

Construction of Campus Cainiao Post Station Service Quality Evaluation Model

- Take Guangzhou College of Technology and Business as An Example

Lingzhi Zeng
1052170613@qq.com

School of Business management Guangzhou College of Technology and Business Guangzhou, China

Abstract—With the increasing number of express deliveries on campus, service quality levels of campus express become a hot research topic, it is especially important to establish an effective service quality evaluation system. To this end, this article built 19 index evaluation system firstly based on SERVQUAL evaluation model of customer satisfaction. Then, the weight of indexes was determined by analytic hierarchy process (AHP) after we obtained the 220 data by questionnaire. Finally, the comprehensive evaluation on the logistics service quality of campus express was carried out by using fuzzy comprehensive evaluation method, and this paper put forward a series of suggestions to improve the service quality of Guangzhou College of Technology and Business campus express service according to the three index dimensions of responsiveness, assurance and empathy with low scores.

Keywords- Cainiao post station; Service quality evaluation; Analytic hierarchy process; Fuzzy evaluation method

1 INTRODUCTION

According to the report on *China consumer trends* released by Boston Consulting Group in 2017, China consumer demand will increase by 250 million dollars in the next five years, which 65 percent of sales will be generated by the born in 90s and 00s [1]. Express delivery volume reached 63.52 billion *yuan* according to survey in 2019, of which colleges reach 3 billion *yuan* [2]. With the increasing of total express delivery in colleges, Cainiao post station have become an important service area for the development of the express delivery industry and have mushroomed and developed rapidly. Cainiao post station was founded on May 28, 2013, led by Cainiao Network Technology Co., Ltd. to establish a comprehensive logistics service platform for consumers. It provides parcel collection service for online shopping users and committed to providing diversified last-mile services for consumers. It has established four exclusive cooperation channels including individual, chain, property and campus. So far, it has 2,800 campus postings serving 24 million college students and teachers [3].

However, college campus has strict requirements for outsiders and vehicles and students have higher experience requirements for quality of logistics service. How to complete the "last mile" distribution brings many problems and confusion to colleges, so it is especially important to construct a scientific model of campus express service quality. To hand this issue, this paper

study the campus Cainiao post station of Guangzhou College of Technology and Business, constructing service quality evaluation model, analyzing the current service quality problems of Cainiao post station, and putting forward improvement measures.

2 INFORMATION OF GUANGZHOU COLLEGE OF TECHNOLOGY AND BUSINESS CAINIAO POST STATION

Guangzhou College of Technology and Business is a private full-time undergraduate university, it has Huadu and Sanshui campuses. Nearly 27,000 full-time teachers and students in this college, of which more than 17,000 teachers and students in Sanshui campus [4]. Cainiao post station is located in the commercial area of the school, business hours from 10:00 AM to 7:00 PM. It sets up various types of shelves for sorting label, picking, sorting, placing large package, and is distributed 3 areas including post area, display area and pick up area. It also has many pick-up machines to provide self-service pick-up service for teachers and students. At present, the Cainiao post station cooperates with express companies including China Post, YTO Express, STO Express, ZTO Express and so on. Sanshui Campus is located in the remote area and far from the urban area, online shopping dominated students' daily shopping, which results to the demand for express delivery increases sharply. Therefore, a large number of express deliveries are received and sent in the Cainiao post station every day. However, with campus delivery quantity and scale increasing unceasingly, a series of problems were appeared gradually. These problems led teachers and students to complain about the service efficiency of Cainiao post station.

3 ANALYSIS ON EVALUATION INDEX OF CAMPUS EXPRESS SERVICE QUALITY OF GUANGZHOU COLLEGE OF TECHNOLOGY AND BUSINESS

3.1 Constructe evaluation index system

This paper studies from the perspective of teachers and students on campus, and constructs the evaluation index based on SERVQUAL model, the characteristics of express service and the actual situation of colleges. Express service quality model has 5 dimensions which are tangibility, reliability, responsiveness, assurance, empathy, according to the content of the SERVQUAL service quality evaluation theory [5]. Therefore, it is divided into 5 dimensions, of which a total of 19 indicators, as shown in Table 1.

