Research Article

The explore research of higher education service quality dimensions

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ABSTRACT

In the idea of people, institutions of higher education and marketing are two unrelated fields. For a long time, our country's higher education is in the seller's market, institutions of higher learning without any pressure to survive. But in recent years, the situation has changed somewhat, appeared in the school competitiveness at the top of the pyramid contact in advance the practice of excellent key middle school students, college entrance examination after the end of immediately grab for excellent students. Obviously these schools competition between high quality students. In addition, what is more serious, some colleges upgraded from college at the lift force of the whole school recruitment of students propaganda, these schools have realized education institutions survival pressure. The idea of "higher education is a kind of service" is gradually accepted by many scholars and the public, to institutions of higher learning is service quality to establish competitive advantage in market competition in the direction of efforts. In this paper, applying in the field of marketing is relatively mature theory of service quality applied in higher education services trade, is beneficial to the quality of higher education services to explore, large Numbers of higher education quality of ranking, school-based research provides a new perspective.

Keywords: Higher education; marketing; quality of service

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INTRODUCTION

Nordic scholars have had a huge influence on QOS in terms of research, representatives of Christian Gronroos. He proposed the concept of customer perceived quality of service and its constitute a detailed study, thus completing the definition of service management and the most important scientific concepts. Gronroos defines the basic elements of quality of service, that is, "QOS by the technical quality and functional quality constitutes"[1]."Prior to this, although it is well known that the difference between the quality of service and tangible product quality, but there was no one on the connotation of quality of service and to conduct further studies, while the quality of service model is the most essential to Gronroos service features -- in the process of scientific explanation. For service enterprises, determines the level of service quality is not only the service of the outcome, is not whether the enterprise with advanced equipment, and how to improve the quality of "service process of [2]. Gronroos pointed out that "quality of service including technical quality and functional quality. Technology and quality is the solution of the problem of WHAT, customer perceived themselves in the service of income or profit; quality function is HOW problem, customer perceived service process, service is how to carry out"[3].

Since the service management research portfolio PZB (A Parasuraman, Zeithaml, V and l. Berry) identity was Gronroos's point of view, based on his SERQUAL system of measuring the quality of service. In the SERVQUAL system, service quality consists of five dimensions: tangibility, responsiveness, assurance, empathy, and reliability. "Tangible sex refers to the service facilities and equipped with service personnel; reactive refers to the willingness to help customers; guarantee refers to the server with the etiquette and passed to customer confidence and credible ability; empathising refers to care and to provide customers with personalized service, reliability refers to the ability to reliably and accurately commitments" [4]. However PZB team SERVQUAL system did not make service quality

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dimensions of all inclusive. SERVQUL school's theory of customer perceived quality heritage from Europe, but to give up on the technical quality of service quality dimensions measurement. SERVQUAL focus is just the process quality of service, Richard and Allaway pointed out that the process of "focus on service quality could be a misunderstanding of the quality of service and have very low effectiveness" [5]. "SERVQUAL put all its energy in the process of service delivery, and neglected the service technology" [6]. That is to say, if use SERVQUAL to study higher education service quality, the results may simply reflect the higher education service in the process of bearing instrument, service attitude, service process and service behavior, but the results of the after service of professional level, service quality and didn't get the explanation, and the "gap". This needs on the basis of the SERVQUAL to add a new dimension to increase the explanatory power of the model. This study based on the SERQUAL, back to the theory of customer perceived quality, strive to explore a better explanation of the higher education service quality dimensions.

2 Study Design
Design of this research includes questionnaire design, sample selection, questionnaire distribution and recovery method, statistics method and so on part. This study was based on the Gronroos's theory of customer perceived quality of higher education service quality that can be divided into technical quality and functional quality two dimensions. At the same time, with the aid of SERQUAL assessment system, the function of quality into reliability, tangibles, empathy, assurance and reactivity. On the basis of these two points, the quality of higher education service exploratory and confirmatory factor analysis.

