Logistics Service Quality Evaluation

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Abstract: Based on the B2C logistics environment, integrated customer perceived quality with the quality of logistics operations refer to NDSERV, a logistics service quality evaluation system has been established. A comprehensive analysis and evaluation have been done with regard to 4 aspects of enterprises, the qualified process quality, software process quality, potential quality, and result quality. A service quality evaluation has been done refer to Sifang logistics companies in Shanxi, several suggestions have been give been based on evaluation results.

Key words: logistics service quality, customer perception of quality, operational quality

1 Introduction

Logistics enterprises are engaged in the ability to provide the owner systematic and professional services, as well as logistics activities. Logistics services are the fundamental provision of logistics enterprises; their good service quality is an important advantage in the modern competition. The logistics enterprises in China started relatively late, most of the logistics enterprises are enterprises reformed from traditional storage and transportation. Single function services, weak sense of service, poor service quality are the bottle neck of these logistics companies in China. But now there is no standard evaluation system for the study of the quality of logistics services companies, lack of uniform system makes companies still rely on the past experiences during the improvement of their service quality, therefore, designing a suitable service evaluation system becomes vital.

2 Research Logistics Service Quality

The Studies of quality management theory and method of Manufacturing enterprises at home and abroad are fairly mature. But for logistics service, quality assessment and management has lagged behind. According to characteristics of logistics services, many researches have been done by scholars from different angles. These researches mainly can be divided into the customer perceived service quality and the quality of logistics.

2.1 Customer Perceived Service Quality

Through a large number of research, in 1988 PZB (1988) [1] designed SEVEQUAL service quality evaluation which is composed of 22 indicators. Cronin and Taylor proposed that empirical research is not adequate in PZB gap model, then they launched the "perceived service quality performance measurement model" SERVPERF (Service Performance), they believe that the service quality measurement should focus on customer perceived service quality. However, SEVEQUAL [2] is still widely used in practice

In China research on the perception of logistics companies mainly focus on customer satisfaction evaluation [3] [11] Sung Park (2002) combined PZB model with Mentzer model, measure the perceived quality of customer service delivery from the tangible, reliability, responsiveness, assurance, empathy, personal contact between processing and product processing .etc, in 8 dimensions, 31 term.

Li Aiguo, Blocks, HUANG Jian-hong, who, uses advantages of NDSERV under B2B environment, established the third party logistics evaluation model of customer perceived quality, and evaluated customer perceived quality from the potential quality, hard process quality, process quality and outcome of soft four aspects of the quality.

2.2 The quality of logistics

In some foreign countries, the evaluation of logistics services is partially operated from the evaluation of the operational aspects of logistics, measure orders, instant delivery ratio and distribution ratio of non-damaged items, known as “7Rs”theory.

In 1982, Lie Dining (Lehtinen, 1982) proposed the concept of quality of output and process quality, then defined quality of service in 1983 into physical quality, interactive, three aspects of quality and corporate quality. Gumu Song (Gummesson, 1988) also proposed model of service quality in 1988 including design quality, production quality, delivery quality and relationship quality. Then this mode was revised in 1991, the service quality was divided into design quality, product quality, process quality and output quality. [4].

However, for the two following reasons, the literature on logistics service quality evaluation is not necessarily suitable for our country. First, the logistics service quality evaluation is based on multi-scale B-to-C of

the PZB scale, without considering the assumption that enterprises are the main target logistics companie is based on B2B service model. Spiros Gounaris believes that, SERVQUAL scale was developed in general consumer environment. While, in the B2B environment, using the SERVQUAL scale will encounter methodological problems, SERVQUAL scale predictive effect in the B2B [5]; Secondly, during the evaluation service of Logistics enterprises, it is necessary to consider whether customer perception can be integrated with operation levels, so as to establish a comprehensive evaluation system of logistics. From three aspects, this paper is aiming to build a more comprehensive evaluation system of logistics enterprises.

3 Logistics Service Quality Evaluation System

Customer perceived quality of Logistics enterprise is abstraction of customers` overall judgment of logistics products or performance, excellence of high-level, which is also a kind of customer attitude to the product or service. Spiros Gounaris developed NDSERV scale, in order to compare with SERVQUAL Scale; he conducted a questionnaire survey in 1285 companies in Greece Athens. The results show that the NDSERV scale is more suitable for customer perceived service quality in B2B environment.