Table 1 The index table of service quality system

Dimensions (First level indicators)	Second level indicators
Tangibility (B1)	1. Advanced service facilities; (B11) 2. Well-groomed, dressed in uniform, and equipped with work cards with all staff; (B12) 3. Covered much express company. (B13)
Reliability (B2)	4. Be trustworthy; (B21) 5. Inquire the storage location of goods

	accurately; (B22)
	6. Guarantee the express goods will not be lost or damaged; (B23)
	7. High information security of sender. (B24)
	8. Provided timely customer service; (B31)
	9. Flexible and convenient pick-up time; (B32)
Responsiveness (B3)	10. Convenient and fast customer order business process; (B33)
	11. Speed and efficiency of express delivery; (B34)
	12. Deal with complaints in time. (B35)
	13. Initiative help by staff when customers can't find the delivery; (B41)
Assurance (B4)	14. High professional level of staff; (B42)
	15. Always provided satisfactory solutions with customers. (B43)
	16. Polite and high quality qualified with staff; (B51)
	17. Provided personalized services; (B52)
Empathy (B5)	18. Check the goods before signing allowed by consignee; (B53)
	19. Help to return the goods when damage is found after inspection. (B54)

3.2 Allocate index weights of the evaluation system

The paper determines the weight of indexes by adopting AHP, after we compare with various analytical methods. The main principle of AHP is the characteristics of mathematical calculation, which combining qualitative and quantitative to treat complex difficult problem to decision making. The AHP reflects its practicability, timely and effective principle when applied to weight allocation [6]. Therefore, the AHP is adopted to determine the weight of indicators in the index system, and this paper assign the weight of the corresponding indicators in the model by using expert interview with questionnaire.

3.2.1 Construct pairwise judgment matrix to determine first-level index weight

According to the 1-9 proportional scale method, this paper makes pair comparison on the importance of first-level indicators by relevant experts and teachers of logistics major in college, and constructing judgment matrix \mathbf{A} as follows:

$$\mathbf{A} = \begin{bmatrix} 1 & 1/5 & 1/5 & 1/3 & 1/2 \\ 5 & 1 & 3 & 3 & 2 \\ 5 & 1/3 & 1 & 3 & 2 \\ 3 & 1/3 & 1/3 & 1 & 2 \\ 2 & 1/2 & 1/2 & 1/2 & 1 \end{bmatrix}$$

Step 1: According the judgment matrix \mathbf{A} , we normalize the column, and obtain the feature vector by MATLAB software calculation: $w_a = (0.057 \ 0.411 \ 0.260 \ 0.149 \ 0.122)$.

Step 2: Calculate the maximum characteristic root of **A** index matrix by MATLAB software calculation, $\lambda_{\max} = 5.2858$.

Step 3: Consistency check, calculate the consistency ratio $CR = CI/RI$, When $CR < 0.1$, the judgment matrix has satisfactory consistency. CI is the consistency index, $CI = (\lambda_{\max} - n) / (n - 1)$, we can get $CI = 0.0714$ according to the above formula. RI is the average random consistency index, and it can be obtained by looking up the table that $RI = 1.12$, then $CR = CI/RI = 0.0638 < 0.1$, so w_A is suit for weight vector that can be used as a first-level indicator.