2.1 Questionnaire Design
Process quality aspects of the questionnaire design based on the theory of SERQUAL, and strive to more suitable for characteristics in the field of higher education.In this paper, on the five elements of SERQUAL assessment system made some additions and 22 items were deleted, such as: "keep record" has never made a mistake, for students, it is hard to understand to the teacher's records, can be removed; "Safeguard" this one is not suitable for higher education services, itself of this article is designed for telecom companies set up by the network security, can be removed; "Employees dress" aspect in the field of higher education service is not too strict requirements, compared with Banks and other industries, the student to the teacher is neat uniform dress not too concerned about, also can be deleted; In addition, the paper added some such as teaching facilities, dormitories and team activities as tangibles, such as employment service guarantee sexual items. Due to the quality of the results of the questionnaire design and there is no systematic theory system can draw lessons from, in this paper some literature related items won.

In this paper, it based on the literature on the formation of finishing a preliminary questionnaire. The initial questionnaire were distributed to the experts of our school steering group in the quality of education . "The purpose is that whether all the items of the questionnaire covers the connotation of higher education quality service on one hand, on the other hand the questionnaire wording and other items can ask for the students to understand" [7]. In this expert investigation, after the repeated consultation on a questionnaire, experts agreed on basic. After the preliminary questionnaire for synthesizing the author eventually formed the formal questionnaire.

2.2 Select Samples
In this paper, the research object are undergraduate colleges and universities ,which are the local province and the Ministry to build together. Of the colleges and universities, was chosen as the author resources nearby choose. Which scale is average in local colleges and universities, school quality reputation in the local belongs to the upper position . Undergraduates is chosen as the first survey of object because of the scale of colleges and universities undergraduate scale is much larger than the graduate student, and undergraduate students to perceive higher education quality is higher than graduate students have the enthusiasm and participation. The choice of respondents taken according to different disciplines more strict sampling approach. In engineering, science, literature and law issued 500 the number of samples. There are no restrictions on age and gender for students, using a random way to facilitate collection of samples

The sample uses the field investigation, field distribution and site recovery. Using the convenient conditions in the contact of each class the teacher in charge, before the questionnaire for the purpose of the questionnaire and the procedure, make the student's approval and understanding. Then a questionnaire, after waiting for students to fill in one by one. The benefits of this approach is a high recovery rate, so it can reach almost one hundred percent recovery rate. In addition, students in the process of questionnaire have any question can be answered on the spot.

3 The Dimensions of Service Quality in Higher Education Research
3.1 Functional Quality Dimension Analysis
Exploratory factor analysis (EFA) and confirmatory factor analysis (Confirmatory Factor Analysis, CFA) is the most widely used two methods of factor analysis). "Obviously, the CFA is the study of factors (that is, latent variables)

relationship between the structural equation modeling (Structural Equation Modeling, SEM) measurement models used by. But the CFA often do not reproduce the EFA factor structure, this is a long history of unresolved issues "[8].

"ESEM is containing the EFA measurement model of SEM, it is the structure of the part from the usual SEM that is the same, the difference is its measurement model part, allows at the same time as the same index in a number of factors on load". ESEM inherited features from the CFA ,which also have the flexibility of EFA, is a mixture of EFA and CFA.

We by EFA questionnaire conducted factor extraction, the process quality is successfully extract the three common factor, process and the quality of the project on their common factor of the load is more than 0.5, but the individual subject appeared across the factor loading situation, namely load factor in more than two, close to and are more than 0.4. In order to overcome the traditional shortcomings of EFA and solve the above problem further, to extract common factor model for the better validation, this study uses the latest advanced statistical analysis methods of ESEM for process quality analysis questionnaire.

"The EFA used orthogonal rotation (maximum variance method) before, to detect the structure of three common factor model, but due to a large number of studies show that service quality dimensions may be related to each other, therefore, oblique rotation method is more appropriate" [9]. In ESEM analysis, we have to set up of the above methods, and use the SEM of the Maximum Likelihood estimation (Maximum Likelihood, ML) for parameter estimation. According to Joreskog competitive model proposed by (1993) comparative method, aimed at the structure of the process quality, this paper builds four comparison model, validate the process quality.

