

International Experience of Civil Aviation Service Quality Evaluation

Lili Zhang*, Junbo Gao, Yujun Huang, Xi Kou, Junjie Yang, Jianping Chen,
Lei Liang

The Second Research Institute of Civil Aviation Administration of China, Chengdu, China

* Corresponding Author Email: 458045087@qq.com

Abstract. Civil aviation service quality evaluation research plays a crucial role in improving the travel experience of passengers and increasing the market competitiveness of civil aviation transport enterprises. There have been relatively abundant relevant theoretical research results, but combined with the practical application, there are still areas that need further exploration and improvement. Based on the development of the connotation of service quality evaluation, this paper reviews the research on civil aviation service quality evaluation in terms of the development history, index system, index weights, methods and models of service quality evaluation, and finds that there are obvious differences in service quality evaluation research in terms of methods and other aspects. According to the results, the international experience of civil aviation service quality evaluation can provide a reference for the construction of China's civil aviation service quality evaluation system.

Keywords: civil aviation, service quality, evaluation index.

1. Introduction

With the economic development and the improvement of people's living standard, civil aviation passenger transport has gradually become a popular way of travel, with its service quality receiving increasing public attention. The civil aviation industry, as a basic and pioneering industry in China, has been supported by the successive introduction of relevant national industry policies and documents, which have raised higher requirements for the improvement of civil aviation service quality. In 2017, the Air Traffic Control Industry Management Office of Civil Aviation Administration of China (CAAC) issued the Technical Specification for Airport Moment Capacity Assessment, proposing to construct the four systems of airline operation management, airport security management, ATC operation service management and government supervision and management, aiming to fundamentally change from focusing on scale and speed to quality and efficiency. In 2018, Guidance on Further Improving Civil Aviation Service Quality and Action Outline for the Construction of a Civil Aviation Power in the New Era were released. In 2019, CAAC High-Quality Development Index Framework System (Trial) and Outline for the Construction of A Transportation Power were issued, and Special Action on "Enhancing Civil Aviation Service Quality" in 2019 was launched. On January 3, 2020, the CAAC promulgated the Action Outline for CAAC Four-Type Airport Construction (2020-2035), which clarifies the connotation, objectives and key tasks of the construction of four-type airports.

From the perspective of passengers, their requirements for air transportation service quality is no longer limited to the transportation from A to B, but the requirements for ground service environment, aircraft type, aircraft cabin equipment on the one hand, and attitude of service personnel and convenience of service on the other hand. It has been nearly six years since the civil aviation industry carried out comprehensive service quality improvement management, and airlines have made significant improvements in flight punctuality rate and baggage transportation, which have a high passenger complaint rate. However, individual index is clearly not enough to measure the development and change of the service level of the entire industry. Therefore, a scientific and reasonable civil aviation transportation service quality evaluation index system should be established for evaluation to continuously improve the quality of civil aviation services based on the evaluation results, so as to

improve the overall service level of passenger transportation in the civil aviation industry and maximize the pillar role of the civil aviation industry for China's economic development.

2. Overview of Civil Aviation Service Quality Evaluation

2.1. Foreign Studies

In terms of theoretical research, foreign research on service quality evaluation theory starts earlier, with many classical service quality models and evaluation methods, such as the perceived service quality model, Kano model, and the service quality model. According to the perceived service quality model, the customer's evaluation of service quality is the result of comparing his actual feeling in the process of receiving the service with his expectation before receiving the service. If the actual feeling meets the customer's expectation, the customer's perceived quality is excellent; if the customer's expectation is not fulfilled, the customer's perceived quality is poor even though the actual quality is good by objective standards (Grönroos and Christian, 1982). Noriaki Kano introduced the two-factor theory and established the Kano Model based on the subjective perception of customers and the actual supply of services. Based on the customer's service demand, it studies the relationship between customer satisfaction and service quality, including the five dimensions of service quality: attractive quality, must-be quality, one-dimensional quality, reversal quality and indifferent quality (Noriaki Kano, 2002). Three scholars, A. Parasuraman, Zeithaml and Berry (PZB), constructed the Service Quality Model (SERVQUAL), which pointed out that the main reason for service quality failing to meet customers' needs came from the five gaps between service production and delivery (Parasuraman et al, 1985), providing a very inspiring theoretical basis for the study of service quality evaluation method. Based on this study, PZB proposed the famous SERVQUAL, the five elements of which are tangibles, reliability, assurance, responsiveness and empathy (Parasuraman et al, 1988).

