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The study and use of AHP in logistics and customer satisfaction

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ABSTRACT

With the fast development of the economy, every walk of life is under great pressure as the competition has become fiercer. In terms of logistics, the positive feedback of customer satisfaction is the essential element for logistics enterprises to survive and develop. This article talks about customer satisfaction in logistics by using (AHP) Analytic Hierarchy Process.

KEYWORDS

Logistics management; Customer satisfaction; (AHP) analytic hierarchy process.

INTRODUCTION

In 1950s, the term “customer satisfaction” got great attention and feedback soon after it had been put forward by some scholars. The scholars usually discuss about customer satisfaction centering around a formulary. The formulary is that customer will make comparison among the commodity and service of different sellers, providing sellers with reference to better trading. As subjective ideology, customer satisfaction describes whether the reality after purchasing goods or services meets with what customers have imagined before and to what degrees. In China, the study of customer satisfaction is still in the starting phase. Few relevant information or examples can be found right now. As for study methods, the feedback of customers is always very vague, failing to evaluate the goods or services objectively. As for evaluation, we need AHP METHOD to analyze and generalize customer satisfaction and give some constructive suggestions accordingly. This article will discuss about logistics and customer satisfaction by using AHP METHOD to further talk about the study and application of customer service in logistics industry.

CONSATRUCTION AND STRUCTURE OF LOGISTICS ENTERPRISES’ CUSTOMER SATISFACTION EVALUATION SYSTEM

Customer satisfaction is a subjective ideology. It describes whether the reality after purchasing goods or services meets with what customers have imagined before and to what degrees. In other words, customer satisfaction is not simply about the service attitude, the service quality, the quality, the shipping time and the price of goods. It should further investigate the feeling of customers after they purchase the goods or services. Usually we call this kind of feeling customer satisfaction. In terms of enterprises, they will ask their customers about the degrees of satisfaction. Below are some aspects of customer satisfaction.

1) Service satisfaction: After enjoy the logistics services, customers need to evaluate the capability, quality and price of the service based on certain standards. This is the most basic part of service satisfaction.

2) Behavior satisfaction: It refers to how satisfied customers are with the ways the executive level of enterprises adopts to deal with conflicts between customers and seller.

3) Image satisfaction: The image of enterprises in their promotion always directly affects customers’ impression about enterprises. This is also the recognition from customers and the credibility in the industry.

The three aspects above are the main things of customer satisfaction in logistics and the features of logistics. Based on the feature, we created a form showed in TABLE 1, forming an evaluating system of customer satisfaction.

ANALYTIC HIERARCHY PROCESS (AHP)

Introduction of analytic hierarchy process (AHP)

Analytic Hierarchy Process (AHP) was firstly put forward by an American operational research expert in 1970s. At this level, it is a simple and practical analysis method, combining qualitative and quantitative analysis together. Among them, we can form a hierarchical goal. The level of this goal is composed from top to bottom. The highest level is the master goal of the system. Only one element exists in this highest level. The middle level is the preparation part of the realization of the highest goal in the system, containing lots of policies and measures. The bottom level is the level of plans to solve all kinds of problems. Every level has certain connections with other two levels. When forming the levels, we need to compare the elements in different levels and give priority to the part which has the largest share.

TABLE 1 : Indicator system of logistics customer satisfaction

An index	Two indicators
Corporate image	Customer acceptance
	Industry credibility
Service capabilities	Rapid response capability
	Flexible Service
	Value-added service capabilities
	Equipped facilities of
	Advanced facilities and equipment
	Practical business website
Quality of service	Service cost
	Timeliness of service
	Service Reliability
	Services Security
	Feedback timeliness
	Rate of customer complaints
Service prices	Service price reasonableness
	Service price competitive
Handling customer objections	Processing timeliness
	Treatment satisfaction

The steps and methods of analytic hierarchy process (AHP)

Analytic Hierarchy Process is a structure which can simplify complex problems and decompose the problems into single elements. These elements are arranged in certain order. We need to make a comparison to see which element is more important according to decision makers. Meanwhile, we also need to arrange them in orders according to their importance. To use this analytical method to analyze and design, we need to take four steps.

First of all we need to study the direct connection among ever single elements so as to form a stepped construction;

Secondly, we need to compare the two elements in the same level, analyze their importance respectively and arrange them in matrix;

After matrix arrangement, we need to do some calculation and comparative analysis of the elements;

Lastly we need to calculate the proportion of every level in all elements, make a comparison and put them in mathematical orders.

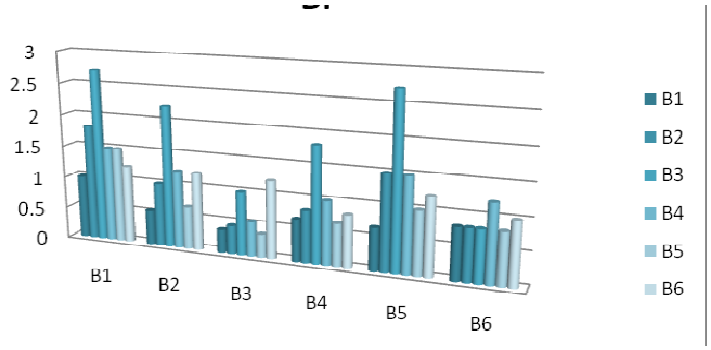

Figure 1 : The range is A- B_i, i=1~6

Formation and assignment of judgment matrix

When forming and assigning the judgment matrix, we need to apply expert consultation method. In the mean time, the leaders need to analyze the index of every level and generalize the results. In the process, one-to-one comparative method and positive-negative matrix are necessary to describe the main content. (The range is A- B_i, i=1~6) See Figure 1.