3.2.2 Determine the weight of secondary indicators

The importance of secondary indicators was studied repeatedly by the relevant experts and teachers of logistics major in college, and they determined the judgment matrixes of each secondary indicator **B**₁, **B**₂, **B**₃, **B**₄, **B**₅.

$$\mathbf{B}_1 = \begin{bmatrix} 1 & 3 & 1/4 \\ 1/3 & 1 & 1/5 \\ 4 & 5 & 1 \end{bmatrix} \quad \mathbf{B}_2 = \begin{bmatrix} 1 & 2 & 1/3 & 2 \\ 1/2 & 1 & 1/4 & 1/3 \\ 3 & 4 & 1 & 2 \\ 1/2 & 3 & 1/2 & 1 \end{bmatrix}$$

$$\mathbf{B}_3 = \begin{bmatrix} 1 & 1/2 & 1/3 & 1/2 & 1/2 \\ 2 & 1 & 3 & 2 & 2 \\ 3 & 1/3 & 1 & 2 & 1/3 \\ 2 & 1/2 & 2 & 1 & 1/2 \\ 2 & 1/2 & 3 & 2 & 1 \end{bmatrix}$$

$$\mathbf{B}_4 = \begin{bmatrix} 1 & 3 & 1/2 \\ 1/3 & 1 & 1/3 \\ 2 & 3 & 1 \end{bmatrix} \quad \mathbf{B}_5 = \begin{bmatrix} 1 & 3 & 4 & 4 \\ 1/3 & 1 & 2 & 2 \\ 1/4 & 1/2 & 1 & 1/2 \\ 1/4 & 1/2 & 2 & 1 \end{bmatrix}$$

The consistency test results and weights of each secondary index are calculated by MATLAB, as shown in Table 2.

Table 2. Consistency test results and weights of secondary indicators

Dimensions	λ_{\max}	CR	Consistency	Feature vector w_i (i=1, 2, 3, 4, 5)
B1	3.0858	0.0739	good	$w_1 = [0.226 \ 0.101 \ 0.674]$
B2	4.1752	0.0649	good	$w_2 = [0.36 \ 0.095 \ 0.469 \ 0.201]$
B3	5.3473	0.0775	good	$w_3 = [0.099 \ 0.336 \ 0.134 \ 0.175 \ 0.257]$
B4	3.0536	0.0462	good	$w_4 = [0.333 \ 0.140 \ 0.528]$
B5	4.0813	0.0301	good	$w_5 = [0.534 \ 0.218 \ 0.102 \ 0.145]$

3.2.3 Comprehensive weight ranking and decision making

According to the above calculation of the weight of the index system at all levels, we can get the weight table of the key evaluation indexes, which affecting the performance evaluation of campus express service quality, by multiply the first-level index weight with the second-level index weight, as shown in Table 3.

Table 3. Evaluation index weight of campus express service quality

Rule layer	B1 0.057	B2 0.411	B3 0.260	B4 0.149	B5 0.122	Weight (unit: %)
B11	0.226	-	-	-	-	1.30
B12	0.101	-	-	-	-	0.58
B13	0.674	-	-	-	-	3.84
B21	-	0.236	-	-	-	9.72
B22	-	0.095	-	-	-	3.90
B23	-	0.469	-	-	-	19.28
B24	-	0.201	-	-	-	8.26
B31	-	-	0.099	-	-	2.57
B32	-	-	0.336	-	-	8.74
B33	-	-	0.134	-	-	3.48
B34	-	-	0.175	-	-	4.55
B34	-	-	0.257	-	-	6.68
B41	-	-	-	0.333	-	4.96
B42	-	-	-	0.140	-	2.09
B43	-	-	-	0.528	-	7.87
B51	-	-	-	-	0.534	6.51
B52	-	-	-	-	0.218	2.66
B53	-	-	-	-	0.102	1.24
B54	-	-	-	-	0.145	1.77

3.3 Apply FCE comprehensive evaluation

The main principle of fuzzy comprehensive evaluation (FCE) method is to use fuzzy mathematics and statistical methods to evaluate target which cannot be directly measured [7]. As we cannot intuitive to judge things, it is necessary to intuitively measure the specific factors that may affect the thing, synthesize the situation of each influencing factor, and establish the fuzzy evaluation matrix according to the factors and their weights, and the final evaluation result of the evaluated object can be obtained after normalization [8].

