An Empirical Case Study on the Service Quality for Traditional Chinese Medical Clinics

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Abstract: Parasuraman, Zeithaml and Berry introduced "A Service Quality Model." and further explored the gap between expected quality customers having before receiving the service and perceived quality customers regarding after receiving the service (they call this gap as the perceived service quality gap). In their methodology, customers are asked to fill out a questionnaire regarding both expected and perceived service after they received the service. Since both expected and perceived service quality are rated in one single questionnaire, it is questionable that the results obtained can effectively convey the differences of the gap as originally defined. This research proposed a Service Quality Diagnosis Model to re-explore the perceived service quality gap. A traditional Chinese medicine (TCM) clinic in Taiwan is used as an example to demonstrate the proposed approach. The first stage of the proposed approach involved developing a suitable scale containing the key service factors to measure the service quality of TCM clinics. The second phase of the proposed approach explored the service quality of the case TCM clinic by analyzing the results obtained from questionnaire filled out by its patients. Different from any exist approach, respondents need to fill out two questionnaires separately before and after they receive services. The proposed research successfully divided perceived service quality into three types: ideal quality, unacceptable quality and satisfactory quality. As with enterprise diagnosis, the research results can effectively help managers to identify abnormalities in current service quality and further to recommend in-time solutions to the problems or countermeasures for continuous improvement.

Key-words: Service quality, Expected service, Perceived service, Traditional Chinese medicine clinic

1 Introduction

On the topic of service quality, since Parasuraman, Zeithaml and Berry developed the Conceptual Model of Service Quality [52] and SERVQUAL [53], many scholars have applied the model to various service industries in order to explore the theoretical aspect of service quality on one hand and extend the scope from service quality to behavioral science through empirical methods on the other hand [8] [17] [18] [30] [43] [48] [64] [65] [66]. To date, however, there has not been a study of the service quality scale of TCM clinics. Furthermore, Parasuraman, *et al.* [54] conducted follow-up empirical research on the model in the service quality gap: perceived service quality formed by the difference between customer expectation of service and perceptions of the service actually received. They divided a consumer's perception of service quality into three categories based on the nature of the difference between the expected service and perceived service [53] [54] [56].

The research methodologies and process used by Parasuraman *et al.* [52] involved asking customers to fill out questionnaires to rate pre-service expectations and post-service perceptions. But this approach may have resulting in conflicting responses from the surveyed. In addition, if the customers reluctantly tried to recall their expectations as they filled out the questionnaires, they would instinctively overestimate the scores of their pre-service expectations. Thus, the logic of such methodology is worthy of discussion. Carman [15] considered the expectations collected by Parasuraman *et al.* [53] found that the data of perceived service were

post-service results. The weakness of the method is similar to the logic of someone wanting to examine the effect of a diet pill without measuring his weight in advance, so that it is impossible to precisely determine the effect of the medicine. The error caused by estimating one's weight before taking the medicine will render the results questionable. Besides, measuring the abstract behavioral intention in social science is not like a virtual measurement that could relatively reduce the error between the measurement and the true value.

Accordingly, this research proposed a Service Quality Diagnosis Model for TCM Clinics. Through the empirical case study of a TCM clinic, the research re-explores the fifth gap of the service quality model proposed by Parasuraman *et al*. [52]. The construction of the proposed model was conducted in two stages. The first stage was to develop appropriate key service quality factors and a scale for TCM clinics and verify the reliability and validity of the model. The second stage was to survey patients' "expected service" before they saw the doctors and "perceived service" after they saw the doctors. The difference between the expected service and perceived service are further explored by using paired samples t-test under the level of significance of $\alpha = 0.05$. Based on the results of paired sample t-test, the gaps of all key service factors can be divided into three categories: "ideal quality gap," "unacceptable quality gap" and "dynamic satisfactory gap." As with enterprise diagnosis, it is hoped that the results of the research can effectively help managers to discover the abnormalities of their current service quality and to recommend in-time solutions to the problems or countermeasures for continuous improvements.

2 Literature Review

2.1 Service Quality

With ongoing economic development and the rise of consumerism, the conception of quality has become increasingly important. The scholars who are experts in quality control have different definitions for different industries. The manufacturing industry focuses on production and explores mostly the quality of physical products. Deming [26] argued that the standard of quality was defined by the manufacture of the most useful products by the most economical methods. Juran [42] emphasized that producers had to consider the demands of users, and that the most important characteristic of quality is satisfying the demands from customers. Crosby and Lemay [24] considered quality as meeting the standard and zero-defect.

However, for the service industry, Goetsch and Davis [35] argued that quality meant not only the quality of products, but also the quality of elements such as service, staff, process and environment. The quality of product and service quality are the part of an enterprise's external review whereas the staff, process and environmental quality are the part of an enterprise's internal review.

Regan [58] conducted research into service quality for the first time and introduced four characteristics of service quality: intangibles, inseparability or called simultaneity, heterogeneity and perish ability. Sasser *et al*. [60] defined service quality with material, personnel and equipment. Service quality includes not only the final results but also the process of providing service. The characteristics of intangibles, unstorability, high participation in entire service process by customers output from the service industry may influence the service quality produced. Churchill and Suprenant [20] considered that service quality was the satisfactory degree of service by customers. The key was the difference between the actual service and the expectations for the service.

