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HiEduQual: An Instrument for Measuring the Critical Factors of Students' Perceived Service Quality

Annamdevula Subrahmanyam[a],*; Bellamkonda Raja Shekhar[b]

[a]Assistant Professor. School of Business Studies, Central University of Karnataka, Gulbarga, India.
[b]Professor. School of Management Studies, University of Hyderabad, Hyderabad, India.
*Corresponding author.

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Abstract

This paper attempts to develop and validate a service quality instrument called HiEduQual to measure the perceived service quality of students in higher education institutions. The study employs survey research design to gather data regarding attitudes of students about quality of service being provided by the universities. The study identifies a model with six-structured dimensions containing 23 items which showed good psychometric properties based on findings from various reliability and validity tests as well. Similarly, study tested the measurement invariance to operate the model equivalently across genders. Implications are discussed and directions for further research are indicated.

Key words: HiEduQual; Service quality; Higher education; Critical factors; Measurement scale

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INTRODUCTION

The management of quality needs a different approach when it now comes to the services sector. The studies of service quality on different sectors have been increasing from past four decades (Philip & Hazlett, 1997). Among all the service sectors, higher education needs a special emphasis on evaluating the issues related to quality of services and its measurement. Significant conceptual contribution has been made by a number of researchers from different academic disciplines on issues of service quality measurement in higher education.

Evaluation of performance is one of the strongest methods for strategic development in higher education environment. The identification of key quality issues in the institution provides the base for better evaluation of service quality in institutions. A few research studies have been carried out in identifying the concerns related to higher education quality and practices followed by the institutions in India. Some of the studies have developed research models by identifying critical factors to measure service quality in higher education (Mahapatra & Khan, 2007; Abdullah, 2006; Senthilkumar & Arulraj, 2011; Clewes, 2003).

The absence of conceptual clarity, divergent views on the dimensionality and lack of psychometrically valid measures in higher education service quality has necessitated this study. Therefore, the study focused on developing a measurement instrument called HiEduQual (Higher Education Quality) to measure service quality in Indian higher education in the perspective of students as primary customers. The resultant dimensions showed good psychometric properties based on findings from various reliability and validity tests as well.

1. REVIEW OF LITERATURE

There is extensive literature on the causes and consequences of quality education (Chua, 2004; Blass & Weight, 2005; Cornuel, 2005; Gupta, 2007; Oliveira & Ferreira, 2009). Today total quality management and quality assessment are becoming very important issues. Many researchers have conducted studies to examine these issues and they developed models to measure service

quality in education (Clewes, 2003; Abdullah, 2006; Mahapatra & Khan, 2007; Senthilkumar & Arulraj, 2011). At a theoretical level, from time to time, there have been a number of attempts to re-examination of the fundamental educational processes and a number of new models have been proposed for service quality management in higher education.

Cheng and Tam (1997) developed a framework of multi-models of quality in education for facilitating practice, supporting policy making and developing research agendas. Multi-models includes seven models of quality in education: the goals and specifications model; the resources input model; the process model; the satisfaction model; the legitimacy model; the absence of problems to model; and the organizational learning model. The authors contend that education quality is a multi-dimensional concept and cannot be easily assessed by only one indicator and the expectations of different constituencies (policy makers, parents, school management committee, teachers, students, etc.) on education may be very different, if not contradictory.

Ford, Joseph and Joseph, (1999) developed an instrument to assess service quality perceptions of business students in New Zealand and the USA. The appropriate attributes were identified by focus group discussions which were used to develop the New Zealand questionnaire. Based on the similarity, those 20 attributes were grouped into seven factors: Programme issues, Academic reputation, Physical aspects/cost, Career opportunities, Location, Time and others.

Joseph, Stone and Joseph, (2003) conducted a study to identify the determinants of service quality in education from the perspective of foreign students using a set of measurement scales based upon the importance/performance grid. Major factors of the instrument were obtained during the focus group discussions and the measurement instrument used in the study was divided into four sections to obtain data about university, quality service experience, perception of their own university and demographics information.