The logistics service quality is the foundation of the services supplied by enterprises. Wang Zhitai said: Logistics Quality should include the quality of logistics and logistics engineering quality. Quality of logistics work is mainly the management of logistics links, types of work, the positions of specific workload. The logistics project quality is subject to the level of logistics technology, management, technology and equipment such as engineering and project quality.

3.1 Logistics Service Evaluation System

In this paper, based on previous studies, integrated customer perceived quality evaluation with Logistics Service Quality. And designed a comprehensive logistics service quality evaluation system, which divided the evaluation of operation of the quality and customer perceived quality evaluation into 4 different aspects: hard process quality, soft process quality, potential quality, quality of results. (Table 1).

Table 1 Logistics Service Quality Evaluation System

Level indicators	Secondary indicators	3 indicators
Hard Over Cheng Quality Volume A	Logistics Network A_1	Degree of transit time of goods a_{11}
	Staff stability A_2	Staff in-service rate a_{21}
	Modern equipment level in departments A_3	Equipment and the work of various departments to match the extent a_{31}
	Services to achieve level A_4	Punctuality rate of transport a_{41}
		Mass loss rate of distribution a_{42}
		Storage capacity utilization rate a_{43}
		Frequency of transport accidents a_{44}
		Pick up on time rate a_{45}
	Unexpected capacity A_5	No customer complaint rate a_{51}
		Opinion treatment rate a_{52}
		System checks on time rate a_{53}
		Working improvement rates a_{54}
		Unforeseen circumstances process on time rate a_{55}
Soft Over Cheng Quality Volume B	Management capacity of managers B_1	Management education b_{11}
		Management of life b_{12}
		Departments satisfaction b_{13}
	Degree of due diligence of the staff B_2	Level of Staff completed work b_{21}
	Staff communication skills B_3	Understanding of customers demands b_{31}
		"Act polite, happy to do" Customer service level b_{32}
	Information processing capacity B_4	Order processing time rate b_{31}
		Return on time rate b_{32}
		Transport Information Query time rate b_{33}
		Inventory information quality b_{34}
	Order of convenience B_5	Order to provide customers with convenient level b_{51}
	Dress, and external image B_6	Overall Customer Satisfaction for the staff b_{61}
Latent In Quality Volume C	Staff professionalism and ability of C_1	The level of staff qualifications c_{11}
		Training of staff time passing rate c_{12}
		Training time rate of c_{13}
	Cost advantage of C_2	Reasonable profits c_{21}
		Reasonable cost of logistics t c_{22}
Results Fruit Quality Volume D	D_1 business relationships	Dependence on the Enterprise d_{11}
		Factory level of international relations d_{12}
		Take care of the interests of logistics user d_{13}
		sales to customers` companies Or the degree of image contribute d_{14}
		Services creativity degree d_{15}
		Degree of consistency of services with company's strategic objectives d_{16}
	D_2 Customer Satisfaction	Customer remaining rate d_{21}
		Customers obtain rate d_{22}
		Customer complaint rate of d_{23}
		Handle customer complaints properly rate d_{24}

3.2 Logistics service quality evaluation index weights

In the index system, influence of each factor is different, according to given criteria, the AHP method is used to determine. First, compare each two elements of all indicators using expert law, use a_{ii} to represent ratio of the relative importance of i element and j element in matrix, use number 1, 2, 3, 4, 5, to represent i and j elements are elemental Similar, more important, important, very important, very important respectively. Get criteria layer weights using Root Method:

① seek a matrix by row $v_i = \sqrt[n]{\prod_j a_{ij}}$

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② normalized, $w_i = \frac{v_i}{\sum v_i}$, i = 1,2, ..., n

w $_I$ is the weight of first class indicator. Similarly second class weights b ^{j} $_{i,}$ and thirds class weight l $_i$ can be achieved. Combinations of weight factors shall be: w ^{1} b $_{1\ 1}$ l ^{11} $_1$ ... w ^{n} b $_{n\ m}$ l ^{nm} l. Consistency of the obtained matrix will be tested

$C.I. = \frac{\lambda_{\max} - n}{n-1}$, Where $\lambda_{\max}$ is Eigenvectors for the matrix, for the first class indicator, it is $\lambda_{\max} = \sum_{i=1}^{n} \frac{\sum_{j=1}^{n} a_{ij} w_j}{n w_i}$, So we have a group vectors of third class weight (l $_{1,}$ ... l $_{t).}$ Among these $t = \sum_{i=1}^{m} n_m$

Through evaluating the “rate” of the third class indicators and the actual data of business operations, and carrying out customer questionnaire survey about "level" of the third class indicators, therefore evaluation system can be divided into operation quality table and customer perceived quality table. Finally, put two kinds of data into a corresponding evaluation system and multiply corresponding weight, then Logistics Quality scores can be achieved.