Grönroos [36] described service quality by technology (things provided) and function (how service is provided). He also considered the service quality as the customer's expectation of service and actual cognition after service. Parasuraman *et al*. [52] stressed that service quality and the quality of physical product was different, the former being an abstract idea whereas the latter could be objectively measured through indicators such as capability and number of unqualified products. Lacking objective measurement standards, we could observe only the customer's subjective cognition of service quality, that is, measure the cognition of service quality. The "cognition of service quality" refers to the customer's subjective judgment on the degree of excellence in overall service. That is different from objective quality. It is an attitude that comes from the comparison between prior expectation and post-service cognition of performance. Three key points were inducted: for customers, the evaluation of service quality is more difficult than the evaluation of physical product, the cognition of service quality comes from the comparison between the customer's expectation and actual service performance. The evaluation of service

quality is not only for the results of service but also for the entire service process. Parasuraman *et al.* [53] added that service quality is the degree of pros and cons of service in the interactions between service provider and consumers during the service process. Bitner *et al.* [9] argued that service quality was the customer's overall attitude toward re-purchase or acceptance of service after consumption. Stewart *et al.* [62] divided service quality into the main body and process of service. The former was evaluated after the delivery of service whereas the latter was evaluated during the delivery of service. That is, it could be divided into the gains of service or "technological quality" produced by service and the "functional quality" that indicates service attitude or service process. Lovelock and Wirtz [46] and Grönroos [37] stressed that service quality is the actual overall experience received by the customer during the process of enjoying consumption. Crosby *et al.* [23] argued that service quality means the result of mutual comparisons between the expected service and actual perceived service.

2.2 The Development of the Construct of Service Quality

Parasuraman *et al.* [52] chose banks, credit card companies, securities companies, and maintenance and repair factories for exploratory research. Through focus group interviews with customers, the research introduced 10 constructs of service quality: 1) reliability, indicating whether the promise of service is reliable and timely; 2) responsiveness, indicating whether the service provided is instant and quick service, whether customer complaints are dealt with in a timely manner, and whether customers' questions are answered quickly; 3) competence, indicating whether the service staff personnel have professional knowledge and techniques, and whether they can satisfy customer demands; 4) access, indicating whether customers' feelings are taken into consideration when providing service, so that the customers may feel the relationship to be a close one; 5) courtesy, indicating whether the words, behavior, attitudes and appearance of the staff are friendly and polite, so that customers would have a feeling of comfort; 6) communication, indicating whether the staff could use language that is easy to understand by customers when providing necessary information and giving detailed explanations; 7) credibility, indicating whether the service process could create a good image and enhance the reputation of the company, so that

customers would have a good feeling about and confidence in the company; 8) security, meaning that the company should take preventive measures that could prevent customers from undergoing risks, danger or violations of privacy; 9) understanding customer demand, meaning that the company tries to understand the demands from customers and provides individualized services; 10) tangibles, meaning that the company should provide good facilities, tools and equipment while the staff's external performance should make customers satisfied.

Parasurman *et al.* [53] conducted an empirical research of the model introduced by Parasurman *et al.*[52] (called PZB model) with the aim of identifying the relationship between the components of the gap. They also created a service quality (SERVQUAL) scale based on the development process of marketing construct introduced by Churchill [21]. The process involved 11 steps, and the constructs of service quality were reduced from 10 to 5. The five constructs are tangibles, reliability, responsiveness, assurance and empathy. Based on those, the difference between perceived service and expected service is compared to measure the service quality.

The 10 constructs of service quality identified by Parasuraman *et al.* [52] have many similarities with the classification of characteristics of consumer products in the research of Darby and Karni [25] and Nelson [49]. Furthermore, although the SERVQUAL scale provides the service industry with tools necessary for measuring service quality, according to the research on the application of the SERVQUAL scale by Babakus and Boller [3], Carman [15], Finn and Lamb [31], Grönroos [38] and Triplet *et al.* [63], there was no consistent construct. Cronin and Taylor [22] also argued that the SERVQUAL scale emphasized only results without considering the process, and the surveyed were often confused between the constructs of expectations and perceptions in answering the questions. Therefore, we developed the SERVPERF scale in order to directly measure perceived service quality.

Even though some scholars have criticized the variable manipulation, definition and methodology in research by Parasurman *et al.*, most scholars still consider the PZB model to be an excellent indicator of overall service quality [57]. Carman [15] also suggested that the researchers should adopt the development process of the PZB scale, based on different characteristics of various industries, to re-design question items in their questionnaires from the basic 10 constructs. By

doing so, it would be possible to obtain precise results of measurement.

2.3 The Measurement Model of Service Quality

Among the various models for measuring service quality, the most representative is the PZB model. [52]. The conception of the PZB model emphasizes that service quality is determined by customers who evaluate their expectations before receiving service and their cognition after receiving service, plus the gap between them. The model combines the customers' psychological, perceived and social factors with the perceived factors of enterprise management and the internal operation of the enterprise.

The "service quality gap model" introduced by Parasurman *et al*. [52] provided a very important basis for establishing a service quality model. Among the five gaps discussed in this model, four are related with the enterprise, the service provider. The fifth gap that is determined by the expectation and perception of customers is the function of the four enterprise-related gaps. Lastly, Parasurman *et al*. [52] defined perceived service quality (PSQ) as the gap between expected service (ES) and perceived service (PS). When PS is greater than ES, the service quality is considered ideal, indicating that the service quality of a particular enterprise gives it a competitive edge; when PS is equal to ES, service quality is considered satisfactory; when PS is less than ES, service quality is considered unacceptable, and the enterprise under scrutiny has no competitive edge. The three scholars also argued that the service provided by an advanced company should include the measurement of the gap between the expected service and the perceived service of the customer, and analysis of that gap should be a priority in the improvement of operation.