De Jager and Gbadamosi (2010) carried out a study on process of developing a standardized measure of service quality in higher education in South Africa and also examines the relationship between the measures of service quality on the one hand and some other related variables such as intention to leave the university, trust in the university management and the overall satisfaction with the university. The study reveals the findings of the research questions that indeed the multidimensionality of service quality scale loading on 13 factors and shows a very strong internal consistency among the factors.

Apart from the above models, many researchers have adopted "SERVQUAL" model into education sector with modifications (e.g., Cuthbert, 1996; Pariseau & McDaniel 1997; Mostafa, 2006; Oliveira & Ferreira 2009; Katiliūtė & Kazlauskienė, 2010). Nevertheless, measuring service quality in the higher education sector is a difficult task as it has unique characteristics and dimensions.

Although generic instruments have been tested with some degree of success in a wide range of service industries, their duplication in the higher education sector is still hazy. Apart from this many researchers have conducted studies to measure the service quality in the higher education with modification of service excellence models and they have mentioned different ways to measure the same (Arjomandi, Kestell & Grimshaw, 2009; Farrar, 2000; McAdam & Welsh, 2000; Hides, Davies & Jackson, 2004; Davies, Douglas & Douglas, 2007).

Service quality has attracted considerable attention within the higher education sector, but despite this, little work has been concentrated on identifying its determinants from the standpoint of students being the primary customers. Therefore, there is a gap in the literature and it seems rational to develop a new measurement scale that incorporates not only the academic components, but also aspects of the total service environment as experienced by students as primary consumers.

2. RESULT ANALYSIS

The objective of the study is to develop an instrument for measuring the critical service quality factors of students' perceived service quality in the context of Indian universities. The study employs survey research design to gather data regarding attitudes of students about quality of service being provided by the universities. The study used a mix of qualitative and quantitative approaches to explore and identify the critical factors to measure service quality in universities.

2.1 Sample

The respondents of the study are senior students from various departments, who completed at least one year of education in the university. Total 2,565 valid sample were collected using non-probability purposive sampling method from seven Universities in the state of Andhra Pradesh, India. Respondents are almost an equal split between males (48.5 percent) and females, 68 per cent of the students are in the age group of 18 to 22. The whole valid sample 2,565 was divided into two samples based on the geographical region: Sample n_1= 1126 from Telangana region and Sample n_2 = 1439 from Andhra and Rayalaseema regions.

Based on psychometric scale development ways, this research conceptualized, constructed, refined, and tested a multi-item scale 'HiEduQual' that examined key factors influencing students' perceived service quality. The theory underlying structure was developed through exploratory factor analysis using sample n_1= 1126. The second sample (n_2) was used in a confirmatory study to validate the underlying structure.

2.2 Survey Instrument

The development of a theoretical model involved the development of a survey instrument through item generation and pilot study. Review of literature, In-depth Interviews, Focused Group Discussions (FGD) and Pilot Study helped to develop the final structured Questionnaire containing a total of 48 measurement items cover all the academic and non-academic services experienced by the student being the primary customer in the higher education sector. All the items were measured on a seven-point Likert scale that varied from 1= strongly disagree to 7=strongly agree.

2.3 Exploratory Factor Analysis

The sample n_1= 1126 was used for Exploratory Factor Analysis (EFA) to develop the 'HiEduQual' theoretical model to identify the underlying factor structure. A preliminary analysis of the data was done by item statistics. Cronbach's alpha coefficient and critical analysis of correlation of the data matrix was computed to ensure the use of factor analysis (Hair et al., 2008). The value of coefficient alpha of all the items was above 0.90 which indicates that all the items are internally consistent (Nunally, 1978). Total 11 items were deleted as those items to total correlations less than 0.40 (Hair et al., 2008; Nunnally, 1978).

