AN EXPLORATORY STUDY ON EFFECTS OF SERVICE QUALITY ON TECHNICAL EDUCATION IN THE INDIAN CONTEXT

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ABSTRACT

This study is being carried out to suggest, develop and validate the model for service quality in technical education with minute observation. According to the current approach of multidimensional and hierarchical structure to the service quality, the proposed model is also based on the similar construct and tries to follow and obey the above mentioned concepts.

The proposed model first defines the two primary dimensions of service quality, which in turn are again redefined to several corresponding sub aspect: (a) Program quality, consisting of educational schedule, academic facilities, input quality, intercommunication with industry; and (b) Quality of student’s life, consisting of alternative activities, reinforcement facilities, and interaction and communication quality. The theoretical model was tested and the outcomes supported the conceptualization. The results reveal that there is a strong and positive dependence between service quality and outcome and reputation of an institute. The study further explored the mediating role of outcome; the findings confirmed the mediating role of outcome in relationship between service quality and reputation on an institute.

Keywords: Service quality, Technical education, Hierarchical Model

Key words: fixed points; generalized contraction maps; fuzzy set; fuzzy G-partial metric space.


1. INTRODUCTION

These days, higher education sector is one of the rapidly spreading sectors that acquire a very speedy growth. It has been emerged as a dignity of an industry. The current aggressive environment of student’s enrolment leads the institutions to endorse the “students as customer” approach and this is required for educational delivery (Simpson & Siguaw, 2000). The students have expansive options to choose an institution and the reality of the institutes is
that there is actual competition for students for their rapid growth. In such situation, the quality of the service plays a vital part and it stimulated the student decision-making process (Bateson, 1995). University quality assurance systems also give attention to student experience during the service delivery process and consider it a assessment criteria (HEQC, 1995). In India, the National Assessment and Accreditation Council (NAAC) and National Board of Accreditation (NBA) have also constituted student experience as criteria for assessment. These apprehensions bound institutions to consider and recognize their outcome like skills and abilities of their graduates (Lawson, 1992). It also leads them to evaluate themselves as per student’s impression and how their students evaluate their educational experience (Bemowski, 1991).

These new perspectives require attention of the institutions to be considered for the service delivery. These are to be investigated along with the traditional areas of evaluation parameters like academic standards, accreditation and performance indicators of teaching and research. Institutions are being labeled as per the quality of overall service experience they are providing to their customers. In developing countries like India the higher education particularly technical education, is of high priority and importance. Thus it directly affects in operation of higher education in a healthy competitive environment. So it is quite justified to lead research efforts for development of a service quality model specific to higher education.

2. REVIEW OF LITERATURE
Holdford and Reinders (2001) have defined that a student’s educational service quality is a part of the educational experience that he/she received as overall evaluation of services. This quality defines wide aspect of educational activities, both inside and outside of the classroom. These activities include classroom instruction, educational facilities, faculty member and student interactions, and administration interaction of students. The concept of service quality has been forwarded by many researchers, particularly in higher education field; some have certified the appropriateness of SERVQUAL in higher education (Gatfield, 2000; Wright and O’Neill, 2002) and some have suggested the dimensions/parameters specific to higher education (Sahney et al., 2004; Firdaus, 2006).

The key requirements of students from an educational institute are reported as competence, attitude, content, delivery and reliability by Sahney et al. (2004). The confirmations of six dimensions by Firdaus (2006) are distinct and clear in the context of higher education. These dimensions are namely, non-academic aspects, academic aspects, reputation, access, program issues and understanding.

As per Zineldin (2006) (Groonoo’s Model) technical-functional quality model was expanded with five quality dimensions description. These parameters are namely object quality, processes quality, infrastructure quality, interaction and communication quality and finally atmosphere quality. Mahapatra and Khan (2007) have approached an instrument to measure service quality in the ambience of technical education namely ‘EduQual’. This instrument is having following dimensions: academics, learning outcomes, responsiveness/acceptance, physical facilities, and personality development. Douglas et al. (2008) have classified the originator of service quality as teaching, learning, assessment and ancillary services.

An analytical review of the literature suggests that these commonly agreed upon dimensions of service quality offers limited support on higher education. So it is required to develop a comprehensive conceptual model for better perceptive and impressive application of service quality. The current literature indicates the multi-dimensional and hierarchical nature of general service quality and it highlights on assistance of resolving of the conceptual differences in service quality research (Brady & Cronin, 2001; Dabholkare et al., 1996).
Pereda et al. (2007) have suggested a term corporative-quality in higher education field and it very much similar to corporate prominence. Its measured by the different choices given to students for the statements like: ‘The ranking of this school is high’, ‘A degree from this university is strongly accepted internationally’ and ‘A degree from this university has a prominence influence in my home country’. Habib and Jungthirapanich (2008) have defined the outcomes from the university as the graduates with adorable quality and research outcomes delivered to the society. Depending on the quality of graduates and quality of research outcomes, the performance of the university is evaluated.