Through field research and calculations, relative weight first class indicators, second class indicators and third class indicators are showing as follows:

WA= 0.0718,W B = 0.1932, WC = 0.1739, WD = 0.561 1, WA $_1$ = 0.4652, WA $_2$ =0.1156, WA $_3$ = 0.0586, WA $_4$ = 0.2528, WA $_5$ = 0.1078, WB $_1$ = 0.0501,W B $_2$ = 0.107 1, WB $_3$ = 0.0983, WB $_4$ = 0.3231, WB $_5$ = 0.3231, WB $_6$ = 0.0983, WC $_1$ = 0.2, WC $_2$ = 0.8, WD $_1$ = 0.2, WD $_2$ = 0 .8, Wa $_{11}$ = 1.0, Wa $_{21}$ 1.0,Wa $_{31}$ = 1.00,W a $_{41}$ = 0.2453, W a $_{42}$ 0.2453, Wa $_{43}$ = 0.0613, Wa $_{44}$ = 0.2453, Wa $_{45}$ = 0.2025, Wa $_{51}$ = 0.2717, Wa $_{52}$ = 0.2717, Wa $_{53}$ = 0.0605, W a $_{54}$ = 0.1066, Wa $_{55}$ = 0.2893,W b $_{11}$ = 0.1018, Wb $_{12}$ = 0.5321, Wb $_{13}$ = 0.3661, Wb $_{21}$ = 1.0, Wb $_{31}$ = 0.2, Wb $_{32}$ = 0.8, Wb $_{31}$ = 0.3704, Wb $_{32}$ 0.2207, Wb $_{33}$ = 0.2379, Wb $_{34}$ = 0.1710, Wb $_{51}$ = 1.0, Wb $_{61}$ = 1.0, Wc $_{11}$ = 0.311 9,W c $_{12}$ = 0.4905,W c $_{13}$ = 0.1976,W c $_{21}$ = 0.3, Wc $_{22}$ = 0.7, Wd $_{11}$ = 0.1672,W d $_{12}$ = 0.1088, Wd $_{13}$ = 0.0709, W d $_{14}$ = 0.3896, Wd $_{15}$ = 0.0542, Wd $_{16}$ = 0.2096, Wd $_{21}$ = 0 .5342, Wd$_{22}$ = 0.2194,W d $_{23}$ = 0.0763,W d $_{24}$ = 0.1701,

4 Case Study

4.1 Service Quality Evaluation of Shanxi Sifang Logistics Company

Shanxi Sifang Logistics Company is a regional, integrated logistics company with its services covering the Northwest of China and major cities all over the country. This company is a third-party logistics company mainly provides transportation services for 4S stores of Volkswagen etc under B2B environment with existing 7 offices in Urumqi, Lanzhou, Xining, Yinchuan, Taiyuan, Zhengzhou and Shanghai. This study is carried out by service quality evaluation based on Shanxi Sifang Logistics Company. Specific data can be obtained through actual research on this company's data table. These values are further changed into ratio from probability: handling capacity for unexpected situations, implementation level of service capabilities, customer satisfaction level are the three highly required indexes during normal operation. Operation variables play important roles in daily manufactory and influence the company critically. While transforming the scores, the new score will be 0 if its probability is less than 80%, and this value increases by 5 for every 1% increase, finally 100 for 100%. All ratio values for other indexes are exactly their probability values. Among those 105 questionnaires issued to customers, 87 copies are returned with a response rate of 82.86%. The average of each index is calculated by SPSS13.0 software. Then the third and second indicators are calculated as showing in table 2 and table 3. The first indicator values are calculated from table 3 with scores: A = 74.80, B = 86.10, C = 85.49, D = 88.08.