The final 37 service quality variables, after a preliminary analysis, were considered as input for the analysis. The principal component analysis with subsequent various rotation was adopted to reduce the data into a smaller number of variables and set of uncorrelated measures for subsequent use in other multivariate techniques (Structural equation modeling). The mixed approach of latent root, scree plot and priori was used to extract the factors. A total of 31 items which were grouped under six factors (Teaching, Administrative services, Academic facilities, Campus infrastructure, Support services, Internationalization) emerged from the final result of factor analysis. The Cronbach's α value of six factors ranged from 0.65 to 0.86 indicates that the scale was internally consistent and reliable (Cronbach, 1951; Nunally, 1978).

3. CONFIRMATORY FACTORY ANALYSIS

3.1 First Order Measurement Model

The sample n_2 = 1439 was used for Confirmatory Factor Analysis (CFA) to develop 'HiEduQual' measurement model by validating the indicators and dimensions of a theoretical model. The preliminary analysis of the data has been done through an assessment of normality, linearity and outlier to validate the results. After the preliminary analysis, CFA to each factor of the factor structure was done. The first-order and second-order measurement models were developed and tested for validity.

In the process of validating the first-order measurement model however, eight items were discarded as they had high standard residuals (>± 0.40) or less standard estimates (< 0.50). The revised first-order measurement model, contains 23 items under six dimensions, is shown in Figure 1**.** The revised model has a good model fit with a value of χ2 /df ratio 4.128. This value indicates that the model is acceptable. The different types of fit indices are used to assess the model fit. Table 1 shows all the values of model fit indices are above 0.90 and RMSEA value is less than 0.50. It indicates that the model fits well (Hu & Bentler, 1995; Hair et al., 2008).

Table 1
Fit Indices of First-Order Measurement Model

χ2	*df*	*χ2/df*	*GFI*	*AGFI*	*NFI*	*TLI*	*CFI*	*RFI*	*IFI*	**RMSEA**
887.430	215	4.128	0.948	0.933	0.938	0.944	0.952	0.927	0.952	0.047

The validity of the measurement model was assessed through multiple approaches: construct validity and construct reliability. All the indicators are statistically significant at a level of significance 0.001 and standard estimations are above 0.50 (ranging from 0.62 to 0.90). The Average Variance Extracted (AVE) and Construct Reliability (CR) values of each construct exceeded the minimum level 0.50 and 0.70 respectively. The correlations between the constructs are positive and statistically significant. All the extracted variance estimates were also greater than squared inter-construct correlations. Further, all the dimensions were positive and significantly related with the overall service quality. The results show in the Table 2 indicate the dimensions of first-order model are valid and reliable.

Table 2
AMOS Results of HiEduQual First-Order Measurement Model

Regression paths	Standard loadings	$CR_{\#}$	P^{*}	AVE	CR
Teaching (TC)					
TC1←TC	0.85	**	0.000		
TC2←TC	0.81	40.71	0.000		
TC3←TC	0.82	43.04	0.000		
TC4←TC	0.80	39.99	0.000	**0.60**	**0.91**
TC5←TC	0.80	39.09	0.000		
TC6←TC	0.69	32.98	0.000		
TC8←TC	0.65	32.25	0.000		
Administrative services (AS)					
AS1←AS	0.88	**	0.000		
AS2←AS	0.88	50.28	0.000		
AS3←AS	0.81	45.35	0.000	**0.63**	**0.90**
AS4←AS	0.72	30.43	0.000		
AS5←AS	0.67	31.15	0.000		
Academic facilities (AF)					
AF1←AF	0.67	**	0.000		
AF2←AF	0.81	26.13	0.000	**0.55**	**0.78**
AF3←AF	0.73	22.23	0.000		
Campus Infrastructure(CI)					
CI1←CI	0.62	**	0.000		
CI2←CI	0.90	25.44	0.000	**0.58**	**0.80**
CI3←CI	0.73	20.34	0.000		
Support services (SS)					
SS1←SS	0.72	**	0.000		
SS2←SS	0.77	23.57	0.000	**0.50**	**0.75**
SS3←SS	0.62	18.39	0.000		
Internationalization(IN)					
IN1←IN	0.66	**	0.000	**0.53**	**0.70**
IN2←IN	0.79	14.85	0.000		

