Cold Chain Logistics Performance Evaluation Research Based on Electronic Commerce

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ABSTRACT: As "Internet +" model and the organic integration of agricultural development in our country, the traditional agricultural products sales mode is gradually replaced by the online dual channel mode, at the same time, based on the special agricultural products trade, and the condition of low temperature moisture, cold chain logistics arises at the historic moment. In this paper, based on the perspective of cold chain logistics of agricultural products transportation, by using the fuzzy evaluation method, according to the level of logistics, warehouse management, logistics information and logistics information level four evaluation indexes, construct electricity performance evaluation model of agricultural products logistics mode, expecting to benefit optimization.

KEYWORD: E-commerce; cold chain logistics; fuzzy evaluation method

1 INTRODUCTION

As Internet big data era, our country agricultural products sales began to combine "Internet +" model using electric business platform for fresh agricultural products dual channel mode of online sales, changed the traditional single way of sales. But liable to occur during storage and transportation of agricultural products such as corruption, deterioration, cold-chain logistics begin to enter the modern transportation and distribution system (H.J. Yang et al, 2008) (B.L. Zhang et al, 2008).

Our country cold chain logistics system is not yet mature, for agricultural products cold chain distribution system the lack of a scientific and objective performance evaluation index system. Performance evaluations of agricultural products cold chain distribution system have important economic and social significance.

2 THE BASIC ASSUMPTION OF PROBLEMS WITH FUZZY EVALUATION METHOD

2.1 The basic assumption of problems.

In order to be more objective, scientific and accurate evaluation of agricultural products cold chain logistics system, and makes the electric business enterprise logistics distribution system is more efficient, more in line with the actual needs. Build based on e-commerce platform of agricultural products cold

chain logistics performance evaluation becomes even more important.

2.2 The basic assumptions of the method of fuzzy evaluation.

Suppose some electricity agricultural cold chain logistics enterprise level indicators evaluation factors sets: $U = \{U_1, U_2, U_3, U_4\}$; Secondary index evaluation factor set, respectively: $U_1 = \{U_{11}, U_{12}, U_{13}, U_{14}\}$, $U_2 = \{U_{21}, U_{22}, U_{23}, U_{24}\}$, $U_3 = \{U_{31}, U_{32}\}$; $U_4 = \{U_{41}, U_{42}, U_{43}\}$. Determine the weighting sets: $A_i = \{A_1, A_2, A_3, A_4\}$;

and $\sum_{i=1}^4 A_i = 1$; The weights are the secondary set:

$$A_{ij} = \{A_{i1}, A_{i2}, \dots, A_{im}\}; \sum_{j=1}^m A_{ij} (i=1, 2, \dots, n)$$

3 FUZZY EVALUATION METHOD

3.1 Determine the weight set.

There are many methods to determine the weighing values of, such as experts estimate method, analytic hierarchy process (AHP), the weighted statistics, frequency statistics, etc. For convenience, this article can be using weight factor to judge table method (Y.W. Deng et al, 2013) (R. Luo, 2014).

3.2 Find evaluation matrix.

Evaluation matrix called membership degree vector matrix, it is mapped to a fuzzy evaluation factors set U within the various evaluation factors were assessed, and it reflects the relationship between the evaluation factors and evaluation level between the F relation from U to V, matrix $R \in F(U \times V)$.

3.3 Fuzzy comprehensive evaluation.

Fuzzy comprehensive evaluation is calculated as $B_k = A_k \bullet R_k$. Evaluation vector= Weight vector • Membership vector.

4 THE ELECTRONIC COMMERCE OF COLD CHAIN LOGISTICS PERFORMANCE EVALUATION

Performance evaluation index system of agricultural electricity supplier chain logistics involves many factors, the paper through the use of evaluation methods of qualitative and quantitative analysis, using the fuzzy comprehensive evaluation method to evaluate the performance. Results first, the right to secondary evaluation indexes and evaluation of secondary membership of the ratings shown in Table 2.

According to the data in Table 2 and fuzzy comprehensive evaluation formula $B_k = A_k \bullet R_k$, You can get two indicators of the level of logistics transportation, warehousing management, logistics, information technology degree and five other factors comprehensive evaluation vector respectively (J.Y. Chen, 2015) (F. Tian, 2012).

