



# Empirical Research on Evaluation Index System of Service Quality in Express Delivery Industry

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**Abstract.** With the increasingly fierce market competition, the service quality of express delivery enterprises has become the focus of industry competition. How to effectively measure the service quality of express delivery enterprises and find the key elements to improve the service quality. By consulting a large number of literatures related to express delivery enterprises and service quality, referring to the research status of logistics service quality, this paper uses online questionnaire survey, SPSS and other research methods and tools, combined with qualitative analysis and quantitative analysis to carry out the research work of this paper. Based on SERVQUAL model, according to the characteristics and existing problems of express delivery industry, an evaluation model of service quality of China's express delivery enterprises is established, and a relational expression is established through factor analysis. Finally, an empirical study is completed through example analysis. This paper verifies the applicability of the theory in China's express delivery industry, which has certain theoretical significance and provides a tool for the evaluation and improvement of the service quality of express delivery enterprises.

**Keywords:** Express delivery; Service quality; Evaluation index system

## 1 Introduction

In May 2020, the State Post Bureau recently released a report on the express delivery development index in April of that year and a report on the operation of the postal industry in April of that year. Combining the two reports, it is found that the express delivery industry market is further concentrating on leading enterprises, and small and medium-sized enterprises have to survive in the cracks. The companies occupying the top eight seats in the domestic express delivery market continue to expand their market share. It also shows that other express delivery brands can only grab food from less than 20% of the market share, and the competition threshold in the express delivery market is being further raised. The report also shows that the quality index of express delivery services has improved year-on-year, and the public satisfaction with express delivery services, the 72-hour on-time rate and the effective complaint rate have all improved simultaneously. This also shows that with the gradual formation of an oligarchic pattern and the general strengthening of express delivery companies, express delivery giants have shifted from simply fighting low prices in the past to paying more

attention to service quality in the competitive bargaining chip, thus guiding the entire industry to focus on user demands. develop. It can be seen that it is particularly important to establish an evaluation index system and quantitatively analyze the service quality of my country's express delivery industry.

Regarding the theoretical development of service quality, the Finnish marketing scientist Gronroos (1982) first proposed the concept of perceived service quality[1]. He believed that service quality is the difference between customer's expectation of service (Expectation) and actual perception (perceived) service[2]; The SERVQUAL model is constructed by Parasuraman, Zeithaml & Berry based on the service quality gap model[3]. It establishes 22 indicators that affect the evaluation of service quality, and summarizes them into responsiveness, reliability, assurance, empathy, tangible Under the five dimensions of sexuality, the widely used SERVQUAL scale has been formed. On the basis of the original LSQ model, Mentzer, Flint & Kent et al, considering the practical process of logistics and the correlation between various dimensions, propose a customer-oriented LSQ. Model.[4]Regarding the research on express service quality, domestic and foreign scholars' research on the evaluation dimensions of express service quality is mainly based on the five dimensions of tangibility, reliability, responsiveness, assurance and empathy of SERVQUAL scale.[5] It is either divided according to the service result quality and service process quality in the Gronroos customer-perceived service quality model, or modified and evaluated on the basis of 9 indicators in the logistics service quality model (LSQ model)[6].

The index system of express service quality by sorting out the existing theoretical models in the literature on the basis of analyzing the current situation of domestic express delivery industry and China's express service quality. Finally, the method of issuing questionnaires is used to further verify and improve the index system to establish a scientific, feasible and reasonable index system.

## **2 The Construction of the Evaluation Index System of Express Service Quality**

### **2.1 Evaluation index system setting**

In the previous article, the measurement dimensions of express service quality were summarized, and the existing literature was summarized. In the research of constructing the evaluation dimension of express service quality in this paper, on the one hand, we learn from the previous service quality model, and on the other hand, we establish a preliminary express service quality evaluation index system on the basis of fully understanding the characteristics of the industry and consumer demand.