In terms of empirical studies, various models and methods have been applied to civil aviation service quality evaluation. For example, Gourdin and Kloppenborg (1991) used the service quality model to propose 14 important factors that affect airline service quality, such as check-in, transit convenience, flight punctuality rate, and lost baggage disposal, etc. Robledo (2001) used the five dimensions of SERVQUAL and the customer management dimension to propose by empirical research that meeting customer expectations is the first priority of providing quality services. Ali et al. (2015) used structural equation model to assess the quality of services provided by Pakistan International Airlines (PIA) and its impact on passenger satisfaction, and the results of the study showed that PIA customer satisfaction is influenced by five dimensions including airline tangibility, terminal tangibility, personnel services, empathy, and airline image. Perçin (2018) used a combined fuzzy decision making approach to assess airline service quality, suggesting that customer satisfaction is the most important dimension for measuring service quality, followed by staff, reliability, management, and tangibles. In addition, the most important impact indexes in order of relative weight were customer complaint handling, employee image, air safety, security, and check-in efficiency.

2.2. Domestic Research

Related domestic research started late and are mostly extension studies or application examples of service quality models or evaluation methods that have been proposed abroad, with a lack of theoretical research. Li Xing (2003) proposed to establish a service quality management system by combining the gap theory, ISO9001 standard system and the actual situation of airlines. Based on the ISO9001 standard process model, customer expectations analyzed with the gap model are added before the input of customer requirements in ISO9001 as the input of customer requirements of the ISO9001 service quality system combined with the gap model, taking China Southwest Airlines as an example to evaluate its service quality. Li Jiamei (2009) established an airline service quality evaluation model combining the Kano model, the service quality model and the perceived service quality model, with the three elements of the model being customer segmentation, customer demand hierarchy and service quality. She modified the evaluation methods of the service quality model and the perceived service

quality model according to the characteristics of airlines, and proposed the passenger service quality evaluation scale of Chinese Airlines, with seven dimensions of service facilities, staff, flight patterns, reliability, responsiveness, assurance, and empathy. Based on the customer satisfaction index models ACSI and ECSI, Mao Man and Zhu Jinfu (2010) removed "perceived value" and "perceived quality" and added "perceived service quality" to construct an airline customer satisfaction measurement model, concluding that perceived service quality has the greatest influence on customer satisfaction, followed by airline image, which provides a clear direction for the strategic adjustment of airline passenger service quality.

3. International Experience of Civil Aviation Service Quality Evaluation

3.1. Evaluation index system

In terms of the evaluation index system, scholars generally establish the civil aviation service quality evaluation index system based on the service quality model and the SERVQUAL model, and SERVQUAL scale is considered to take maximum account of customers' feelings. For example, Pabedinskaitė and Akstinaitė (2014) used the SERVQUAL model to analyze airport service quality and established a service quality index system with 5 primary and 34 secondary indexes, and analyzed the relative importance of evaluation indexes. Himanshu et al (2017) ranked the service quality of five Indian airlines based on the SERVQUAL model using VIKOR method and finalized four important indexes of exactness, trustworthiness, safety, and airfare through multi-criteria decision-making (MCDM) analysis among a series of indexes affecting airline service quality evaluation.

Customer evaluation criteria for service quality are somewhat universal, but the SERVQUAL scale can only be a basic framework when applied to specific industries, which should be appropriately modified and supplemented (PZB, 1988). For the application of the SERVQUAL scale in the evaluation of civil aviation service quality, some scholars have modified the SERVQUAL scale by modifying and adding or subtracting its dimensions and specific indexes. For example, KUO (2011) replaced the reliability of SERVQUAL scale with safety reliability, and Gilbert and Wong (2003) retained the reliability, assurance and responsiveness of the SERVQUAL scale, while specifying the tangibility and empathy from four dimensions of equipment and facilities, service personnel, flight patterns and customized services, respectively. Hao Yong and Wu Yiping (2009) evaluated the service quality of Shanghai Airlines using 40 indexes of 6 dimensions including SERVQUAL's five dimensions and service recovery dimension, and the results showed that customer expectations were not met in all dimensions.