2.4 Confirmatory Factor Analysis

Using the domain sampling model, if all question items pertaining to a particular construct are used to estimate scores, the real value score of that construct can be effectively measured [50]. The basic hypothesis of the domain sampling model is if all question items are in the same field of a construct, there should be a high correlation between constructs and between question items. Cronbach's α is a statistic based on domain sampling model and designed to measure the

internal consistency between question items. In general, confirmatory factor analysis (CFA) usually explores two models: a structural model and a measurement model [21]. A structural model is designed to define the linear relationship between latent independent variables and latent dependent variables [6] [13] [14] [59]. A measurement model is designed to define latent variables and observe the linear relationship between variables [13] [29] [59]. Under consideration of an integral model, each measured variable in the model is verified if it can accurately measure its latent variable, that is, the convergent validity and discriminate validity of the model is tested. In the second-order CFA model, there is a linear relationship between the first-order latent variable and the second-order latent variable [27] [28] [47].

3 Research Methodology

The main purpose of this article is to present a model of business diagnosis to assist managers in identifying current abnormalities of service quality and, furthermore, in finding solutions or recommending measures for improvement. A TCM clinic that has internal and trauma departments with average monthly patient volumes of more than 3,000 is selected as the subject of this empirical case study. In order to truthfully reflect the service quality of the selected TCM clinic, in addition to citing the PZB model developed by Parasurman *et al*. [52], and modifying their service quality scale – SERVQUAL [53], we also invited superintendents and doctors from the selected clinic together with scholars and experts to form a focus group for developing the service items that were suitable for TCM clinics. Moreover, the survey process used in this research is different from the one employed by Parasurman *et al*. [53]. The following subsections describe the proposed approach.

3.1 Research Structure

Although the perceived quality gap discussed in Parasurman *et al*. [52] is divided into three types, the authors did not recommend an effectively approach to determine these three types of this gap. This research would extend the fifth gap discussed in the PZB model to construct a Service Quality Diagnosis Model for TCM clinics. The concept of the proposed model is illustrated in Fig. 1.
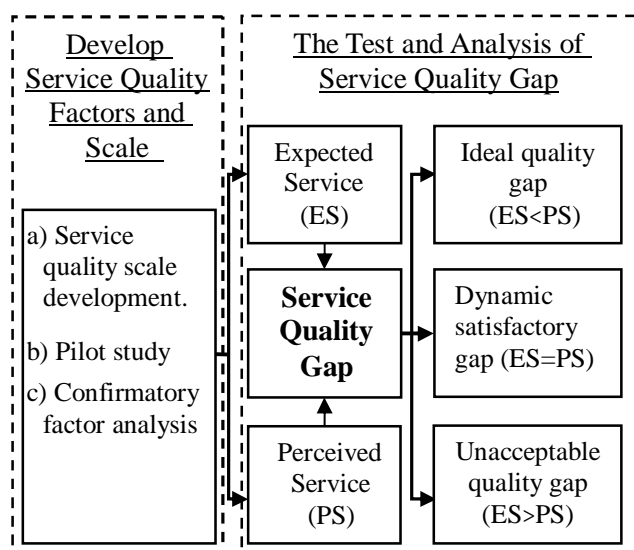
Fig. 1 Service Quality Diagnosis Model

In the proposed model, a service quality scale that is suitable to measure the service quality of TCM clinics is developed. After verifying the reliability and validity of the scale developed, questionnaires are distributed to patients before they saw their doctors and their perceptions of service after they saw their doctors to measure their expected and perceived service quality. The gaps of service quality are then divided into three different types by means of paired samples t-test and under the significance of $\alpha = 0.05$. The three types of gaps for service quality are named as "ideal quality gap," "unacceptable quality gap" and "dynamic satisfactory gap." The theory and practical meaning of three types of gaps are as follows:

(1) Ideal quality gap: If the expected service before customers receive services is significantly smaller than the perceived service after customers receive services, an "ideal quality gap" exists and managers can continue to maintain the current service standard on the service items with this type of gap.

(2) Unacceptable quality gap: If the expected service is significantly greater than the perceived service, an "unacceptable quality gap" exists and managers should find out immediately the reasons for the problem with the service items and seek to improve the current service.

(3) Dynamic satisfactory gap: If there is no evidence to show that the expected service is either significantly greater or smaller than the perceived service, a "dynamic satisfactory gap" exists. In the research performed by Parasurman et al. [52], the same situation is defined as a "satisfactory gap." The reason this study re-defines it as a "dynamic satisfactory gap" because the gap indicates that the degree of satisfaction by customers is in an unstable state, and that the dynamic satisfactory gap may become an ideal quality gap owing to an enhancement of service standards or a decrease in expected service by customers. On the other hand, it is also possible that the dynamic satisfactory gap may become an unacceptable quality gap when a decrease in service standards or the enhancement of expected service by customers presents. Therefore, manager should emphasize on improving the service items in a continual basis to create customers' satisfaction for these service items.