Table 2 The three index score

Index	a $_{11}$	a $_{21}$	a $_{31}$	a $_{41}$	a $_{42}$	a $_{43}$	a $_{44}$	a $_{45}$	a $_{51}$	a $_{52}$	a $_{53}$	a $_{54}$	a $_{55}$	b $_{11}$	b $_{12}$	b $_{13}$	b $_{21}$	b $_{31}$	b $_{32}$	b $_{31}$
Score	65	70	85	80	90	60	95	90	90	90	85	90	85	80	85	70	85	80	85	98
Index	b $_{32}$	b $_{33}$	b $_{34}$	b $_{51}$	b $_{61}$	c $_{11}$	c $_{12}$	c $_{13}$	c $_{21}$	c $_{22}$	d $_{11}$	d $_{12}$	d $_{13}$	d $_{14}$	d $_{15}$	d $_{16}$	d $_{21}$	d $_{22}$	d $_{23}$	d $_{24}$
Score	85	95	70	85	85	85	90	85	85	85	90	85	85	80	20	85	95	80	95	85

Table 3 index score

Index	A $_1$	A $_2$	A $_3$	A $_4$	A $_5$	B $_1$	B $_2$	B $_3$	B $_4$	B $_5$	B $_6$	C $_1$	C $_2$	D $_1$	D $_2$
Score	65	70	85	86.93	88.25	79	85	84	89.63	85	85	87.45	85	78.27	90

4.2 Measurement data analysis

Shanxi Sifang Logistics Company develops well in practice with service quality evaluation score of 86.29, indicating the company's logistics service is above the average. According to evaluation results, following issues exist in the company's logistics service:

First, the hard process quality indicators are worse than others. The low scores of logistics network and staff stability affect the hard process quality scoring. Low scores of Logistics network are due to the fact that this company needs help from other logistics companies when goods are shipping to non-primary destinations. At the receipt of customer orders, the goods will be delivered to transit Logistics Company, took its transportation. However, the transit company will first deliver the goods of its own company when transporting task is heavy, which resulting in a lower rate of transport on time; staff stability is not very high. Left staff is mainly junior staff, because of lacking of sense of identity of the corporate culture and their own work, and the lacking of institutional management as well as unreasonable working hours and work intensity for employees, in particular the storage workers.

Second, scores of the soft process quality and potential indicators are more balanced. But department working satisfaction and stock quality of information scores are low. Two aspects of reasons cause staff satisfaction of the department low:

(1) The dissatisfaction for the reasonableness organization of work;

(2) The dissatisfaction for the coordination of various departments. Low quality of inventory information is due to poor quality management in the company's warehouse, and poor information processing capacity; warehouse packing a lot of private goods and lack of management, resulting in decreased storage utilization.

Third, the result of service quality is the ultimate goal of this company and weights more than the summation of the first three. The score of creative services is lower. Shanxi Sifang Logistics Company is goods delivery based company. The capacity of expanded value-added logistics services: packing and repacking, is not high, therefore, the score of creative services is 20.

4.3 Suggestions

According to the results of service quality analysis, the following recommendations are made for Shanxi Sifang Logistics Company to improve its service quality.

(1) Expanding logistics company network. Establish a more comprehensive national logistics distribution system and timely find out the reasons for delays in logistics, inspect transit companies comprehensively, timely warn those transit companies with repeated delays, replace the transit company if necessary;

(2) Improve company's employee training system. increase staff training strength, enhance the vocational skills training of general staff to enable employees to understand the major customer's industry production processes, organizational structure, staffing, etc., and also understand the industry`s present status and goals in future development, so as to provide better customer services; one the other hand, we should accelerate the talent introduction, introduce people with high standard qualification, and develop third-party logistics business;

(3) Shanxi Sifang logistics company only has simple facilities, single function, can only provide the individual or section of logistics services, logistics function is mainly on storage, transport and urban distribution, not many related packaging, processing, value-added, picking and similar services. Of course not even come the core logistics industry, like information-technology-based and value-added logistics services, such as logistics information services, order management, inventory management, logistics cost control, logistics, design and supply chain management, etc.;

(4) Strict implementation of enterprise systems management, strengthening sectional integration, to avoid too many departments and waste of work force. Strengthen communication and coordination and improve coordination among various departments to achieve overall optimization of company.

5 Conclusions

(1) Hard process quality, soft process quality, potential quality and results quality have the greatest impact on logistics service quality; and the quality of hard process is always the bottleneck of logistics companies in China.

(2) Soft process quality, potential quality and balanced work management, and the co-ordination between departments are the important factors that could improve the logistics service quality.

(3) Quality of results is the ultimate goal of corporate services. It shows innovative services is the key for logistics companies to enhance their influence and optimize competitions.

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