3.3.1 Build evaluation index and weight allocation

We establish the corresponding evaluation criterion index on the basis of determining the service quality evaluation target of the campus post station. The first layer is total goal layer denoted with V , and the second level is the criterion level, which further divided the overall objective of the evaluation into five secondary indexes including tangibility, reliability, responsiveness, assurance and empathy denoted as $v = \{v^1, v^2, v^3, v^4, v^5\}$ respectively. The third level is the specific evaluation index layer for each secondary index, denoted with $v^i = \{v_{1i}^i, v_{2i}^i, \dots, v_{ni}^i\} (i = 1, 2, \dots, N)$. Finally, we determine the corresponding weight of indicators

by using AHP analysis as shown in Table 2, in this way, an evaluation index system with hierarchical structure is formed.

3.3.2 Establish indicator set and evaluation set

In the evaluation index set of this paper, the first level evaluation index is set as $B = \{B1, B2, B3, B4, B5\}$, and second level evaluation index are set as $B1 = \{B11, B12, B13\}$, $B2 = \{B21, B22, B23, B24\}$, $B3 = \{B31, B32, B33, B34, B35\}$, $B4 = \{B41, B42, B43\}$, $B5 = \{B51, B52, B53, B54\}$. We set up 5 evaluation levels, which are used to represent the evaluation results of all levels of indicators as $U = (U_1, U_2, U_3, U_4, U_5)$, the evaluation sets are denoted with very dissatisfied, dissatisfied, general, satisfied, and very satisfied, which scored 1, 2, 3, 4, 5, respectively. Therefore, the person under investigation can scored according to themselves.

3.3.3 Fuzzy evaluation of single factor

We construct the service quality evaluation system based on SERVQUAL model, and the 19 evaluation indicators of the evaluation system were taken as the contents of the questionnaire. 220 questionnaires data of different teachers and students in Sanshui Campus of Guangzhou College of Technology and Business were collected through the method of online questionnaire survey, and 200 valid questionnaires were collected, the fuzzy evaluation table was obtained after sorting out as shown in Table 4.

Table 4. Fuzzy evaluation table

Indicators	Very satisfied	Satisfied	General	Dissatisfied	Very dissatisfied
B11	10/200	32/200	148/200	10/200	0
B12	0	18/200	92/200	85/200	5/200
B13	28/200	108/200	54/200	10/200	0
B21	6/200	74/200	105/200	10/200	5/200
B22	92/200	95/200	5/200	8/200	0
B23	16/200	124/200	38/200	18/200	4/200
B24	6/200	90/200	82/200	14/200	8/200
B31	9/200	17/200	87/200	58/200	29/200
B32	8/200	25/200	80/200	78/200	9/200
B33	17/200	51/200	102/200	30/200	0
B34	0	32/200	85/200	46/200	37/200
B35	0	27/200	114/200	38/200	21/200
B41	0	20/200	75/200	85/200	20/200
B42	19/200	70/200	89/200	12/200	10/200
B43	10/200	26/200	124/200	40/200	0
B51	19/200	46/200	108/200	27/200	0
B52	37/200	69/200	80/200	5/200	9/200
B53	65/200	101/200	29/200	5/200	0
B54	13/200	111/200	70/200	4/200	2/200

After sorting out the fuzzy evaluation table, the following fuzzy evaluation matrixes are obtained,