(1) Virtual model (Null Model). This model assumes that the common concepts process quality does not exist, there is a common dimension to support the concept of process quality. Because it is the easiest and most restrictive model, can be used, and other less restrictive model for comparison.
(2) One-dimensional model. This model assumes that the process quality between the observed variables have a common factor, can explain the covariance between all observed variables. With the traditional process quality measure treated as a variable to agree.
(3)Three-dimensional model. This model assumes that the process between the quality of the observed variables have three common factors, such as Shen Yong (2008) will guide the process of quality into the quality and reliability of the three physical dimensions.
(4) Five-dimensional model. Based on five important aspects of literature suggests, and most researchers collected the views of both tangible process quality, assurance, responsiveness, empathy and reliability. The research model is built on the basis of this assumption.

It will take the method of free-estimates, single-dimension, three-dimension and five-dimension,the result will show in the table.

Table 1: different dimensions of the process quality verification results

Model	χ^2	df	χ^2/df	TLI	CFI	RMSEA	SRMR
Virtual model	10875.147	210	51.786				
One-dimensional model	1902.139	189	10.064	0.822	0.839	0.127	0.053
Three-dimensional model	941.164	150	6.274	0.896	0.926	0.097	0.030
Five-dimensional model	503.137	115	4.375	0.934	0.964	0.077	0.018

Due to the deficiency of the most simple, the most restrictive, poor fitting is usually effective, generally used for comparison with other models. χ^2 due to the influence of sample size is large, typically is marked, depending on other indicators of fitting. It has been suggested, when the value of χ^2/df at the time of between 2.0 and 5.0, you can accept the model. Single-dimension model and three dimensional models of the χ^2/df is greater than the recommended value and one-dimension model of TLI and CFI recommended value is less than 0.9. Steiger (1990), RMSEA is less than 0.1 better fitting; lower than 0.05 are very good fitting; lower than 0.01 means very good fitting. "Hu and Bentler (1998) on SRMR recommended threshold is 0.08, SRMR model is less than 0.08 considered acceptable when SRMR greater than 0.08, believe that model fitting is bad" [10]. RMSEA single-dimensional model the critical value greater than 0.1; χ^2/df，TLI is greater than the critical value of three dimensional models. Only a five-dimensional model of the fitting indicators are very good.

As table by shows, except observation indicators "courses set meet we of learning needs" in the public factor Shang load lower, be delete outside, process quality in ESEM in the of remaining 20 a observation indicators in respective factor Shang of load are over has 0.4, and no longer exists single observation indicators in two a factor Shang load over 0.4 of situation, so, process quality five dimension structure is suitable of.

Table 2:The ESEM factor loading of process quality

Process Quality	Common factor				
	1	2	3	4	5
Modernization of teaching facilities and equipment P1	0.830	-0.070	0.121	0.018	-0.073
Enough teaching facilities and equipment P2	0.827	0.096	-0.009	-0.013	0.003
Living equipment easy to use P3	0.708	0.068	0.021	0.037	0.053
Library and information resources P4	0.530	0.351	0.027	-0.046	0.025
Sport service facilities P5	0.545	0.279	0.074	-0.014	0.051
Curriculum to meet our learning needs P6	0.399	0.269	-0.017	0.132	0.157
Teaching content focused on theory and practice P7	0.383	0.439	-0.033	0.110	0.044
Teachers and curriculum related deep expertise P8	0.035	0.784	0.082	0.066	-0.035
University faculty are full of confidence that its full boot capabilities P9	0.106	0.572	0.044	0.229	0.028
Met a lot of interest in the school and the students P10	0.015	0.173	0.011	0.618	0.081
Opportunities for team work or activities a lot P11	-0.045	0.014	0.045	0.848	0.028
Schools provide employment information sufficient P12	0.165	0.036	0.307	0.460	-0.028
School staff will be happy to help students P13	0.027	0.066	0.650	0.146	0.018
Smooth interaction and feedback between teacher and student P14	0.025	0.022	0.848	-0.003	0.025
Staff care about student life and learning progress P15	0.156	-0.077	0.539	0.064	0.246
Teachers in time, to answer questions specifically for your knowledge P16	-0.037	0.064	0.544	-0.016	0.343
School staff understand the special needs of students P17	0.031	0.009	0.334	0.037	0.545
When required, staff can give my Special attention P18	-0.028	0.177	0.236	-0.033	0.570
School teaching staff can promptly resolve practical questions for you personally (such as handling of grants, etc) P19	-0.028	0.171	0.063	-0.011	0.715
When the problem occurs, to sincerely warm and friendly approach to problem-solving P20	0.078	0.023	-0.022	0.052	0.791
School commitments provided by the thing will be scrupulously honoured P21	0.121	-0.090	0.004	0.224	0.648