In addition to establishing an evaluation index system based on the SERVQUAL scale, some scholars have also established an evaluation index system from a process perspective, as the service quality of passenger transportation can also be understood as the extent to which the airline meets the different needs of passengers from the beginning to the end of the transportation, starting from the booking of the ticket. For example, Li Qi (2006) established an airline service quality index system from seven dimensions: operational quality, irregular flight service quality, ground service quality, air service quality, ticketing service quality, customer complaints, and customer loyalty. Chen and Chang (2005), who believe that passengers' expectations vary at different stages of receiving airline services, constructed evaluation indexes from ground service and air service respectively. Lu and Ling (2008) considered six indexes: pre-trip ground service quality, flight scheduling, in-flight cabin service and safety and frequent flyer programs, professional skills of service personnel, and their ability to communicate with and respond to passengers in their study on the difference of passenger service quality satisfaction across the Taiwan Strait. In the survey Passengers Talk about Civil Aviation (2013), sponsored by the Consumer Affairs Center of the CAAC, the service quality of Chinese airlines was evaluated in terms of ticketing service, ground service, air service, arrival service, and services when flights are on time and when they are delayed.

3.2. Evaluation Index Weight

In the determination of the index weight, Analytic hierarchy process (AHP), expert survey method, Likert scale and other subjective assignment methods are often used to determine the index weight. The relative importance of each index, i.e., the index weight, is a quantitative distribution of the relative importance of different aspects of the evaluated object, which represents the contribution rate to the comprehensive evaluation value.

AHP requires decision makers to first analyze the relationship between airline service quality indexes, establish a progressive hierarchy of indexes, and construct a judgment matrix by comparing two indexes at the same level according to a certain criterion, to obtain the index weight (Zhou Dequn, 2005). This method has been widely applied to determine the weight when evaluating airline service quality. For example, Tsaur et al (2002) applied this method to determine the index weight of service quality evaluation of Taiwan airlines and found that tangibility was the most important index among primary indexes, followed by reliability, responsiveness, assurance, and empathy, and the most important index among the secondary indexes was the courtesy of service personnel. Liou and Tzeng (2007) also applied this method to determine the weight of the primary indexes independently of each other, and found that the weights of the three indexes, security, reliability and service personnel, accounted for 1/3 of the weight.

The expert survey method takes the experts who are familiar with the airline service quality as the survey object, and relies on their knowledge and experience to score the relative importance of each index to finalize the index weight. The expert survey method is relatively scientific and effective when other methods of determining weights are not appropriate, especially when the non-additivity between index preferences is considered. For example, Liou and Tzeng (2007) considered a certain degree of non-additivity among the secondary indexes for evaluating airline service quality and selected 18 experts to analyze the relative importance of each index and its power set to determine its weight, and found that the most important index was the correct handling of customer complaints. Cheng et al (2002) used the expert survey method to establish the dynamic index weights for evaluating the service quality of Taiwan airlines.

In addition to the above two methods of determining the evaluation index weight, the Likert scale is more often used. It is mainly based on a direct questionnaire survey of passengers to determine their level of agreement on the importance of each index. For example, Gilbert and Wong (2003) used the Likert scale to determine the relative importance of each index when determining the service quality indexes that influence passenger behavior. The nine values of 0 to 8 represent the degree of recognition of passengers to the importance of the corresponding indexes in the scale, and 0 and 1 and 8 respectively represent no opinion, unimportant and very important. The average value of each index score is calculated by the sum and standardized as its weight. Chen and Chang (2005) used a 5-point scale (five response levels), with 1 to 5 ranging from least important to most important, to determine the weight of the ground service quality index.

3.3. Evaluation Methods and Models

At present, different methods have been proposed to analyze and evaluate the civil aviation service quality from theoretical and practical perspectives, mainly including importance-performance analysis method, multivariate statistical analysis method, multi-criteria evaluation method, etc.

