Research on the evaluation and selection of the third party logistics supplier under the e-commerce environment

Yi Gao

School of Economics and Management, Xidian University, Xian 710126, China.

864937243@qq.com

Abstract

According to the characteristics of e-commerce environment and the specific situation of third-party logistics suppliers, this paper establishes the third-party logistics supplier's ability evaluation index system in e-commerce environment, and uses the analytic hierarchy process to determine the index weight. There are three sources of data for third-party logistics supplier competency evaluation. In this way, you can get a more objective and comprehensive third-party logistics supplier ability evaluation value. This method can comprehensively, accurately and objectively reflect the ability of third party logistics providers.

Keywords

The third party logistics supplier, evaluation, index system.

1. Introduction

Four streams in the process of e-commerce: information flow, business flow, capital flow and logistics, other third-rate can be achieved online, except logistics must be provided by the reality of the logistics service providers. In China, most of the e-commerce business will choose third-party logistics model. If you choose properly, not only can reduce operating costs, and continuously improve the customer experience, and effectively reduce the logistics bottlenecks, and ultimately enhance the core competitiveness of e-commerce enterprises to win the user. However, improper choice may result in higher total logistics costs, poor logistics service attitude and longer delivery time and so on. Eventually, it will reduce consumer satisfaction and leading to consumer loss. Therefore, a comprehensive scientific third-party logistics supplier ability evaluation is the premise and foundation of the choice of third-party logistics providers.

2. Evaluation Index System of Third Party Logistics Providers in e-commerce environment

Based on the previous research, according to the specific requirements of logistics service for e-commerce, this paper establishes the evaluation index system of the third-party logistics in e-commerce environment. According to the customer's request to the logistics supplier, this article describes the evaluation index of the third party logistics supplier ability from different angles.

2.1 Logistics cost-control capability

Logistics cost is the price paid by the enterprise to realize storage of goods and the two-way flow of services and related information between the output and the consumer. According to statistics, the logistics cost of enterprises accounted for about 40% of the operating costs of enterprises. Reduce logistics costs for each enterprise is very important. Therefore, effective control of logistics costs will help reduce the operating costs of enterprises, so as to enhance the competitiveness of enterprises. The stronger the logistics cost control ability, the stronger the ability to represent the logistics supplier. Logistics cost control capabilities include:

a. packaging cost per unit of product: the total cost of packaging of a product divided by the number of products.

b. storage cost per unit of product: the total cost of category of a product divided by the number of products.

c. transportation cost per unit of product: the total transportation cost of a certain product divided by the quantity of the products.

d. labor costs: the total cost of manpower is divided by the number of employees.

2.2 Logistics quality assurance capability

Theoretical research shows that logistics service quality is one of the most important factors to win customer satisfaction. DELL and FedEx experience shows that the quality of logistics services has a significant impact on corporate profits.

a. order entry accuracy: the accuracy of the logistics supplier when entering the customer order.

b. order processing accuracy: the correct rate of logistics supplier handling customer orders.

c. on time delivery ratio: the ratio of logistics providers to deliver goods to customers in time.

d. the ratio of goods in good condition: the ratio of the goods in good condition when they are delivered to consumers.

2.3 Management effect

Business performance indicators reflect the logistics supplier's performance results accumulated through historical performance, is an indicator reflecting the long-term performance of suppliers.

a. status of fund: status of fund of the logistics provider includes the scale of the fund, the level of the assets and liabilities, and the circulating speed of the circulating fund.

b. popularity: popularity is an enterprise to be known outside the world.

c. credit degree: credit degree is the degree to which an enterprise obtains the external trust. Only those who are honest and trustworthy, highly responsible logistics provider is the first choice of enterprises.

2.4 Logistics informatization level

Logistics information refers to the logistics enterprises to use modern information technology to process all or part of the information generated during the logistics collection, classification, transmission, aggregation, identification, tracking, query and a series of processing activities to achieve the control of the flow of goods, Thereby reducing costs and improving efficiency management activities. In the e-commerce environment, the logistics provider's information level occupies a very important position, the higher the level of enterprise information, the more reflect to its advantages in the e-commerce environment.

a. information sharing degree: logistics providers to share consumer order processing and product transport location and other information level in the logistics information system with customers.

b. the degree of standardization of information systems: logistics information system of the standardization of the module.

c. the advanced level of information system technology: the use of new technologies such as computer network, data communication and database, and the use of new technologies such as bar code and radio frequency identification.

d. the accuracy of the information transfer: the accuracy of logistics provider to deliver customer information.

2.5 Customer service capability

Under the environment of e-commerce, consumer demands for service attitude is also rising, the logistics supplier service attitude will greatly influence the customer's choice, therefore, the level of customer service is also a very important indicator.

a. quick response to customer: The extent which logistics providers meet customer needs.

b. service attitude: the attitude of the logistics supplier to the consumer.

c. service personnel quality: the professional quality of logistics providers in the face of the consumer's work processes and packaging standards.

d. ability to respond to customer complaints: when the customer is not satisfied with the logistics services, logistics providers can give timely and effective solutions.