3.2 The First Stage: Develop Service Quality Factors and Scale

3.2.1 Developed question items to measure service quality

This study used the five constructs in the PZB model [52] and the SERVQUAL developed by Parasurman et al. [53] as basic structure of the service quality scale. In addition, the research constructs and measurement variables used in evaluating the quality of medical service identified by Bowers et al. [11], Brown [12], Fiser and Anderson [32], Lang [44], O'Connor and Bower [51], Sovd et al. [61] and Williams [66] are inducted into 40 items that were associated with service quality of TCM clinics. Among them, 13 items were screened out by members of the focus group by means of critical incident technique and methods such as experience survey insight-stimulating example. The remaining 27 items were the question items for evaluating service quality. The operational definitions and measurement variables for the research constructs are illustrated as Table 1.

3.2.2 Pilot study

The main purpose of the pilot study is to explore from the customers' viewpoints which service items were deemed important among the 27 question items in the questionnaire survey developed by the experts. They constitute the key service factors (KSF) of service quality for TCM clinics. The design of the questionnaire adopted the Likert five-point scale, with responses ranging from "not very important" and "very important" as the measurement standards for the questionnaire.

Table 1 Operational Definition and Measurement Variables of Constructs

Construct(Codes): Operational Definition	Service Items of Service Quality for TCM Clinics
Tangibles(C1): Facilities, equipment, traffic links and surrounding environment of the TCM clinic	Q1.Clear signboards and displays Q2.Television available for patient to watch in waiting room Q3.Chairs in waiting room are comfortable Q4.Convenience of traffic to the clinic Q5.Clean environment inside and outside the clinic Q6.Advanced medical equipment Q7.Good lighting
Reliability(C2): Capacity to reliably and accurately implement promised services by the TCM clinic	Q8.Aability to accurately record diagnostic information about patients Q9.Clearly labeled medicine Q10.Medicines are reliable and safe Q11.Medical records kept confidential and secure
Responsiveness(C3): Capacity to provide prompt services by the TCM clinic	Q12.Efficiently fill and package prescriptions Q13.Efficient diagnosis and treatment by doctors Q14.Address complaints from patients in a timely manner Q15.Waiting time for calculating charges Q16. Efficiently dealing with registration by counter clerks
Empathy(C4): The capability of providing patients with individualized services and empathy by the TCM clinic	Q17.Provide pre-registration service Q18.Sufficient privacy in consulting room Q19. Kind and friendly attitude by doctors toward patients in diagnosis and explaining treatment Q20.Priority consideration of patient interest Q21.Provide medical information
Assurance(C5): The capacity to implement medical services and communicate trust and confidence by the TCM clinic	Q22.Professional services provided by doctors Q23.Acupuncture skills of doctors Q24.Skillful and professional services provided by massagers Q25.The skill of Massagers Q26.Provide medical diagnosis correctly on first attempt Q27.Significant improvement of patient condition after diagnosis and treatment

In order to enhance the validity of the research, through purposive sampling, the research surveyed patients who had visited one of the five TCM clinics involved in the study on more than 10 occasions. A total of 150 questionnaires were issued for pretest purposes, of which 114 valid questionnaires were received. The items of the questionnaire were analyzed after the questionnaires were returned to explore the discrimination and commonality of the measured variables. Then the materials were tested to determine whether they were in line with the hypotheses of multivariate normality and model identification. Moreover, the order of the pretest samples is arranged based on the total scores in the pretest scale, from high scores to low scores, by the criterion of internal consistency. The first 25% of the high scores constituted the high-score group, whereas the last 25% of the low scores constituted the low-score group. Through the independent t-test of the high-score group and the low-score group, if the significance was greater than 0.05, the item had no discrimination. Following recommendations made by Hair *et al*. [39], question items with a commonality smaller than 0.5 are ruled out.

3.2.3 Confirmatory Factor Analysis

The measurement models are first evaluated. We wanted to infer two hypotheses in this stage: (1) If each measured variable could correctly measure the latent variable in the integral model; and (2) Test the convergent and discrimination validity of the model. The convergent validity can be assessed by three measures: individual item reliability, composite reliability and variance extracted [33].

The individual item reliability indicates the amount of variance in an item due to the underlying construct rather than to error. It can be obtained by squaring the factor loading. The composite reliability (CR) of the latent variable is formed by the reliability of all measured variables of each construct and is used to indicate the internal consistency of each construct. The higher the reliability is, the higher the consistency of the construct. Fornell and Larcker [33] suggested a minimum of .80 for evidence of convergent validity. The variance extracted (VE) measures the amount of variance that is capture by the construct. The higher VE is, the higher reliability and convergent validity of latent variable. Fornell and Larcker [33] recommended that the VE be greater than .50.