Table 2 The electronic commerce of cold chain logistics performance evaluation Data Sheet Storage Center

	Level indicators U_i	Weights A_i	The secondary indicators U_{ij}	Weights A_{ij}	Rating membership degree			
					excellent	good	fair	poor
The evaluation index system U	Logistics service level U_1	0.12	The punctual arrival rate U_{11}	0.4	0.1	0.3	0.5	0.1
			Every freight cost U_{12}	0.25	0.2	0.4	0.3	0.1
			In transit loss U_{13}	0.22	0.2	0.3	0.3	0.2
			Frozen ice truck bought U_{14}	0.23	0.1	0.5	0.2	0.2
	Warehouse management level U_2	0.32	Storage cost level U_{21}	0.2	0.2	0.5	0.2	0.1
			Storage and loss U_{22}	0.23	0.1	0.5	0.3	0.1
			Clean up the inventory number per cycle U_{23}	0.27	0.1	0.2	0.3	0.4
			Fresh library proportion U_{24}	0.2	0.2	0.2	0.2	0.4
	Logistics information level U_3	0.34	The proportion of information infrastructure spending U_{31}	0.59	0.1	0.1	0.3	0.5
			Transmission error rate U_{32}	0.41	0.1	0.2	0.4	0.3
			Accuracy of delivery U_{41}	0.25	0.2	0.2	0.3	0.3
			The user satisfaction U_{42}	0.45	0.1	0.4	0.2	0.3
	Other factors U_4	0.22	The quality of service recovery U_{43}	0.3	0.2	0.4	0.3	0.1

$$B_1 = (0.4 \quad 0.25 \quad 0.22 \quad 0.23) \begin{pmatrix} 0.1 & 0.3 & 0.5 & 0.1 \\ 0.2 & 0.4 & 0.3 & 0.1 \\ 0.2 & 0.3 & 0.3 & 0.2 \\ 0.1 & 0.5 & 0.2 & 0.2 \end{pmatrix} = (0.153 \quad 0.388 \quad 0.326 \quad 0.133)$$

Similarly, we can know

$$B_2 = (0.164 \quad 0.364 \quad 0.272 \quad 0.2);$$

$$B_3 = (0.16 \quad 0.144 \quad 0.362 \quad 0.334);$$

$$B_4 = (0.156 \quad 0.356 \quad 0.267 \quad 0.221).$$

The evaluation results of the above two indicators $\{B_1 \quad B_2 \quad B_3 \quad B_4\}^T$, as a four-level indicator Rank membership matrix (B.Y. Zhang et al, 2008), according to the right level indicators of weight and Fuzzy formula $B = A \bullet R$, Can get under the elec-

tronic commerce of cold chain logistics performance evaluation for comprehensive evaluation vector of U (K. Fang et al, 2014).

$$B = (0.12 \quad 0.32 \quad 0.34 \quad 0.22) \begin{pmatrix} 0.153 & 0.388 & 0.326 & 0.133 \\ 0.164 & 0.364 & 0.272 & 0.2 \\ 0.16 & 0.144 & 0.362 & 0.334 \\ 0.156 & 0.356 & 0.267 & 0.221 \end{pmatrix} = (0.09 \quad 0.24 \quad 0.28 \quad 0.39)$$

If a collection evaluation grades $V = \{ \text{Excellent, Good, medium, difference} \}$, The corresponding collection $V = \{100 \quad 70 \quad 45 \quad 20\}$, You can calculate the cold-chain logistics performance in the context of e-business comprehensive score. $C = B \bullet V^T = 46.2$.

From the fuzzy evaluation results of cold chain logistics enterprise performance can be seen that the logistics performance has no more than 50%, rating for the excellent and good membership account for less than 50%. Show that the cold chain logistics operation of the above, there are many deficiencies. So should strengthen enterprise level of storage and transportation and logistics information level, improve the efficiency of the enterprise.

5 CONCLUSION

Supply chain performance evaluation is an important index of efficiency evaluation of a system, how to choose a reasonable evaluation index and the right to build evaluation system for analysis and evaluation, according to the evaluation results to optimize adjustment, in order to achieve optimization. Electric business platform model at the same time promoting the agricultural products sales model to the modernization of the traditional O2O mode transition process, transportation and delivery of this also for agricultural products and management put forward higher requirements.

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