Single hierarchical arrangement and consistency test

This part then needs to use AHP METHOD as well as professional calculator. In this way, we can get the weight of different levels in the matrix. As we can see, the CR number of matrix A-B_i (i=1~6) in the consistency test is smaller than 0.10. Therefore, judgment matrix passes the consistency test. (See TABLE 1)

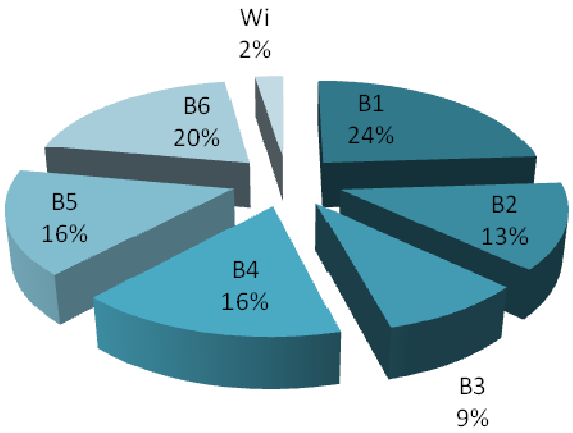

Figure 2 : Logistics enterprise customer satisfaction rating A judgment matrix consistency ratio: 0.0230; overall objectives of the right weight: 1.0000

The total sort of levels

In this case, we need Analytic Hierarchy Process AHP's professional calculator to calculate the weight of every single index to the total index. It is the result of the average weight of the target level which is got when the index level's each index passes criterion level.

IMPLEMENTATION MEASURES OF AHP METHOD IN CUSTOMER SATISFACTION EVALUATION

Based on 20 evaluating index, using the specific situation of customer satisfaction in three different logistics enterprises A, B and C, we can calculate the final evaluating results of the logistics enterprises. After making sure about the final results, we can then carry out customer satisfaction-level analysis. The level is the degrees of customers' satisfaction.

Suppose W_i is the weight of index C_i to target level A, and D_i is the evaluating result of customer satisfaction of logistics enterprises, then we can see that customer satisfaction of logistics enterprises' comprehensive score is the product of W_i and D_i from 1 to i less than 20 units.
The definition equation is:

$$: D=\sum_{i-1}^{20} W_i D_i$$

.

D can be formed by percentage or grading. As for grading, levels like {bad, poor, fair, good, very good} can be turned to numbers like {0.2, 0.4, 0.6, 0.8, and 1.0} accordingly. The score is the feedback of logistics enterprises' customer service from customers. Specific results are shown in TABLE 2. See from the results, we can see that enterprise A gets the best score. This for shows the customer satisfaction of logistics services directly and clearly.

TABLE 2 : The customer satisfaction of logistics services directly and clearly

Index C i	Weights Wi	Enterprise A		Enterprise B		Enterprise C	
		Di	WiDi	Di	WiDi	Di	WiDi
Customer acceptance C1	0.0716	0.9	0.05928	0.5	0.03463	0.7	0.04696
Industry credibility C2	0.0513	0.9	0.04404	0.3	0.02652	0.7	0.04304
Rapid response capability C3	0.0425	0.7	0.0295	0.7	0.016	0.6	0.0295
Flexible Service C4	0.0437	0.7	0.03696	0.8	0.02696	0.4	0.01448
Value-added service capabilities C5	0.0366	0.8	0.0318	0.5	0.01496	0.3	0.02064
……	……	……	……	……	……	……	……
Referrals wishes C20	0.0865	0.7	0.0479	0.6	0.0679	0.5	0.0486
Total D	1	0.844		0.7254		0.7736	

STRATEGIES TO IMPROVE THE CUSTOMER SATISFACTION OF LOGISTICS ENTERPRISES

Consolidation strategy

In the process of logistics, the shipped products are of great variety in sizes, weight and even the environment they need to be put in. While loading, if we only put goods with large capacity, then after putting all the goods, there will still be some space, wasted. If we only put goods with small capacity, then even if all the goods are loaded, space will be left and it will fail to reach the theoretical loading capacity of the truck or car. Both the two ways will lead to waste of space. Therefore, we need to arrange the space reasonably while loading, avoiding the destruction of goods caused by the space left. The destruction of goods will lead to lower customer satisfaction. Usually, we can load goods with different sizes together. It is called common distribution, or joint distribution.

Differentiated strategy

The shipping capability of logistics center is decided by the size of the center, the situation of the targeted region and the number of customers. Also, as different customers have different requirements, the services have different levels which can lower the rate of customer complaint and increase customer satisfaction. We can suppose there are three different types of groups A, B and C. Group A contains customers with many requirements. These customers should be treated with specific shipping plans. Group C contains customers with few requirements, but we need to make sure whether the customers of this group change their requirements or not to make adjustment for them in time. In this way, the problems caused by customer satisfaction will be decreased because we have different strategies for different customers accordingly. The credibility of logistics enterprises will be improved in customers' mind.

CONCLUSIONS

With the fast economic development in China, the development of logistics enterprises is also moving in a positive direction. The speed of its accomplishment of required targets is also becoming

higher and higher. In terms of logistics, logistics enterprises should check and update the satisfaction index from time to time to meet with the changing requirements from customers. This is a dynamic and ongoing process. The technical analysts should always pay great attention to the attitudes of customers, analyze and generalize the change, and make appropriate adjustment in time to deal with the problems in customer satisfaction.

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