Importance-performance analysis method. It was proposed by Martilla and James (1977) and was first applied to evaluate the service quality of automotive retailers, mainly to analyze customers' perceptions of the importance and performance of suppliers' products and services to improve customer satisfaction and customer loyalty. The method consists of two factors: one is importance, which refers to the importance customers attach to each index of the product or service; the other is performance, which is an evaluation of customers' real experience or perception of using the product or service provided by the supplier. Chen and Chang (2005) were the first to apply the importance-performance analysis method to airline service quality evaluation. They first analyzed the gap between passengers' expectations and actual perceptions of service, and the gap between passengers'

expectations and airline frontline managers' expectations of service quality, and then applied this method to construct a service index distribution chart to identify ways to improve service quality. Cheng-Min and Kung-Yeun (2005) also applied this method to determine the level of customer attention, satisfaction, and service improvement priorities for Taiwan airlines' service quality.

Multivariate statistical analysis method. Multivariate statistical analysis method such as structural equation modeling, hypothesis testing, consistency analysis, factor analysis, and principal component analysis are widely used to study the relationship between civil aviation service quality and other related factors and to determine the dimensions of civil aviation service quality indexes. For example, Chen (2008) used structural equation modeling to study the relationship between airline service quality and passengers' perceived value, satisfaction, and behavioral intention. Park et al (2004) studied the influence of airline service quality on passengers' behavioral intention by constructing a structural conceptual model combining maximum likelihood estimation. Gilbert and Wong (2003) combined hypothesis testing and significance test to study the service quality factors influencing passengers' choice of airlines taking Hong Kong Airlines as the research object, and found that passengers of different ethnicity/nationality and travel purpose have different requirements for service quality. Gursoy et al (2005) studied the positioning strategies of 10 major U.S. airlines from the perspective of airline service quality, combined with consistency analysis. Nameghi and Ariffin (2013) determined a cabin service quality evaluation index system with four dimensions of courtesy, appreciation, socialization, and comfort with a total of 19 indexes combining exploratory and validation factor analysis. Pakdil and Aydın (2007) conducted a principal component analysis on the constructed airline service quality indexes and came up with an evaluation index system consisting of 8 dimensions, including service personnel, tangibility, responsiveness, reliability and safety, flight patterns, availability of value-added services, airline image and empathy. The indexes were weighted by applying principal component factor loadings, and it was verified combined with hypothesis testing that the gap between passengers' expectations and perceptions was real, and that it was significantly influenced by passengers' education, flight frequency, and travel purpose.

Multi-criteria evaluation method. Since airline service quality involves qualitative and quantitative factors, and its evaluation subject is intangible, transient, heterogeneous, and non-storable, the traditional study of airline service quality from the perspective of efficiency measurement is no longer suitable. In addition, it is difficult for passengers to accurately evaluate their perceived service quality based on their own experience, compared to their expectations of airline service. Chang and Yeh (2002) demonstrated that airline service quality can be evaluated by measuring the utility function of passengers, i.e., it is feasible to evaluate airline service quality by using multi-criteria evaluation method. At present, a considerable number of scholars have used multi-criteria evaluation methods such as AHP, TOPSIS, VIKOR, and fuzzy integral to evaluate airline service quality. For example, Mustafa et al (2005) used AHP to comprehensively evaluate the service quality of Malaysian airlines. Tsaur et al (2002) used TOPSIS to rank the service quality of airlines. Liou et al (2011) used VIKOR to evaluate the service quality of Taiwan airlines, claiming that it allows decision makers to understand the gap between the program set and the desired level. Liou and Tzeng (2007) constructed a non-additive multi-criteria model combining the fuzzy measure and Choquet integral to rank and evaluate the service quality of six airlines in Taiwan, considering the correlation between the secondary indexes used to evaluate airline service quality.