Note: *Probability level of 0.001; ** The critical ratio is not available, because the regression weights are fixed at 1; $CR_{\#}$ = Critical Ratio; AVE= Average Variance Extracted; CR=Construct Reliability

3.2 Second-Order Measurement Model

The second-order measurement model was improved by integrating the entire first-order factor as indicators to measure the second-order factor 'Students' Perceived Service Quality' (SPSQ) (Figure 2). All the first-order factors are significantly loaded onto second-order construct. The regression weights range from 0.62 to 0.85 with all critical ratios above 1.96. The convergent validity measured through the standard estimates of the first order indicators and average variance extracted (AVE) is above 0.50 and the construct reliability (CR) value exceeds the recommended level of 0.70. Table 3 presents the second order measurement model fit indices. The $\chi 2$= 1063.858, df= 224 and $\chi 2/df$ = 4.749. The RMSEA = 0.051 and all the fit indices are above 0.90. It indicates that the second-order HiEduQual measurement model has good fit.

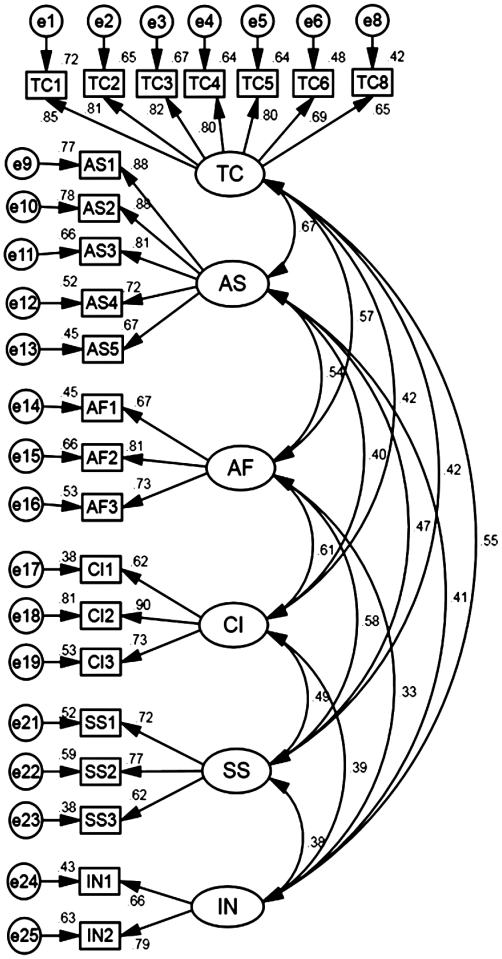

Figure 1
First-Order HiEduQual Measurement Model

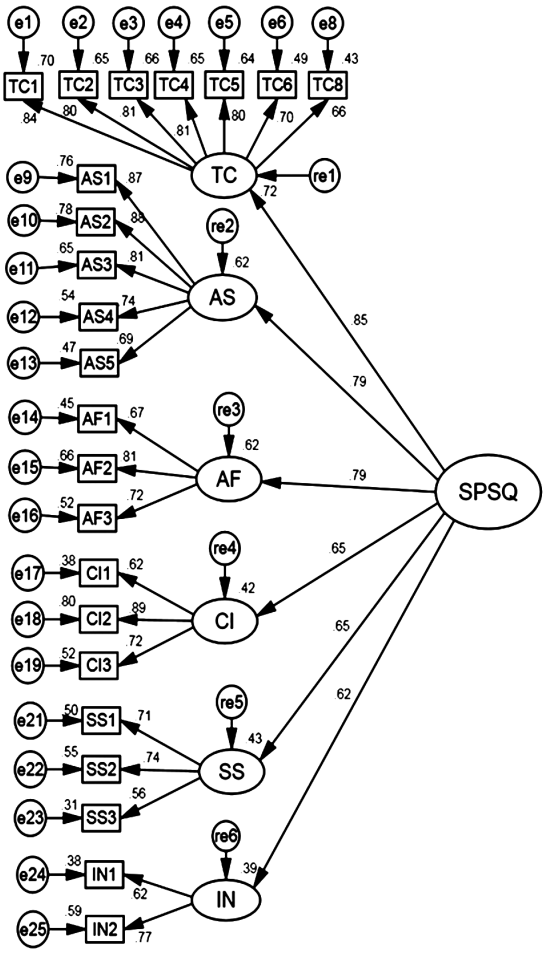

Figure 2
Second-Order HiEduQual Measurement Model

Table 3
Fit Indices of Second-Order Measurement Model

χ2	*df*	*χ2/df*	*GFI*	*AGFI*	*NFI*	*TLI*	*CFI*	*RFI*	*IFI*	RMSEA
1063.86	224	4.749	0.937	0.923	0.925	0.932	0.940	0.916	0.940	0.051

4. TESTS OF MEASUREMENT INVARIANCE (MULTIGROUP ANALYSIS)

With a background of having good model fit, validity and reliability of the measurement model, the tests of measurement invariance (multigroup analysis) were administered for the final second-order measurement model to generalize the model across the male and female groups. The Chi-square Difference ($\Delta\chi 2$) Statistic Test (CDST) was used to test the measurement invariance of measurement weights, structural weights and factor variance in comparison with configured model. The difference between $\chi 2$ and degrees of freedom values among these models is statistically insignificant which means that the HiEduQual measurement model is strongly related to both the male and female groups. The difference between CFI and RMSEA values is zero, it indicates that the model is invariant. In reviewing these tests, it can be concluded that the items comprising HiEduQual measurement instrument operate equivalently across genders.

5. DISCUSSION

The originality of this research is based on the development of a comprehensive model that examines the factors influencing service quality. The research contributes to the academic theory by developing the HiEduQual model, which identifies variables and dimensions in students' perceived service quality