Through further analysis, we try to understand the appropriateness and rationality of the results. In addition to the importance of the factor of load and variables, combination of relevant literature review and theoretical research are also required. According to the result of ESEM (see chart), the first factor includes five projects which are visible (number of modernization of teaching facilities, enough teaching facilities,convenience of living facilities,enough book information, enough sports service facilities), therefore, the first factor named "visible". Tangibility undoubtedly play an important role in higher education, Tomovick, Jones and Al-Khtib (1996) examined the foreign students evaluation on education service quality.the result founds that tangibility is one of the main dimensions.

O 'neill (2003) also found the importance of physical factors in the distribution system in the context of education service. "material aspects of the academic environment"is seen as a one of the obstacles influence the quality of teaching and research [11].

Second factor including three observation projects, (wether teaching content focus on theory with practice , teachers with profound professional knowledge related to this course; trust faculty), we can found that the three projects can be attributable to the guarantee of teaching, as a result, the second factor named as "teaching guarantee".

The third factor includes four projects, and three were observation project of reactive factors (school staff will be happy to help students; smooth interaction and feedback between teachers and students; the teacher can timely, especially for you in answering questions) and 1 was empathic factor observation project (school faculty concerned about students' progress in learning and in life). This shows that the reaction and empathic and guarantee may overlap. PZB also admitted, responsiveness, assurance and empathy can be putted in a dimension. "Mels also defines the dimension as " interaction quality "in the study , referring to the service quality produced in interpersonal interaction in the process of contact ".[12] "Shen Yong adopted adaptation of the SERVQUAL model to the field of higher education in China, a similar dimension of overlapping occurs" [13]. (Anderson 1995),This may be because the university itself is not profitable organization in SERVQUAL research background, as the empathic there does exist difference of performance. In the SERVQUAL system,reaction refers to the willingness to help customers; The possibility of the overlap, such willingness is usually with empathic inclination, in the final analysis is a kind of reactive. Therefore, the third factor can be named "reactive".[14]

The fourth factor including three observation projects,component of three guarantee observation projects (met a lot of students with the same interests in the school, there are a lot of team-works or activities , the schools provide sufficient employment information), we can found that the three items are associated with the practice of colleges and universities, for example,university will carry out all kinds of competitions (including team competition), club activities, and recruitment, etc., students can encounter the students with the same interests through these activities .students also can make full use of these opportunities, information, further experience of higher education quality in the service process. So, the fourth factor can be named as "practice".

The fifth factors includes five observation projects by two empathic factors(school faculty and staff are aware of the special needs of students; when required, staff can give you a special care), one is observation project of reactive factors (the teaching staff timely solve your all kinds of everyday problems (apply for financial aid etc.), for example), and 2 reliability factors (when problems occur, the school can take a sincere attitude to solve the problem friendly enthusiasm; the school once promised,they do it). Mentioned before, due to the non-profit nature of colleges and universities, in the field of higher education services, highly contact such as empathy decreases, that is, the specific empathy behavior may be converted into other behaviors. And in the Servqual system, reliability refers to the service organization to complete correctly the promised service, the ability to perform service commitments accurately .in line with the purpose of education, therefore, as for the objective of reliable service, concrete behavior may be associated with certain empathic inclination. in PZB (1998) service quality model, reliability dimension have a observation project is "when customers encounter problems ,I will try my best to help customers solve the problem", it is also a reactive. Above all, the two empathic factors and the 1 reactive factor, may be reflected in the field of higher education service quality reliability. Therefore, the fifth factor can be named "reliability".