4. Conclusion and Discussion

There have been a wealth of foreign studies on civil aviation service quality evaluation, and the methods, processes and results of establishing the evaluation index in the existing literature are very important references for the establishment of the evaluation index system of civil aviation service quality. However, there are still some problems to be further explored and improved mainly in the following two aspects: First, considering the actual airline service quality characteristics, the non-additive effects among the constructed indexes are usually difficult to avoid. However, the existing

literature is usually based on the classical test theory, which requires that the relationships between indexes are independent. Although this is one of the three conditions (completeness, representativeness, and independence) that should be met when constructing an evaluation system, it is difficult to find a set of evaluation indexes that are both independent of each other and comprehensive in practice. A common treatment in the existing literature is to assume that the relationships among indexes are independent, which does not necessarily match the actual situation. For example, in the SERVQUAL-scale based airline service quality evaluation index system, the indexes or dimensions are not necessarily independent of each other. Second, in the process of obtaining data, it is for airline passengers to evaluate airline service quality according to their personal experience, which itself is a cognitive thinking activity of self-psychological experience that may be partially incomplete or holistically complete. This cognitive activity of passengers is inherently uncertain and ambiguous, so it is difficult for them to quantify indexes in the range of real numbers when expressing agreement or importance. Some scholars have also pointed out that passengers usually have some bias or even distortion when expressing their preferences with precise real numbers. Therefore, scholars mostly use fuzzy multi-criteria evaluation methods to evaluate airline service quality. However, since the membership function of fuzzy degree in fuzzy set theory is a single scale, it can only express the two states of passengers' satisfaction or dissatisfaction with the quality of civil aviation services, and it cannot express passengers' support and opposition to the services, i.e., the degree of hesitation, which has not been considered when evaluating the quality of civil aviation services.

Acknowledgments

This work was financially supported by Civil Aviation Administration of China (CAAC Security Capacity Building Programs).

References

- [1] Grönroos, Christian. An Applied Service Marketing Theory [J]. *European Journal of Marketing*, 1982, 16(7): 30-41.
- [2] Noriaki Kano. Attractive Quality Creation Under Globalization [J]. *China Quality*, 2002, (9): 32-34.
- [3] Parasuraman, A, Zeithaml, V. A. & Berry, L. L. A conceptual model of service quality and its implications for future research [J]. *Journal of Marketing*, 1985, 49(3): 41-50.
- [4] Parasuraman, A, Zeithaml, V. A. & Berry, L. L. Communication and control processes in the delivery of service quality [J]. *Journal of Marketing*, 1988, 52(1): 35-48.
- [5] Gourdin K. N, Kloppenborg T. J. Identifying Service Gaps in Commercial Air Travel: The First Step Toward Quality Improvement [J]. *Transportation Journal*, 1991, 31(1): 22-30.
- [6] Robledo M. A. Measuring and Managing Service Quality: Integrating Customer Expectations [J]. *Managing Service Quality*, 2001, 11(1): 22-31.
- [7] Ali F, Dey B. L, Filieri R. An Assessment of Service Quality and Resulting Customer Satisfaction in Pakistan International Airlines [J]. *International Journal of Quality & Reliability Management*, 2015, 32(5): 486-502.
- [8] Perçin S. Evaluating Airline Service Quality Using a Combined Fuzzy Decision-Making Approach [J]. *Journal of Air Transport Management*, 2018, 68: 48-60.
- [9] Li Xing. Air Passenger Service Quality Management Based on Gap theory and ISO9001 Standard [D]. Sichuan University, 2003.
- [10] Li Jiamei. A Case Study of Aviation Service Effectiveness Based on Kano Model [D]. Nanjing University of Aeronautics and Astronautics, 2009.
- [11] Mao Man, Zhu Jinfu. Airlines Customer Satisfaction Testing Model and Case Study [J]. *Journal of Transportation Systems Engineering and Information Technology*, 2010, 10: 201-207.
- [12] Zhang Huimin. Research on Higher Education Quality Management Method Based on Index [D]. East China Normal University, 2012.