measurement. The contribution to the theoretical development falls mainly within the confines of the quality of services of Indian universities. The dimensions derived from this research will contribute to a greater understanding of the role played by these constructs at the generic level in determining the higher education services. The study contributes methodologically to exist service quality measurement research. Testing and validating the HiEduQual model with data across the state of Andhra Pradesh through vigorous psychometric scale development procedures and methodologies in each phase shows that the HiEduQual instrument is robust.

The study provides a number of directions for future research. This research needs to be taken up to other universities in different states so that the model can be tested thoroughly. The study developed and tested a new measurement instrument that covers all the service aspects experienced by the student as the primary customer in higher education. The further studies can also measure service quality in the perspective of other key stakeholders namely academic and non-academic staff, parents, employers etc..

CONCLUSION

Service quality measurement and approaches are key issues in the present scenario in the higher education sector. The study identified six critical factors to measure students' perceived service quality in Indian university settings. The theoretical model has been tested using confirmatory factor analysis (CFA). The first-order measurement model was developed and contained a total of 23 items with six factors. The second-order measurement model was developed conjoining the first-order factors into one second order factor (students' perceived service quality). The final HiEduQual second-order measurement model was cross validated across genders using multigroup analysis.

REFERENCES

Abdullah, F. (2006). The development of HEdPERF: A new measuring instrument of service quality for the higher education sector. *International Journal of Consumer Studies*, *30*(6), 569–581.

Arjomandi, M., Kestell, C., & Grimshaw, P. (2009). *An EFQM excellence model for higher education quality assessmen* (pp. 1-7). In Proceedings of the 20th AAEE Australasian Association for Engineering Education Conference: Engineering the Curriculum.

Cheng, Y.C., & Tam, W. M. (1997). Multi-models of quality in education. *Quality Assurance in Education, 5*(1), 22–31.

Clewes, D. (2003). A student-centered conceptual model of service quality in higher education. *Quality in Higher Education*, *9*(1), 69-85.

Cronbach, L. J. (1951). Coefficient alpha and internal structure test. *Psychometrika,16*, 297-300.

Cuthbert, P. F. (1996). Managing service quality in HE: Is SERVQUAL the answer? Part 1. *Managing Service Quality*, *6*(2), 11–16.