3.2 Exploratory Factor Analysis on Technical Quality

Calculated, the result shows alpha value of 0.930 of nine projects, no project can affect the alpha value, the quality of the four projects of KMO is 0.938, bartlett sphere (2 statistic significant probability is less than 0.01, the approximate chi-square was 2149.771, shows data correlation matrix is not a unit matrix, correlation, but also shows data for factor analysis.

Table 3: Quality factor to explain the results of the total variance

ingredients	Extraction of sum of squares loaded		
	eigenvalue	Explain variance percentage	Cumulative explained variance percentage
1	6.108	67.865	67.865

Note: the extraction methods: principal component analysis.

Explain the quality nine projects to extract a common factor, they can explain 67.865% of the total variance, the component matrix as shown in table. Table 4 results quality factor matrix components.

Table 4: Quality Factor Matrix Components

quality of results	ingredients
	1
The received higher education services help your expected goals O1	.866
Your knowledge has made great growth O2	.872
Your social skills have improved O3	.839
By receiving higher education, you are confident of finding a satisfactory job O4	.837

Extraction method: the main ingredient. Has had one extract ingredients.We can see from the element matrix, as a result, the quality of four projects in their respective load on the common factor more than 0.5, so the quality of extracted a factor.

4 The Higher Education Service Quality Dimensions

Based on the structure of higher education service quality, 5 comparison model is constructed. (1) the virtual Model (Null Model). This model assumes that the concept of service quality does not exist together, no common dimension supports the concept of service quality. Since it is the simplest and most restrictive model, it can be compared with other restrictive weaker model (2) a single dimensional model. This model assumes that the quality of service between the observed variables have a common factor,it can explain the covariance between all observed variables. It is the same with tradition (3) the two-dimensional model. Suggestions is based on the collected literature, service quality including process factors and results of two important aspects. And the predecessors' research results are more towards the two-dimensional model. This research model is also based on this hypothesis. (4) six-dimensional models. The assumption is that the result dimension is looked as a factor the same level of process quality. That is as a service process of the five dimensions, they are coordinate. Powpaka (1996) put forward service quality measurement in the study which is based on a similar model.

Using Mplus 7.0 software to carry on the analysis, respectively take free estimate, single dimension, the method of two dimension, three dimension and six dimension, the results as shown in table 5.

Table 5: Different dimension verification table higher education service quality

model	χ^2	df	χ^2/df	TLI	CFI	RMSEA	SRMR
virtual model	7664.360	406	18.878				
The unidimensional model	2150.504	377	5.704	0.737	0.756	0.134	0.074
two dimensional model	62.624	19	3.302	0.976	0.984	0.093	0.024
Six dimensional mode	1019.581	362	2.817	0.898	0.909	0.083	0.043