The literature review cited above as on service quality in higher education has cornered to the gaps described in following paragraphs and this research will try to address these gaps.

2.1. Literature Gap 1
All the previous studies viewed education service quality as a second order construct which is measured by first order dimensions and dimension being measured by observed variables. Researchers have challenged the second order model in various service settings. They figured out the service quality construct to be a structure of third–order model (Dabholkar et al., 1996; Brady and Cronin, 2001; Liu, 2005; Dagger et al., 2007). Service quality at third order level is measured by dimensions at the second order level and dimensions, in turn, are measured by sub-dimensions at the first order level. And sub-dimension being measured by observed variables. Thus, the recent research is attempted to determine whether a second order model or a third order model is better suited to describe the service quality construct in higher education.

2.2. Literature Gap 2
Relationships of service quality with costs (Kellogg et al., 1997), financial performance (Rust et al., 1995) and customer satisfaction (Soderlund, 1998) are well established in previous researches. Higher education institutions are non-profit organizations and hence contribute towards more importance to outcome and reputation of education to measure their performance. This leads to the study that emphasizes on finding the consequences of service quality on accordance to the reputation of the institute. Linking service quality to reputation, the study persuades the intervening role of outcome of the institute.

3. OBJECTIVES AND SCOPE OF THE STUDY
The main objective of this research study is to design and approve a multidimensional, hierarchical model for service quality in higher education and to link it to outcome and reputation of an institute. Specifically, the research is carried out with following sub-objectives:

- To provide an abstract construction of the service quality in higher education.
- To develop a measurement scale methodically to ascertain service quality from the students’ perspective.
- To determine the different psychometric qualities of the scale.
- To develop and authenticate this hierarchical model of service quality for higher education.
- To link the service quality to the reputation of institute and to assess the mediating role of outcome of the institute.
- To assess the difference in the service quality across institutes of technical education.
- To validate the structural model with the secondary data.
The focus area for the study is to obtain service quality in higher education. It mainly focuses on the importance of service quality in technical education when students’ perspective is concerned. But it should be cleared from the view that the limelight is not concerned on the higher education as a whole context which would require elaborated estimations and study of some of the elements which may be too diverge to converge. It does not focus on the faculty, industry and parents perspective of service quality, as interests of these stakeholders are too diversified to accumulate.

4. RELATED WORK
4.1. Conceptualization of the Service Quality (Sub Objective 1)

The service quality model is designed basing on the reviews of this study and through analysis of the literature. This model clearly indicates the factors to be used to regulate the quality of higher education as anticipated by students. The proposed model comprises of two primary dimensions: Program Quality and Quality of Life, which are again sub divided into various sub-dimensions. Sub-dimensions of Program quality are defined as: educational schedule, academic facilities, input quality, and intercommunication with industry. Sub-dimensions of Quality of Life are described as: alternative activities, reinforcement facilities, and interaction and communication quality. Using the hierarchical approach, the proposed model (Figure1) is designed with the amalgamation of multidimensional aspects of service quality.

Educational institutes measure their performance not in financial terms but in terms of their ranking which is majorly determined by the quality of their outcome and reputation. Thus, a structural model linking service quality to outcome and reputation of the institute has been developed for this purpose.

4.2. Scale Development (Sub Objective 2)

Item generation

For each of the dimensions and sub-dimensions of service quality, multiple measures are taken into account and based on the items of existing scales and the focus group interviews, outcome and reputation of institute were regenerated.

Sample

As there are four geographic strata, cities selected from these area are Kolkata, Pune, Indore and Bangalore. An average of 135 students were chosen from different AICTE approved management, engineering and other technical courses like pharmacy/ computer application/ architecture/ town planning/hotel management from these different cities.

Scale and Measurement

A five point scale, where 1 representing “strongly disagree” and 5 representing “strongly agree” was designed and the participants were asked to rate their level of agreement with the produced items of questionnaire.

Reliability and Validity

A panel of experts were assigned the task of validation of the scale, followed by the assessment of content and face validity. After the validation, item-to-total Correlation was established and Cronbach’s Alpha Coefficient was computed for each individual sub-dimensions of service quality. Factor analysis suggested a seven factor solution for service quality instead of eight factors. Thus, sub-dimension of campus was removed from the further analysis. Remaining items had a factor loading of more than 0.5.
Then correlation of each of these seven sub-dimensions of service quality was measured with an overall service quality. This leads to the measurement of the “Criteria Related Validity”. All the correlations were convincing at the significance level of 0.05.

4.3. Psychometric Properties of the Scale (Sub Objective 3)
To evaluate the Convergent Validity of SSQHE (Scale of Service Quality in Higher Education) the measurement model was evaluated using the AMOS software package. The Critical Ratios for all the items (indicators) ranged from 2.5 to 7.8 and each one of them was significant at the .01 significance level. The Composite Reliability and Average Variance Extracted (AVE) for each of the sub-dimension were further calculated using standardized regression weights of the items. All the Composite Reliabilities were more than 0.7 and all the AVEs were more than 0.5. The square root of AVE for each of the sub-dimension was greater than the correlation of that sub-dimension with the other sub-dimension; this supported the Discriminate Validity of the SSQHE.