Regarding the discrimination validity, we followed the test of Hatcher [40] and Ahire *et al*. [1] in which we used the nested CFA model to explore whether there is any discrimination validity between the constructs of the constrained model and the constructs of the un constrained model. The inference principle is fixing the coefficient of correlation between two constructs as 1 and

reestimating the model. Significant difference of the chi-square statistics between the constrained and unconstrained models suggests high discriminant validity. In the analysis of structural model, Gerbing and Anderson [34] recommended using directly the chi-square statistic (χ^2) of the goodness of fit of model to test convergent validity and single construct at the same time. We followed the literature of Bagozzi and Yi [4], Bentler [7] [8] and Jöreskog and Sörbom [41], to select seven indicators to evaluate the goodness of fit of integral model: χ^2, χ^2/df, GFI (goodness-of-fit index), AGFI (adjusted goodness-of-fit index) , NFI (normal fit index) , RMR (root mean square residual) and RMSEA (root mean square error of approximation). For a well fit model, NFI should be greater than .90 and RMR and RMSEA should be smaller than .05. Since the χ^2 statistic is vulnerable to the effect of sample size, it is recommended that the ratio of χ^2 and the degree of freedom (χ^2/df) be smaller than 3 to measure the goodness of fit of model [4] [16] [10] [39].

3.3 The Second Stage: The Test and Analysis of Service Quality Gap

After completing the first stage of determining the key service quality factors and scale for TCM clinics, the second stage was based on the scale to develop a formal questionnaire designed to analyze service quality gap. The first part of the questionnaire focuses on the exploration of patients' expected service on the key service quality factors before seeing their doctors. Likert five-point scale was adopted, and scoring ranged from 1 to 5 points to indicate responses from "not very expect" to "very expect" as the measurement standards of the questionnaire. The second part of the questionnaire explores patients' perceptions of service on the key service quality factors after seeing their doctors. The third part of the questionnaire asks for personal background information. The subjects were the patients of the TCM clinic selected. With the assistance from clinic staff, at different period of time, we randomly asked patients to fill out the questionnaire of expected service in the waiting rooms. After finishing diagnosis and treatment, when patients received their drugs at the dispensary, the clinic staff would ask them to take the questionnaire to measure their perceived service, along with a prepaid return envelope for them to make the questionnaire back. Each questionnaire was assigned a number for tracking purpose. The

patients could also return the questionnaire in person or fill out the questionnaire at their next clinic visit. 300 questionnaires are distributed to patients, of which 231 valid questionnaires were returned.

4 Results

4.1 Analysis of Reliability and Validity of the Service Quality Scale for TCM Clinics

4.1.1 The CFA of service quality: first-order factor model

The number of effective questionnaires in the pilot study of the first stage is 114. After item analysis, a total of six service items that had no discrimination and communality smaller than 0.5 were ruled out, as shown by the bold italic words in Table 2. Table 2 shows that after excluding these six item, the corresponding CR and VE of the five constructs (contains total of 21 items) were greater than those of the original values (contains 27 items). Moreover, after excluding these six items, all CR and VE values met the standard suggested by Fornell and Larcker [33]. This means that, after excluding these six items, the service quality model had good internal consistency in measurement models, and each construct had high reliability and convergent validity.

Commercial software AMOS 6.0 was used to analyze the reliability and validity of the scale of the remaining 21 key service items for TCM clinics. We evaluated the measurement models. For individual item reliability, Fig. 2 shows that the measuring path coefficients of five constructs were between 0.76 and 0.89, meeting the recommendations by Hair *et al.*[39] that the coefficient of factor loading should be greater than 0.5 and by Bagozzi [5] that the coefficient should be greater than 0.71. The three evaluation indicators of the goodness of fit, GFI = 0.925, AGFI = 0.904 and NFI = 0.938, were greater than 0.9, while RMSEA = 0.040 and RMR = 0.000 were both smaller than 0.05. This means that the fitting of 5 key factors model of service quality and the questionnaire dates were appropriate.

In the next step, we conducted an analysis for understanding whether there was discrimination validity between the five constructs of service quality. The hypotheses are:

$$H_0 : \rho_{ij} = 1 \quad , \quad H_1 : \rho_{ij} \neq 1 \qquad (1)$$

in which ρ_{ij} represents the coefficient of correlation between different constructs, and i and j represent any two constructs of service equality and $i \neq j$.

Table 2 Item and validity analyses of key service quality factors

Key Service Factor (Codes)	Commu nality	Discrimi nation	Item to total	CR	VE
Q3-KSF(C11)	0.80	4.99**	0.57**		
Q6-KSF(C12)	0. 78	4.35**	0.52**		
Q1-KSF(C13)	0. 75	4.82**	0.56**	0.905^b	0.657^b
Q4-KSF(C14)	0.68	5.73**	0.62**	(0.859^a)	(0.472^a)
Q5-KSF(C15)	0.59	4.80**	0.55**		
Q2-Deleted	*0.59*	*0.94*	*-0.13*		
Q7- Deleted	*0.44*	*2.23**	*0.29**		
Q9-KSF(C21)	0. 84	8.31**	0.75**		
Q8-KSF(C 22)	0.80	7.32*	0.71**	0.907^b	0.711^b
Q11-KSF(C 23)	0.79	7.30**	0.71**	(0.874^a)	(0.636^a)
Q10-KSF(C 24)	0.75	7.05**	0.69**		
Q12-KSF(C 31)	0.74	5.96**	0.63**		
Q16-KSF(C 32)	0.83	6.18**	0.65**	0.904^b	0.703^b
Q14-KSF(C 33)	0.76	5.54**	0.61**	(0.850^a)	(0.541^a)
Q13-KSF(C 34)	0.64	6.10**	0.64**		
Q15- Deleted	*0.45*	*1.81*	*0.11*		
Q20-KSF(C 41)	0.79	3.60*	0.44**		
Q19-KSF(C 42)	0.74	4.66**	0.54**	0.903^b	0.701^b
Q17-KSF(C 43)	0.71	3.44*	0.43**	(0.851^a)	(0.538^a)
Q21-KSF(C 44)	0.66	4.48**	0.52**		
Q18- Deleted	*0.53*	*1.02*	*0.14*		
Q27-KSF(C 51)	0.76	5.46**	0.60**		
Q24-KSF(C 52)	0.75	4.61**	0.54**	0.893^b	0.677^b
Q26-KSF(C 53)	0.66	5.25**	0.58**	(0.842^a)	(0.48^a)
Q22-KSF(C 54)	0.59	5.24**	0.59**		
Q23- Deleted	*0.51*	*1.60*	*0.18*		
Q25- Deleted	*0.493*	*0.75*	*0.40***		