Davies, J., Douglas, A., & Douglas, J. (2007). The effect of academic culture on the implementation of the EFQM excellence model in UK universities. *Quality Assurance in Education*, *15*(4), 382-401.

de Jager, J., & Gbadamosi, G. (2010). Specific remedy for specific problem: Measuring service quality in South African higher education. *Higher Education*, *60*(3), 251-267.

Farrar, M. (2000). Structuring success: A case study in the use of the EFQM excellence model in school improvement. *Total Quality Management*, *11*(4-6), 691-696.

Ford, J. B., Joseph, M., & Joseph, B. (1999). Importance-performance analysis as a strategic tool for service marketers: the case of service quality perceptions of business students in New Zealand and the USA. *The Journal of Services Marketing*, *13* (2) 171-186.

Hair, J. F. Jr., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2008). *Multivariate Data Analysis*. (6th ed.). Pearson Prentice Hall, India.

Hides, M. T., Davies, J., & Jackson, S. (2004). Implementation of EFQM excellence model self-assessment in the UK higher education sector–lessons learned from other sectors. *The TQM Magazine*, *16*(3), 194-201.

Hu, L. T., & Bentler, P. M. (1995). Evaluating model fit. In R. Hoyle (Ed.), *Structural equation modeling: Concepts, issues, and applications* (pp.76–99).

Joseph, M., Stone, G., & Joseph, B. (2003). Using the importance-performance grid to evaluate international student perceptions of service quality in education: an investigation from an Australian college perspective. *Journal for Advancement of Marketing Education*, 3.

Katiliūtė, E., & Kazlauskienė, I. (2010). The model of studies quality dimensions from student's perception. *Economics and Management*, *15*, 580-586.

Mahapatra, S. S., & Khan, M.S. (2007). A framework for analyzing quality in education settings. *European Journal of Engineering Education*, *32*(2), 205–217.

McAdam, R., & Welsh, W. (2000). A critical review of the business excellence quality model applied to further education colleges. *Quality Assurance in Education*, *8*(3), 120-130.

Mostafa, M. M. (2006), A comparison of SERVQUAL and I-P analysis: Measuring and improving service quality in Egyptian private universities. *Journal of Marketing for Higher Education, 16*(2), 83-104.

Nunally, J. C. (1978). *Psychometric theory* (2nd ed.). McGraw Hill, New York, NY.

Oliveira, O. J. D., & Ferreira, E. C. (2009). *Adaptation and application of the SERVQUAL scale in higher education*. POMS 20th Annual Conference, Orlando, Florida U.S.A.

Parasuraman, A., Zeithaml, V. A. & Berry, L. L. (1988). SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality. *Journal of Retailing*, *64*(1), 12–40.

Pariseau, S.E. & McDaniel, J. R. (1997). Assessing service quality in schools of business. *International Journal of Quality & Reliability Management*, *14* (3), 204-218.

Senthilkumar, N., & Arulraj, A. (2011). SQM-HEI – determination of service quality measurement of higher education in India. *Journal of Modeling in Management*, *6*(1), 60 – 78.

APPENDIX

The HiEduQUAL Scale Items

1	Teachers responsive and accessible
2	Course content develops students' knowledge
3	Teachers follow good teaching practices
4	Teachers follow curriculum strictly
5	Continuously evaluate the student's performance
6	Department has sufficient academic staff
7	Collects feedback to provide better services
8	Admin staff provide error free work
9	Admin staff provide service without delay
10	Admin staff are courteous and willing to help
11	Admin maintains accurate and retrieval records
12	Admin staff accessible during office hours
13	Classrooms equipped with teaching aids
14	Computer/ science Labs are well equipped
15	Library has adequate academic resources
16	University has sports& recreation facilities
17	University has adequate hostel facilities
18	University has safety & security measures
19	University has adequate amenities
20	University organizes cultural & extracurricular
21	University provides counseling services
22	University promotes international activities
23	University has teachers from abroad