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The virtual model is the most simple, most restrictive, usually fitting effect is poorer, are commonly used to compare with other model. χ^2 value   is larger due to the effect of sample size, usually are significant. First of all, only the unidimensional modelχ^2/df is greater than the critical value of 5.0, and unidimensional model TLI CFI is less than the recommended value of 0.9, in addition, according to the Steiger (1990) suggested, the RMSEA is greater than the critical value of 0.1 poor fitting index. Six dimensional models of TLI slightly less than the recommended value of 0.9, RMSEA is slightly larger than the recommended value of 0.08, the rest of the fitting index is better; because all the RMSEA value model is greater than the recommended value of 0.08, comprehensive considering other indicators, a two-dimensional model fitting is best in all models, in accordance with previous theoretical assumptions.
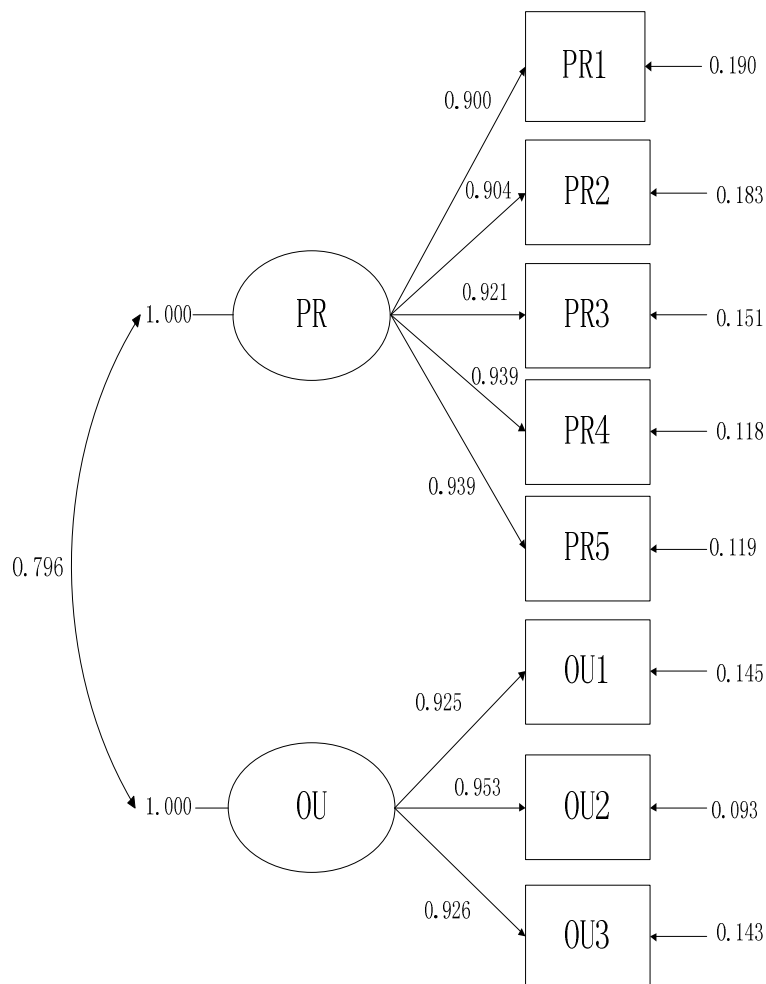

Figure 1. service quality two-dimensional structure

As shown in the figure，8 measurement index of process quality and outcome quality are all above 0.80, at P <0.05 level significantly (to save space, I did not show t value and the standard error and other information). Therefore, service quality of two-dimensional structure is appropriate.

CONCLUSION

Through exploratory and confirmatory factor analysis, this paper formed the following conclusions:
(1) Higher education service quality consists of technical quality and functional quality. From the point of data analysis results, the two-dimensional structure of higher education service quality is the most suitable for the structure of the higher education quality. This shows that not only is the process of service, the result of the service is also the indispensable part of overall service quality. This conclusion also shows,a good process not necessarily leads to satisfy students good service quality. This perhaps is more apparent in the medical service industry, patients may be more pay attention to the result of the service

(2) empathy in the higher education service quality is weakening. Unlike SERVQUAL model, by ESEM, the function of quality dimension of empathic dimension disappeared. Unlike SERVQUAL research background, the

university itself is not a for-profit institutions, at empathy there does exist different performance, especially in some part of the height of contact. It also shows that compared with nonprofit institutions, colleges and universities is lack of humanistic care in empathy.

(3) Higher education quality assurance differentiation in service quality. Relative to the SERVQUAL model, guarantee dimension differentiation has become the teaching and practice of guarantee in this article. Among colleges and universities, the teaching and practice is the key to carry out two pieces of service content, because the two pieces of the emphasis of the content itself is different, its final actual implementation is also different. Therefore, targeted differential between the two, is good for the university to provide the students with the counterpart service

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