To sum up, the third-party logistics supplier's ability evaluation index system in e-commerce environment is shown in Fig. 1.

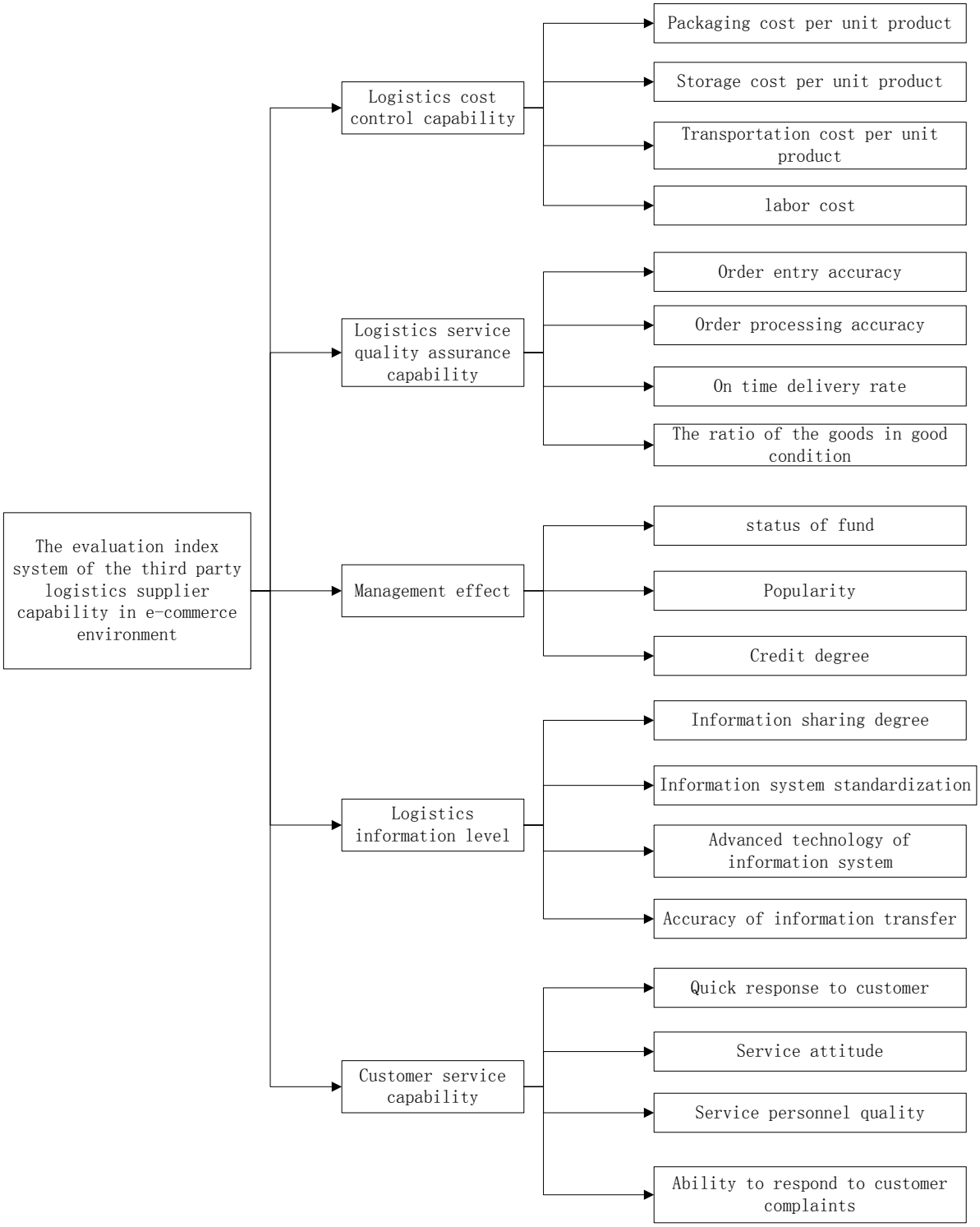

Fig. 1 The evaluation index system of the third party logistics supplier capability in e-commerce environment

3. The evaluation method of the three party logistics supplier under the e-commerce environment

The AHP method can be used as a basic analysis method to complete the selection of logistics providers, and to quantify the qualitative indicators of logistics, to achieve the evaluation of candidate enterprises.