a: the value calculated including all items
b: the value calculated after excluding the items presented in bold italic words.
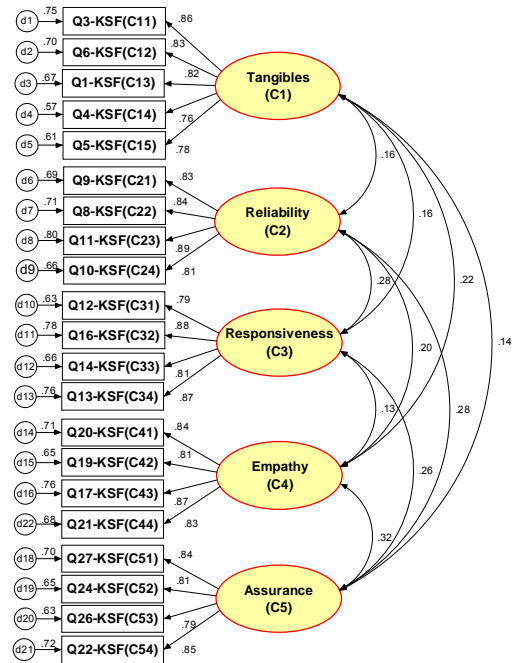

Fig. 2 The CFA of first-order factor model

What the research wants to explore is the chi-square value and relative degree of freedom of the unconstrained model and constrained model. We assumed the coefficient of correlation between different constructs as 1 in the structural equation model to obtain the chi-square value of service quality under the constrained model. The results of analysis of nested model in chi-square difference tests of the two models are shown as Table 3. All the ratios of $\Delta c^2 /\Delta \mathrm{df}$ between any two constructs were greater than the threshold value $C^2_{1,\,0.05} = 3.84$. So it rejected null hypothesis that the coefficient of correlation between two constructs was 1. That is, the service quality model in the research had discrimination validity between different constructs.

4.1.2 The CFA of service quality: second-order factor model

The second-order model is as illustrated in Fig. 3. With the degree of freedom (df) of 184, the value of χ^2/df is 0.561 in the CFA of second-order factor model of service quality, which is smaller than 3. It means that the model was acceptable. Additionally, the three evaluation indicators of the goodness of fit, GFI=0.923, AGFI=0.904 and NFI=0.936, were greater than 0.9, while RMSEA=0.049 and

RMR=0.009 were smaller than 0.05. This means that the fitting of 5 key factors model of service quality and the questionnaire data were appropriate.

Table 3 Chi-square difference test of unconstrained model and constrained model

Relative Constructs	H_0	constrained χ^2 (df)	un constrained χ^2 (df)	$\Delta c^2 / \Delta df$	Result
C1 C2	$\rho_{12}=1$	144.7(180)	100.4(179)	44.3/1	Re H_0
C1 C3	$\rho_{13}=1$	152.6(180)	100.4(179)	52.2/1	Re H_0
C1 C4	$\rho_{14}=1$	136.3(180)	100.4(179)	35.9/1	Re H_0
C1 C5	$\rho_{15}=1$	146.4(180)	100.4(179)	46.0/1	Re H_0
C2 C3	$\rho_{23}=1$	137.4(180)	100.4(179)	37.0/1	Re H_0
C2 C4	$\rho_{24}=1$	131.7(180)	100.4(179)	31.3/1	Re H_0
C2 C5	$\rho_{25}=1$	131.1(180)	100.4(179)	30.7/1	Re H_0
C3 C4	$\rho_{34}=1$	144.6(180)	100.4(179)	44.2/1	Re H_0
C3 C5	$\rho_{35}=1$	140.3(180)	100.4(179)	39.9/1	Re H_0
C4 C5	$\rho_{45}=1$	126.0(180)	100.4(179)	25.6/1	Re H_0

4.2 The Analysis of Service Quality Gap

Under the framework of the proposed Service Quality Diagnosis Model for TCM Clinics, by means of five key factors of service quality for TCM clinics and 21 measured variables, the research continued to explore the dynamic satisfactory gap of service in the second stage. The number of valid questionnaires was 231. Under the significance level α of .05, the research explored the difference between the patient's "expected service" before diagnosis and "perceived service" after diagnosis. The gaps were tested by paired samples t-test and the results were obtained, and are shown in Table 4. Based on the results shown in Table 4, we divided these key service factors into three types of gap to measure patients' satisfaction and organized the results in Table 5.