The initial indicator dimensions include immediacy, reliability, convenience, security, empathy, remedial 6 measurement dimensions and 18 specific evaluation indicators.

**Table 1.** Service quality evaluation index of express delivery enterprises (Self-drawing)

Dimension	Question number	Composition item
Immediacy	1	Can you respond quickly to submitting an order?
	2	Can courier companies provide complete order tracking information in a timely manner?[7]
	3	Whether the express company can deliver the express within the agreed time period[8]
	4	Whether the courier handles the business quickly
Reliability	5	Is the delivery package intact and undamaged?
	6	Is the delivered item accurate?
	7	Can couriers protect your privacy?[9]
Convenience	8	Is there a variety of ways to notify the pickup?
	9	Is the place of receipt convenient?
	10	Is the receipt time convenient?
Guaranteed	11	Is the price of courier service reasonable?
	12	Whether the express company can provide express delivery requirements that meet various speeds
	13	Does the courier company provide multiple delivery methods?[10]
Empathy	14	Do couriers have good image etiquette?
	15	Does the courier have a good service attitude?
	16	Whether the courier has the willingness to actively handle errors[11]
Remedial	17	Can the deviation of the express company be handled in a timely manner?
	18	Whether the complaint channel of the courier company is unblocked

## 2.2 Questionnaire design and distribution

The scale of the measurement is determined, and the questionnaire usually uses the Likert 5-point index system. The question options are divided into 5 grades, and the scores of each grade are 1, 2, 3, 4, and 5 from right to left. The options are: very unimportant, unimportant, general, important, and very important. (The questionnaire will not be shown due to space reasons)

In this survey, 516 electronic questionnaires were distributed. Incomplete questionnaires were excluded, and invalid questionnaires such as questionnaires of the same scale and missing questionnaires were regularly selected. At the same time, this questionnaire was about evaluating the quality of express delivery services, so the respondents must have experienced Courier services, and all options are not selected as important, are considered valid questionnaires. According to statistics, a total of 507 valid questionnaires were recovered, and the questionnaire effectiveness rate was 97%, and the number of valid questionnaires met the requirement that the sample size be 5-7 times the variable.

### 2.3 Sample data test

evaluation indicators of the service quality of express delivery companies set in the questionnaire include six aspects: immediacy, reliability, convenience, security, empathy, and remediation, with a total of 18 indicators (X1- X18 ).

#### i. reliability test

It can be seen that the reliability coefficient value is 0.973 , which is greater than 0.9 , indicating that the reliability of the research data is of high quality. For the " CITC value", the CITC values of the analysis items are all greater than 0.4 , indicating that there is a good correlation between the analysis items, and it also indicates that the reliability level is good.

#### ii. Validity test

**Table 2.** Validity Analysis Results (Self-drawing)

Name	Factor loading factor		Common degree ( common factor variance )
	factor 1	factor 2	
X1	0.790	0.225	0.675
X2	0.829	0.290	0.772
X3	0.885	0.223	0.833
X4	0.755	0.393	0.725
X5	0.751	0.475	0.790
X6	0.843	0.326	0.817
X7	0.777	0.429	0.788
X8	0.239	0.799	0.695
X9	0.716	0.572	0.840
X10	0.561	0.697	0.801
X11	0.655	0.593	0.781
X12	0.476	0.719	0.744
X13	0.320	0.810	0.759
X14	0.166	0.868	0.781
X15	0.496	0.740	0.794
X16	0.643	0.618	0.796
X17	0.663	0.607	0.808
X18	0.639	0.603	0.772
Eigenvalue (before rotation)	12.590	1.380	-
Variance explained rate% (before rotation)	69.943%	7.664%	-
Cumulative variance explained rate % (before rotation)	69.943%	77.607%	-
Eigenvalues ( after rotation )	7.724	6.245	-
Variance explained rate % ( after rotation )	42.911%	34.696%	-
Cumulative variance explained rate % (after rotation)	42.911%	77.607%	-

Remarks: If the numbers in the table are colored: blue indicates that the absolute value of the load factor is greater than 0.4, and red indicates that the common degree (common factor variance) is less than 0.4.