(1) Calculate the weight of the primary indicators

Steps are as follows:

Establish judgment matrix

The expert group is asked to make pairwise comparison between the 5 indicators and rate to them, so as to get the relative importance of each index with the specific scale value. The judgment matrix is composed of all scale values.

$$A=\begin{bmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ a_{31} & a_{32} & \dots & a_{3n} \\ a_{41} & a_{42} & \dots & a_{4n} \end{bmatrix} \quad (1)$$

a_{ij} is the scale value, n is the number of indicators. Generally speaking, the value of scale a_{ij} is as shown in Table 1.

Table 1. Elements of relative importance scale

Scale value(a_{ij})	Signification
1	Two elements are of equal importance
3	Compared two elements, the former is slightly more important than the latter
5	Compare two elements, the former is obviously more important than the latter
7	Compared two factors, the former is strongly more important than the latter
9	Compared two factors, the former is extremely more important than the latter
2, 4, 6, 8	The intermediate value of the adjacent judgment
The reciprocal of the above values	If the relative importance of element i and element j is a_{ij}, the relative importance of element j and element i is $a_{ji}=1/a_{ij}$

Calculation of the level of weight index

Normalize the weights of each index ,the formula is as follows:

$$w_i=\frac{v_i}{\sum_i v_i} \quad (i=1, 2\dots, n;) \quad (2)$$

$$v_i=\sqrt[n]{\prod_{1\le j\le n} a_{ij}} \quad (3)$$

Consistency check

Calculate the consistency index:

$$C.I.=\frac{\lambda_{max}-n}{n-1} \quad (4)$$

λ_{max} can be calculated by the following formula:

$$\lambda_{\max} = \frac{1}{\mathrm{n}} \sum_{i} \left[\frac{(AW)_i}{w_i} \right] \tag{5}$$

$$W = (w_1, w_2, w_3, \ldots\ldots w_n)^T \tag{6}$$

Obviously, with the increase of n, judgment error will increase, so the consistency of judgment should be taken into account the impact of n, using the random consistency ratio:

$$C.R. = \frac{C.I.}{R.I.} \tag{7}$$

R.I. is the average random consistency index. The values are shown in Table 2.

Table 2 Average random consistency index

n	3	4	5	6	7	8	9	10	11	12	13	14	15
R.I.	0.52	0.89	1.12	1.26	1.36	1.41	1.46	1.49	1.52	1.54	1.56	1.58	1.59

When C.R. < 0.1, the consistency of the judgment matrix is acceptable, otherwise the judgment matrix should be adjusted.

(2) Calculate the weight of the secondary indicators

The same to method (1), it should be noted that the expert scoring must meet the logistics needs of the logistics provider.

(3) Calculate the comprehensive weight of evaluation index

The final comprehensive weight of the evaluation index is the product of the weight of the primary indicators and secondary indicators.

(4) Assign the evaluation index

The evaluation indexes are selected from the following sources: actual operation data, expert evaluation and user rating. The index data of logistics cost control ability and logistics service quality assurance ability using the actual operating data; the index data of management effect and logistics information level using expert valuation; the index data of customer service capabilities using user ratings.

Because the value types of each attribute value are different, all the attributes are quantized into numerical types, and then the attribute values are dimensioned by threshold method.

R(i,j)is processed data of the j value of the third party logistics provider i.

For the value of the bigger the better attributes, using the following formula:

$$R(i, j) = \frac{r_{ij} - \min\limits_{1 \le m \le n}(r_{mj})}{\max\limits_{1 \le m \le n}(r_{mj}) - \min\limits_{1 \le m \le n}(r_{mj})} \tag{8}$$

For the value of the smaller the better attributes, using the following formula:

$$R(i, j) = \frac{\max\limits_{1 \le m \le n}(r_{mj}) - r_{ij}}{\max\limits_{1 \le m \le n}(r_{mj}) - \min\limits_{1 \le m \le n}(r_{mj})} \tag{9}$$

(5) Calculate the comprehensive evaluation value of the third party logistics supplier

The comprehensive evaluation value of the third party logistics supplier capability is:

$$E(i) = \sum_{j}^{n} Wj * R(i, j) \tag{10}$$

R(i,j) is the j value of the third party logistics provider i, W_j is the weight of the j index.

The suppliers are sorted according to the size of the logistics vendor's comprehensive evaluation value. The greater the comprehensive evaluation value, the greater the ability of logistics providers, e-commerce business should choose a logistics providers with large comprehensive evaluation value.

4. Conclusion

Logistics is a very important part of the process of e-commerce; logistics services will directly affect the development of e-commerce. Therefore, it is very necessary for e-commerce business to choice third-party logistics providers scientifically and reasonably. This paper establishes the third-party logistics supplier's ability evaluation index system to reflect the demand for third-party logistics providers under the current e-commerce environment. Using widely used analytic hierarchy process to determine the weight of indicators for third-party logistics provider indicators, and using three kinds of data sources to assign them, get a more objective and comprehensive third-party logistics supplier ability evaluation value.

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