Standardized estimates
The CFA of Second-Order Factor Model for TCM Clinics
CHI-SQUARE=103.172 DF=184 P-value=1.000 chi/df=.561
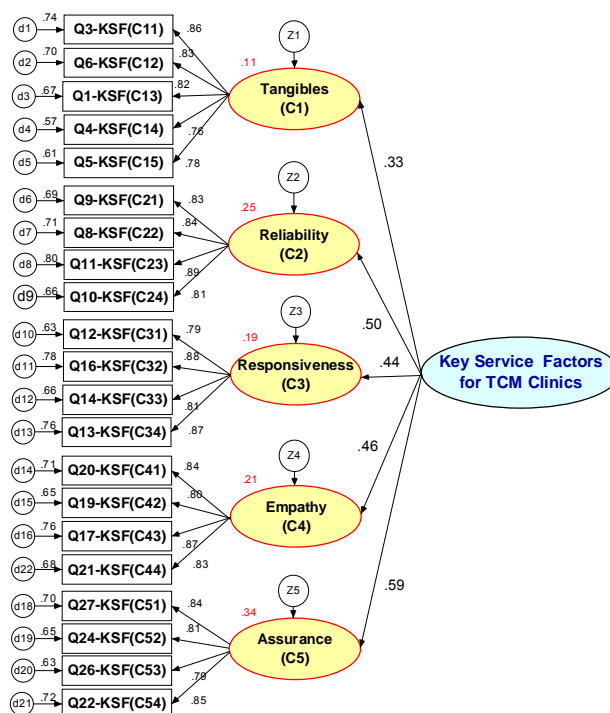GFI=.923 AGFI=.904 CFI=1.000 NFI=.936
RMR=.049 RMSEA=.000

Fig.3 The CFA of second-order factor nodel

Table 4 Paired samples T-test of Service Quality

	ES Mean	PS Mean	SQ Gap	t	Sig.
Q1-KSF(C13)	3.87	3.72	-0.15	-2.02	.04*
Q3-KSF(C11)	3.69	3.89	0.20	2.45	.02*
Q4-KSF(C14)	3.88	3.98	0.10	1.88	.06
Q5-KSF(C15)	3.99	3.98	-0.01	-0.12	.90
Q6-KSF(C12)	4.10	3.89	-0.21	-2.78	.01**
Q8-KSF(C22)	3.86	3.88	0.02	0.30	.77
Q9-KSF(C 21)	3.98	4.06	0.08	1.19	.23
Q10-KSF(C 24)	3.95	3.82	-0.13	-2.06	.04*
Q11-KSF(C 23)	3.93	3.84	-0.09	-1.29	.20
Q12-KSF(C 31)	3.95	3.82	-0.13	-2.28	.024*
Q13-KSF(C 34)	4.06	3.84	-0.22	-3.11	.00**
Q14-KSF(C 33)	3.90	3.87	-0.03	-0.52	.60
Q16-KSF(C 32)	3.78	3.81	0.03	0.39	.70
Q17-KSF(C 43)	3.64	3.79	0.15	2.73	.01**
Q19-KSF(C 42)	3.88	4.02	0.14	2.22	.03*
Q20-KSF(C 41)	3.97	3.80	-0.17	-3.12	.00**
Q21-KSF(C 44)	3.90	3.75	-0.15	-2.57	.01**
Q22-KSF(C 54)	3.91	4.14	0.23	4.49	.00**
Q24-KSF(C 52)	3.94	4.05	0.11	1.98	.049*
Q26-KSF(C 53)	3.78	3.56	-0.22	-3.16	.00**
Q27-KSF(C 51)	4.10	4.08	-0.02	-0.39	.69

*: $a = .05$; **: $a = .01$

Table 5 Service Quality Gap for TCM Clinic

Service Quality Gap	Key Service Items of TCM Clinic	
Dynamic satisfactory gap (ES=PS)	Q4	Convenience of traffic to the clinic
	Q5	Clean environment inside and outside clinic
	Q8	Ability to accurately record diagnostic information about patients
	Q9	Clearly labeled medicine
	Q11	Medical records kept confidential and secure
	Q14	Address complaints from patients in a timely manner
	Q16	Efficiently dealing with registration by counter clerks
	Q27	Significant improvement of patient condition after diagnosis and treatment
Ideal quality gap (ES<PS)	Q3	Comfortable chairs in waiting room
	Q17	Provide pre-registration service
	Q19	Kind and friendly attitude by doctors toward patients in diagnosis and explaining treatment
	Q22	Professional services by doctors
	Q24	Skillful and professional services provided by massagers
Unacceptable quality gap (ES>PS)	Q1	Clear signboards and displays
	Q6	Advanced medical equipment
	Q10	Medicines are reliable and safe
	Q12	Efficiently fill and package prescriptions
	Q13	Efficient diagnosis and treatment by doctors
	Q20	Priority consideration of patient interest
	Q21	Provide medical information
	Q26	Provide medical diagnosis correctly on first attempt

From Table 4 and Table 5, we learn that when PS is greater than ES, the key service items of ideal quality are formed which including the following five items: comfortable chairs in waiting room, providing pre-registration service, kind and friendly attitude by doctors toward patients in diagnosis and explaining treatment, professional service by doctor and skillful and professional services by massagers. The clinic could continue to keep current service levels on these service items.

