency logistics capability of Volkswagen Cold Chain Company	Software and hardware level C_1	0.330	Cold chain logistics facilities and equipment level P_1	0.102
			Information System Reliability P_2	0.205
			Degree of logistics visualization: P_3	0.253 0.123
			Information technology personnel quality P_4	0.123
			Equipment degree of automation P_5	0.205
			Equipment operation reliability P_6	0.112
	Risk management capability C_2	0.235	Risk identification capability: P_7	0.442
			Risk early-warning capability P_8	0.332
			contingency plan P_9	0.227
	Coping ability C_3	0.246	Command and coordination level P_{10}	0.412
			Fast-response capability: P_{11}	0.310
			Data handover accuracy P_{12}	0.110
			Emergency cost p_{13}	0.169
	Summarize the analytical capability of C_4	0.066	Plan revision P_{14}	0.670
			Emergency Incident Summary P_{15}	0.330
	quality of service C_5	0.123	Customer satisfaction P_{16}	0.335
			Customer order Delay rate P_{17}	0.233
			Rate of cargo damage: P_{18}	0.301
			Order satisfaction rate P_{19}	0.132

3.2. Comprehensive Evaluation

Table 17. Evaluation index membership matrix

The standard layer	Index layer	membership matrix				
		outstanding	good	same as	range	difference
Software and hardware level C_1	Level of cold-chain logistics facilities and equipment	0.333	0.556	0.111	0.000	0.000
	Information system reliability	0.222	0.444	0.222	0.111	0.000
	Degree of logistics visualization	0.667	0.222	0.111	0.000	0.000
	Quality of information technology personnel	0.444	0.333	0.222	0.000	0.000
	Degree of equipment automation	0.333	0.333	0.222	0.111	0.000
	Equipment operation reliability	0.444	0.444	0.111	0.000	0.000
Risk management capability C_2	Risk identification ability	0.222	0.333	0.444	0.000	0.000
	Risk warning ability	0.333	0.444	0.222	0.000	0.000
	contingency plan	0.222	0.444	0.333	0.000	0.000
Coping ability C_3	Command and coordination level	0.333	0.444	0.222	0.000	0.000
	Rapid response ability	0.222	0.667	0.111	0.000	0.000
	Data handover accuracy	0.333	0.222	0.444	0.000	0.000
	Emergency costs	0.000	0.444	0.444	0.111	0.000
Summarize the analytical capability of C_4	Preplan revision	0.111	0.333	0.333	0.111	0.111
	Summary of emergency response	0.111	0.333	0.444	0.111	0.000
quality of service C_5	Customer satisfaction	0.444	0.222	0.111	0.222	0.000
	Customer order delay rate	0.444	0.333	0.111	0.111	0.000
	Incidence of cargo damage	0.333	0.333	0.222	0.111	0.000
	Order satisfaction rate	0.444	0.222	0.222	0.111	0.000

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$V=\{\text{excellent},\text{good},\text{general},\text{poor},\text{bad}\}$ In view of the response process of emergency logistics, according to the comment set, 9 experts, including Volkswagen managers, logistics center managers, experts and scholars, were invited to score according to the actual situation, and the membership matrix of Volkswagen cold chain emergency logistics capability was obtained, as shown in Table 17.

Based on the above evaluation data, the cold chain emergency logistics capability of Volkswagen is comprehensively evaluated. The evaluation matrix known

3.3. Analysis of the Evaluation Results

(1) From the evaluation vector B, we can see that the "excellent" membership of Volkswagen cold chain emergency logistics capacity is 0.318,0.390, "good" 0.243, "poor" 0.045, and "poor" 0.005.

According to the principle of maximum membership, it is concluded that Volkswagen's cold chain emergency logistics capacity is in a good state, that is, it has a high ability to deal with the occurrence of emergency logistics activities.

(2) In terms of weight, the software and hardware level is 0.330; second, the response ability is 0.246 and the risk management ability is 0.235, which accounts for 0.811 of the total weight. Summary analysis capability and service quality were 0.066 and 0.123.

It indicates that in order to improve the cold chain emergency logistics ability of Volkswagen company, it is necessary to pay attention to three aspects of hardware and software level, in-process response ability and risk management ability.

(3) From the evaluation of each single layer index, the comments corresponding to software level are excellent, the comments corresponding to risk management ability are good, the comments corresponding to response ability are good, the comments corresponding to summary and analysis ability are general, and the comments corresponding to service quality are excellent. It can be seen that the public company in the information construction and software and hardware level is higher, and for the summary of cold chain emergency logistics analysis ability, Volkswagen company need to strengthen plan summary update management, improve the plan electronic database, strengthen plan training, improve plan management modernization, improve the decision-making efficiency and level.

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