- [13] Pabedinskaitė A, Akstinaitė V. Evaluation of the airport service quality [J]. *Procedia-Social and Behavioral Sciences*, 2014, 110: 398-409.
- [14] Himanshu G, Eusebio M, Helder B, et al. Drug-Resistant Polymorphisms and Copy Numbers in *Plasmodium falciparum*, Mozambique, 2015 [J]. *Emerging Infectious Diseases*, 2017, 24(1): 40-48
- [15] KUO M-S. A novel interval-valued fuzzy MCDM method for improving airlines' service quality in Chinese cross-strait airlines [J]. *Transportation Research Part E: Logistics and Transportation Review*, 2011, 47(6): 1177-93.
- [16] GILBERT D, WONG R K C. Passenger expectations and airline services: a Hong Kong based study [J]. *Tourism Management*, 2003, 24(5): 519-32.
- [17] Hao Yong, Wu Yiping. Improved SERVQUAL Model for Passenger service of Airlines[J]. *Journal of Shanghai University of Engineering Science*, 2009, 23(3): 249-253.
- [18] Li Qi. Research on Service Quality Management System of Airlines [D]; Civil Aviation University of China, 2006.
- [19] CHEN F-Y, CHANG Y-H. Examining airline service quality from a process perspective [J]. *Journal of Air Transport Management*, 2005, 11(2): 79-87.
- [20] LU J-L, LING F-I. Cross-cultural perspectives regarding service quality and satisfaction in Chinese cross-strait airlines [J]. *Journal of Air Transport Management*, 2008, 14(1): 16-9.
- [21] Civil Aviation Resource Net of China. Airline Service Evaluation Report [M]. Civil Aviation Passenger Service Evaluation Report. 2013.
- [22] Zhou Dequn. Introduction to Systems Engineering [M]. Science Press, 2005.
- [23] TSAUR S-H, CHANG T-Y, YEN C-H. The evaluation of airline service quality by fuzzy MCDM [J]. *Tourism Management*, 2002, 23(2): 107-15.
- [24] LIOU J J H, TZENG G-H. A non-additive model for evaluating airline service quality [J]. *Journal of Air Transport Management*, 2007, 13(3): 131-8.
- [25] CHENG C-H, CHANG J-R, HO T-H, et al. Evaluating the Airline Service Quality by Fuzzy OWA Operators [M]//TORRA V, NARUKAWA Y, MIYAMOTO S. *Modeling Decisions for Artificial Intelligence*. Springer Berlin Heidelberg. 2005: 77-88.
- [26] MARTILLA J A, JAMES J C. Importance-Performance Analysis [J]. *Journal of Marketing*, 1977, 41(1): 77-9.
- [27] CHENG-MIN F, KUNG-YEUN J. Analyzing airline service improvement strategy through importance and performance analysis [J]. *Journal of the Eastern Asia Society for Transportation Studies*, 2005, 6(782-97).
- [28] CHEN C-F. Investigating structural relationships between service quality, perceived value, satisfaction, and behavioral intentions for air passengers: Evidence from Taiwan [J]. *Transportation Research Part A: Policy and Practice*, 2008, 42(4): 709-17.
- [29] PARK J-W, ROBERTSON R, WU C-L. The effect of airline service quality on passengers' behavioural intentions: a Korean case study [J]. *Journal of Air Transport Management*, 2004, 10(6): 435-9.
- [30] GURSOY D, CHEN M-H, KIM H J. The US airlines relative positioning based on attributes of service quality [J]. *Tourism Management*, 2005, 26(1): 57-67.
- [31] NAMEGHI E N M, ARIFFIN A A M. The measurement scale for airline hospitality: Cabin crew's performance perspective [J]. *Journal of Air Transport Management*, 2013, 30(0): 1-9
- [32] PAKDIL F, AYDIN Ö. Expectations and perceptions in airline services: An analysis using weighted SERVQUAL scores [J]. *Journal of Air Transport Management*, 2007, 13(4): 229-37.
- [33] CHANG Y-H, YEH C-H. A survey analysis of service quality for domestic airlines [J]. *European Journal of Operational Research*, 2002, 139(1): 166-77
- [34] MUSTAFA A, FONG J-P, LIM S-P, et al. The Evaluation of Airline Service Quality Using the Analytic Hierarchy Process [J]. 2005, 9(11): 382-90.
- [35] TSAUR S-H, CHANG T-Y, YEN C-H. The evaluation of airline service quality by fuzzy MCDM [J]. *Tourism Management*, 2002, 23(2): 107-15.

- [36] LIOU J J H, TSAI C-Y, LIN R-H, et al. A modified VIKOR multiple-criteria decision method for improving domestic airlines service quality [J]. Journal of Air Transport Management, 2011, 17(2): 57-61.