When PS is significantly smaller than ES, the key service item is considered to be unacceptable quality. From Table 5, it can be seen that the following eight items are unacceptable quality: clear signboards and displays, advanced medical equipment, medicines are reliable and safe, efficiently fill and package prescriptions, efficient diagnosis and treatment by doctors, priority consideration of patient interest, provide medical information, and correct medical diagnosis on first attempt. The clinic should take actions to improve these service items.

The key service items of dynamic satisfactory gap were those that were not significant after

statistical analysis; that is, the items of PS=ES, including the air and the degree of cleanliness in convenience of traffic to the clinic, clean environment inside and outside clinic, ability to accurately record diagnostic information about patients, clearly labeled medicine, medical records kept confidential and secure, address complaints from patients in a timely manner, efficiently dealing with registration by counter clerks, and significant improvement of patient condition after diagnosis and treatment. The clinic should consider continuous and phased improvement of these key service factors in order to further satisfy the patients.

5 Discussion

The "service quality gap model" (PZB model) for the service industry introduced by Parasuraman *et al*. [52] established an important base for development of a service quality model. The model also provided managers with a tool for measuring the gap between customers' expected service before receiving service and perceived service after being served to identify key service areas that should be improved by the organization. However, it is found that among the exiting literature that adopted PZB model, researchers asked patients to fill out questionnaires to measure both the expected and perceived service at the same time after they finished receiving the service. That is tantamount to asking a respondent to describe a situation before he/she performs some experiment by memory or comparison after he/she completes such experiment. Such research methodology certainly affected directly the results of the survey and could not effectively discriminate the service quality gap as originally defined.

Second, although the five constructs of service quality-tangibles, reliability, responsiveness, assurance and empathy-and the SERVQUAL scale developed by Parasuraman *et al*. [52][53] (empirically verified by them as well in 1988), could provide the service industry with a tool for measuring service quality, according to the results of research applying the SERVQUAL scale by Carman [15] and Finn and Lamb[31], there was no consistent construct. In addition, Cronin and Taylor [22] also argued that the SERVQUAL scale emphasized only the results without considering the process, and that the survey respondents were easily confused in answering questions regarding their expected service and perceived service. Carman [15] also recommended that enterprises

adopt the development process of the SERVQUAL scale and redesign measured variables according to different characteristics of various industries to obtain more accurate results of measurement.

Therefore, this research integrated the literature of service quality by scholars to construct a Service Quality Diagnosis Model for TCM Clinics to explore the service quality of TCM clinics in two stages. In the first stage, the research developed key service quality factors and scale that were suitable for TCM clinics. We verified the reliability and validity of the scale measurement model, and structural model, and the goodness of fit of the first and second order of structural equation model based on the results of pilot study. In the second stage, different from existing research process found in literature, we asked respondents to fill out the questionnaires both before and after the diagnosis to explore the difference between them. The gaps of the service quality of the key service items were divided into three types — ideal quality gap, dynamic satisfactory gap and unacceptable quality gap — by conducting paired samples t-test. From the research results, we are able to point out the service items that should be improved.

As Parasuraman *et al.* [56] described, the reason for an enterprise to evaluate "service quality" is to understand not only how "satisfied" their customers are but also to identify the gap between the services they provided and the services the customers expected. They hoped to find the problems and make improvements. Using perceived service quality would provide more information and help managers to improve their operation performance.

6 Implication and Conclusions

By the case study of a TCM clinic, the research re-explored the service quality gap introduced by Parasuraman *et al.* [52] [53] and proposed a Service Quality Diagnosis Model for TCM Clinics. We successfully developed and verified a scale that is suitable for general TCM clinics in measuring their service quality, including five key service factors and 21 measurement variables.

With the developed scale, we continue to explore the clinic customers' (patients') expected service before diagnosis and perceived service after diagnosis. As for the difference of perceived service quality formed by expected service and perceived service, the research would like to make following recommendations for TCM clinic managers:

First, for clinics at which key service items are in the ideal quality gap, that is, PS is significantly greater than ES, as long as their managers manage to keep current service levels, their customers' satisfaction would not decrease significantly. For clinics at which key service items fall into a "unacceptable quality gap," that is, PS is significantly less than ES, their managers should immediately consider the service items that need improvement. For clinics at which key service items are in a dynamic satisfactory gap, which means there is no significant difference between expected service and perceived service, their managers should also consider continuous and phased advancement of their key service items and attempt to improve customer satisfaction. For overall service quality improvement, "tangibles", such as advanced trauma medical equipment, clear signboards and displays, is more difficult to improve than other constructs; after all, the improvement of hardware is not only time-consuming but also requires additional investment of cost. The other four constructs are related to the improvement of internal management, such as reliable and safe drugs, efficient prescription and packaging, priority consideration of patient's interest, providing accurate medical information, dealing with patient complaints in a timely manner, efficiently dealing with registration by counter clerks, clear labels on drugs, accurately recording patient medical information, and ensuring the confidentiality and security of medical records. The clinic should consider establishing a standard operational procedure and strengthening internal education and training to enhance patients' confidence in and satisfaction with the clinic.

As with other service industries, the service quality of TCM treatment is an important factor for attracting patients to visit again. The service quality will affect the performance of company operations. Effectively understanding patients' expectations of service and perceptions of service and providing patients with necessary services are very important for maintaining excellent service quality of medical treatment. Furthermore, discovering their own weak points or competitive disadvantages by the methods developed in the research and further seeking an operational strategy of continuous improvement is necessary for sustainable operation of the enterprise.

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