$$\begin{aligned}
\mathbf{R}_{B1} &= \begin{bmatrix} 10/200 & 32/200 & 148/200 & 10/200 & 0 \\ 0 & 18/200 & 92/200 & 85/200 & 5/200 \\ 28/200 & 108/200 & 54/200 & 10/200 & 0 \end{bmatrix} \\
\mathbf{R}_{B2} &= \begin{bmatrix} 6/200 & 74/200 & 105/200 & 10/200 & 5/200 \\ 92/200 & 95/200 & 5/200 & 8/200 & 0 \\ 16/200 & 124/200 & 38/200 & 18/200 & 4/200 \\ 6/200 & 90/200 & 82/200 & 14/200 & 8/200 \end{bmatrix} \\
\mathbf{R}_{B3} &= \begin{bmatrix} 9/200 & 12/200 & 87/200 & 58/200 & 29/200 \\ 8/200 & 25/200 & 80/200 & 78/200 & 9/200 \\ 17/200 & 51/200 & 102/200 & 30/200 & 0 \\ 0 & 32/200 & 85/200 & 46/200 & 37/200 \\ 0 & 27/200 & 114/200 & 38/200 & 21/200 \end{bmatrix} \\
\mathbf{R}_{B4} &= \begin{bmatrix} 0 & 20/200 & 75/200 & 85/200 & 20/200 \\ 19/200 & 70/200 & 89/200 & 12/200 & 10/200 \\ 10/200 & 26/200 & 124/200 & 40/200 & 0 \end{bmatrix} \\
\mathbf{R}_{B5} &= \begin{bmatrix} 19/200 & 46/200 & 108/200 & 27/200 & 0 \\ 37/200 & 69/200 & 80/200 & 5/200 & 9/200 \\ 65/200 & 101/200 & 29/200 & 5/200 & 0 \\ 13/200 & 111/200 & 70/200 & 4/200 & 2/200 \end{bmatrix}
\end{aligned}$$

Multiply the corresponding weight vector (w_i) with the fuzzy evaluation matrix (R_{B_i}) to obtain the corresponding weighted operation of the second layer as,

$$w_1 \mathbf{R}_{B1} = (0.1047 \ 0.4092 \ 0.3957 \ 0.0879 \ 0.0025)$$

$$w_2 \mathbf{R}_{B2} = (0.0943 \ 0.5137 \ 0.2978 \ 0.0719 \ 0.0233)$$

$$w_3 \mathbf{R}_{B3} = (0.0308 \ 0.1454 \ 0.4667 \ 0.2689 \ 0.0888)$$

$$w_4 \mathbf{R}_{B4} = (0.0397 \ 0.1509 \ 0.5145 \ 0.2555 \ 0.0394)$$

$$w_5 \mathbf{R}_{B5} = (0.1346 \ 0.3300 \ 0.4411 \ 0.0830 \ 0.0113)$$

Finally, the fuzzy relation matrix is obtained as follows,

$$\mathbf{R}_B = \begin{bmatrix} 0.1047 & 0.4092 & 0.3957 & 0.0879 & 0.0025 \\ 0.0943 & 0.5137 & 0.2978 & 0.0719 & 0.0233 \\ 0.0308 & 0.1448 & 0.4667 & 0.2689 & 0.0888 \\ 0.0397 & 0.1509 & 0.5145 & 0.2555 & 0.0394 \\ 0.1346 & 0.3300 & 0.4411 & 0.0830 & 0.0113 \end{bmatrix}$$

3.3.4 Conduct multi-factor comprehensive evaluation

The fuzzy evaluation vector can be generated by using fuzzy synthesis operator to process the data as,

$$w_A \mathbf{R}_B = [0.0747 \ 0.3348 \ 0.3968 \ 0.1527 \ 0.0401]$$

According to the evaluation sets (very satisfied, satisfied, general, dissatisfied, very dissatisfied) corresponding score values $\mathbf{d} = [5, 4, 3, 2, 1]$, and the scores of evaluation vector were calculated by $w_i \mathbf{R}_{B_i} \mathbf{d}^T$ as shown in Table 5.

Table 5 Scores of service quality evaluation index

Tangibility	Reliability	Responsiveness	Assurance	Empathy	Total level
3.5257	3.5868	2.7524	2.8960	3.4936	3.249

We can see that the express delivery service evaluation level of Cainiao post station in Sanshui District of Guangzhou College of Technology and Business is poor according to Table 5, in which the total service score is only 3.249 and the score of responsiveness and assurance is much low, failing to meet the customer satisfaction, followed by empathy. Therefore, responsiveness and assurance are the two key indicators to improve the service quality level of Cainiao post station, and how to provide more satisfactory and personalized service for customers from their perspective is also important.