It can be seen from the above table that the common degree values corresponding to all research items are higher than 0.4, indicating that the information of the research items can be effectively extracted. In addition, the KMO value is 0.958, which is greater than 0.6, which means the data is valid.

## 2.4 Factor analysis

According to Table 5, only the eigenvalues of the first two factors are greater than 1, and the sum of the eigenvalues of the first two factors accounts for 77.60% of the sum of the eigenvalues. Therefore, the first two factors are extracted as main factors.

**Table 3.** Factor contribution rate table (Self-drawing)

Ingredients	Initial eigenvalues			Extract sum of squares and load			Rotate Square and Load		
	total	% of variance	Cumulative %	total	% of variance	Cumulative %	total	% of variance	Cumulative %
1	12.590	69.943	69.943	12.590	69.943	69.943	7.724	42.911	42.911
2	1.380	7.664	77.607	1.380	7.664	77.607	6.245	34.696	77.607
3	.800	4.442	82.049						
4	.527	2.926	84.975						
5	.434	2.411	87.386						
6	.336	1.866	89.252						
7	.296	1.643	90.895						
8	.240	1.336	92.231						
9	.209	1.161	93.392						
10	.201	1.117	94.510						
11	.176	.980	95.490						
12	.162	.898	96.387						
13	.141	.781	97.168						
14	.125	.696	97.864						
15	.110	.614	98.477						
16	.109	.608	99.086						
17	.089	.497	99.583						
18	.075	.417	100.000						

Extraction method: principal component analysis.

Because the structure of the initial loading matrix is not clear enough to explain the factors, the factor loading matrix is rotated to achieve the purpose of simplifying the structure, so that each variable has a higher load on some factors, and only a small load on the other factors. For moderate loads, use the orthogonal rotation method for factor rotation. The rotation results show that the common degree values corresponding to all research items are higher than 0.4, which means that there is a strong correlation between research items and factors, and factors can effectively extract information. After ensuring that the factor can extract most of the information of the research item, then analyze the corresponding relationship between the factor and the research item .

**Table 4.** Factor score coefficient matrix (Self-drawing)

	Element	
	1	2
Can you respond quickly when submitting an order ( X1)	.212	-.153
Can express companies provide complete order tracking information in a timely manner (X2)	.205	-.136
Whether the express company can deliver the express within the agreed time period (X3)	.247	-.184
Whether the courier handles the business quickly (X4)	.146	-.067
Is the delivery package intact and undamaged (X5)	.118	-.029
Is the delivery product accurate (X6)	.199	-.125
Can couriers protect your privacy (X7)	.142	-.058
variety of ways to notify the pickup? ( X8)	-.170	.279
Is the place of receipt convenient (X9)	.075	.025
Is the receipt time convenient (X10)	-.021	.130
Is the service price of express company reasonable (X11)	.046	.054
Whether the express company can provide express delivery requirements that meet various speeds (X12)	-.059	.167
Does the express company provide multiple delivery methods (X13)	-.144	.258
Do couriers have good image etiquette (X14)	-.218	.333
Does the courier have a good service attitude (X15)	-.058	.170
Whether the courier has the willingness to actively handle errors (X16)	.034	.069
Whether the deviation of the express company can be handled in a timely manner (X17)	.044	.058
Whether the complaint channel of the express company is unblocked (X18)	.037	.064

Extraction method: principal component analysis .

In summary, the factor analysis method is used to calculate the weight and establish the relationship equation between the factor and the research item, as follows:

$$\theta_1 = 0.212 * X1 + 0.205 * X2 + 0.247 * X3 + 0.146 * X4 + 0.118 * X5 + 0.199 * X6 + 0.142 * X7 - 0.170 * X8 + 0.075 * X9 - 0.021 * X10 + 0.046 * X11 - 0.059 * X12 - 0.144 * X13 - 0.218 * X14 - 0.058 * X15 + 0.034 * X16 + 0.044 * X17 + 0.037 * X18 \tag{1}$$

$$\theta_2 = 0.153 * X1 - 0.136 * X2 - 0.184 * X3 - 0.067 * X4 - 0.029 * X5 - 0.125 * X6 - 0.058 * X7 + 0.279 * X8 + 0.025 * X9 + 0.130 * X10 + 0.054 * X11 + 0.167 * X12 + 0.258 * X13 + 0.333 * X14 + 0.170 * X15 + 0.069 * X16 + 0.058 * X17 + 0.064 * X18 \tag{2}$$

calculated by multiplying the variance explanation rate ( normalized ) and the factor score after rotation. The calculation formula for the current data is:

$$(42.911 * \theta_1 + 34.696 * \theta_2) / 77.607 \tag{3}$$

which ends up being :

$$0.553 * \theta_1 + 0.447 * \theta_2 \tag{4}$$

### 3 Case Analysis

**Table 5.** Case analysis (Self-drawing)

	Express company		
	Enterprise A	Enterprise B	Enterprise C
Can you respond quickly when submitting an order ( X1)	4.40	4.12	4.55
Can express companies provide complete order tracking information in a timely manner (X2)	3.71	4.75	3.71
Whether the express company can deliver the express within the agreed time period (X3)	4.64	3.69	4.15
Whether the courier handles the business quickly (X4)	3.59	4.75	4.57
Is the delivery package intact and undamaged (X5)	3.65	5.00	3.81
Is the delivery product accurate (X6)	4.08	3.87	4.25
Can couriers protect your privacy (X7)	3.75	4.66	3.73
variety of ways to notify the pickup? ( X8)	3.86	4.79	3.70
Is the place of receipt convenient (X9)	3.84	4.33	4.67
Is the receipt time convenient (X10)	4.15	4.98	3.61
Is the service price of express company reasonable (X11)	3.83	4.58	4.64
Whether the express company can provide express delivery requirements that meet various speeds (X12)	3.81	4.51	3.63
Does the express company provide multiple delivery methods (X13)	3.78	4.89	3.86
Do couriers have good image etiquette (X14)	4.65	3.69	3.94
Does the courier have a good service attitude (X15)	4.45	4.76	4.49
Whether the courier has the willingness to actively handle errors (X16)	4.20	4.22	4.10
Whether the deviation of the express company can be handled in a timely manner (X17)	3.92	4.96	4.42
Whether the complaint channel of the express company is unblocked (X18)	4.01	3.94	4.59
Factor score 1	3.28	3.55	3.72
Factor score 2	3.50	4.05	3.25
Total Score	3.38	3.77	3.51

The numerical simulation method was used to score 18 indicators of the three express delivery companies. According to the relationship equation established by factor analysis , two factor scores can be obtained. Through weighted calculation, the highest score of express delivery company B can be obtained, with a score of 3.77 points.

### 4 Conclusions

By summarizing the basic theories of service quality and service quality evaluation, this paper briefly outlines the current situation of domestic express service quality and

the research on service quality evaluation methods of express companies. Based on the SERVQUAL model and combined with the characteristics of express delivery services, a service quality evaluation system for express delivery enterprises is established, including 6 dimensions and 18 elements.

The questionnaire adopts the Likert five-level scale, and the reliability and discrimination of the results are tested, the item indicators are revised, and weights are assigned to each dimension, and finally the service quality evaluation system of express delivery enterprises is established, and on this basis An example analysis was done. Through the analysis, it is concluded that "immediacy" and "guarantee" are the two most important factors in the perception of express service. The conclusion of the empirical study provides a reference for the service improvement of express companies.

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