4 SUGGESTIONS

The suggestions are put forward based on the contents of responsiveness, assurance and empathy index with low scores, and also according to the existing problems of the Guangzhou College of Technology and Business Cainiao post station.

4.1 Appointment time for pick-up and extending pick-up time

Nowadays, Cainiao post station has low pick-up efficiency, it takes 8-10 minutes to pick up items in the high score period. and business hours are unreasonable, it only opens for nine hours. In order to solve the queuing problem of the station during peak hours, teachers and students can make an appointment through an APP and pick up the items in their free time. Moreover, the business hours of Cainiao post station can be extended to 9:00PM to reduce the accumulation of daily post stock packages.

4.2 Improve the service level of staff in Cainiao post station

The majority of teachers and students think that the staff of Cainiao post station lack of professional quality and poor service quality. Therefore, it is necessary to carry out centralized pre-job training for the staff, and only on-the-job after passing the assessment. During the on-the-job period, they will conduct practical operation training and theoretical training by combining online and offline. Moreover, the Cainiao station staff practice operates through the establishment of practice stations and bases, and improve their professional operation and knowledge learning.

4.3 Provide personalized services for different groups

The objects of campus post station service including staff, students and campus managers, which can be classified different groups through data analysis, and provide personalized services according to the characteristics of different groups. Different channels are set according to the size of express delivery. Door-to-door delivery can be provided to meet the needs of customers because of large items that cannot be picked up by themselves. Unable to timely pick up the case can be taken or delivered to the door.

5 CONCLUSION

This article constructs a service quality evaluation mode on Cainiao post station of Guangzhou College of Technology and Business to evaluate the quality of campus express delivery service. The evaluation indexes are determined in 5 aspects based on SERVQUAL evaluation model of customer satisfaction, and the weight of indexes are obtained by using AHP. On that basis, we establish evaluation index system by using FCE method. Finally, suggestions are put to enhanced the campus Cainiao station service quality level based on responsiveness, assurance and empathy dimensions, according to the results of the final evaluation score. Furthermore, this article provides some reference for the improvement of the quality of express service in Guangzhou campus.

However, due to the limitation of samples, the AHP analysis method has certain limitations because of many indicators, large data statistics, and difficult to determine weight. Therefore, the research conclusion is not comprehensive, so the next research focus is to carry out data research in the university of Guangzhou and Foshan, it will ensure the effectiveness of data analysis.

REFERENCES

- [1] China Consumption Trends Report - Three new forces leading the new consumption economy [R]. Beijing, Boston Consulting,2017.
- [2] Campus Express Industry Development Report (2019) [R], Beijing, released by China Education Logistics Association and Alibaba Research Institute, 2020.
- [3] Novice station website. <https://www.taobao.com/markets/cnwww/terminal-poststation>
- [4] Guangzhou Business college official website-Overview of Guangzhou College of Technology and Business, <https://www.gzgs.edu.cn/>
- [5] A.Parasuraman, Zeithaml, etc. SERVQUAL: A multivariable measurement of customer perceived service quality [M].1988.
- [6] Chen Wei. Research on the Performance Evaluation of JT Group Project Construction Management Organization Based on AHP-Fuzzy Comprehensive Evaluation Method [D], Hangzhou: Zhejiang University of Science and Technology, 2021.
- [7] Zhang Yujiao. Research on marketing channel performance evaluation of Gulf Company based on fuzzy comprehensive evaluation method [D], Qinhuangdao: Yanshan University, 2020.
- [8] HUANG J. Construction of campus express service quality evaluation model [J]. Logistics Engineering and Management,2020(12):35-37.