4.4. Service Quality Model Validation (Sub Objective 4)
The hierarchical model of service quality was determined by performing a set of confirmatory factor analyses. Based on the results of the “Confirmatory Factor Analysis”, the three models namely first order, second order and third order, were compared. The Root Mean Square Error of Approximation for first order model was 0.107 while for the second and the third order model it was .073 and .069 respectively. This suggests that the third and second order model better explains service quality in higher education. The second and the third order models were further compared by Chi Square test for Difference of Discrepancy / Degree of Freedom. The difference in Chi Square values for the two models was 173 and difference in Degrees of Freedom was 107 (Satorra & Bentler, 2001). Tabulated value of Chi square at 107 degree of freedom at 0.01 level of significance is 143. This result support that the third order model better explains the service quality.

The regression weights of third order model suggest that Program Quality dimension is more important than the Quality of Life dimension in the service quality model. Among the sub-dimensions of Program Quality; curriculum and academic facilities are more important than industry interaction and input quality. Among the sub dimensions of Quality of Life, interaction quality is more important than the other sub-dimensions.

4.5. Testing the Structural Model (Sub Objective 5)
The model that links the service quality of higher education with the reputation of institute was analyzed next using Structural Equation Modeling. Standardized Regression Weight for the Path linking Service Quality to Reputation was 0.966 which is highly significant at 0.01 level of significance. Outcome variable was then imported in the model and was placed in between Service Quality and Reputation. It was useful to evaluate the intervening effect of Outcome of the institute. It was observed that the Standardized Regression Weight of the path linking ‘Service Quality’ to ‘Reputation’ was reduced to 0.355. This suggested a strong effect of reconciliation of Outcome variable.

Path coefficient of 0.492 was very much convincing at significance level of0.01. Hence it supports absolute relationship of service quality with the outcome of institute. Path coefficient of 0.355 at significance level of0.01 supports a decisive relationship between service quality and reputation of the institute. Path coefficient 0.121 at significance level of0.01 builds an affirmative relationship between the reputation and outcome of the institute.
4.6. Comparing Service Quality across Technical Institutes (Sub Objective 6)
The data were also analyzed to find if there was any difference in service quality offered across different categories of technical institutions. Based on all the seven factors of service quality the difference was determined as per the students’ perception. The following hypotheses were summarized based on the test result of “One way Analysis of Variance”:

H1-7: There is no convincing difference in the service quality perception of students across the technical institutes on the factor Academic Facilities/ Curriculum/Extra-curricular activities/ Interaction Quality/ Industry Interaction/ Input Quality.

The data were also analyzed to determine if there was any difference in the perception of reputation and outcome of the institute across different categories of technical institutions. The hypotheses were tested using the One way Analysis of Variance.

H8-9: There is no powerful difference in perception of students either on the outcome or the reputation across various technical institutes.

The ‘F’ values for all the hypotheses were significant except for ‘curriculum’.

4.7. Validation of Service Quality Model with Secondary Data (Sub Objective 7)
The structural model has also been validated through secondary data. Data related to service quality performance and outcome of the institute were collected from the website of the institute and data related reputation of the institute were collected from the India Today-Nielsen Survey (2011) of engineering colleges. Results of content analysis support the finding that service quality has positive relationship with outcome and reputation of the institute.

4.8. Validation of the Model of Service Quality

4.8.1. Confirmatory Factor Analysis

A set of Confirmatory Factor Analysis were executed to approve the hierarchical Model of Service Quality. Three Models, in the forms of First-, Second-and Third – Order, were compared according to the result of the Confirmatory Factor Analysis. In case of First-order Model, Service Quality was measured by observed variables directly, while it was measured by seven sub-dimensions (viz., input quality, curriculum, activities) in the Second –Order Model, and the sub-dimensions were measured then by observed variables.

The Model that was tested is shown in Figure 5.4 (See Table 5.6 for item Coding). In the model, Service Quality was measured directly by the observed items. The output can be quoted as followings:

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goodness-of-Fit Index (GFI)</td>
<td>0.818</td>
</tr>
<tr>
<td>Comparative Fit Index (CFI)</td>
<td>0.469</td>
</tr>
<tr>
<td>Non-Normed Fit Index (NNFI)</td>
<td>0.423</td>
</tr>
<tr>
<td>Root Mean Square Error of Approximation (RMSEA)</td>
<td>0.107</td>
</tr>
<tr>
<td>Normed Chi-square</td>
<td>3.769</td>
</tr>
</tbody>
</table>

As per Browne and Cudeck (1993) recommendation, a value of about 0.08 or less indicates a reasonable error of approximation and according to them, it would not be worthwhile to implement a model having RMSEA value larger than 0.1. Thus, it could be concluded that the First-Order Model did not fit to Service Quality.
An Exploratory Study on Effects of Service Quality on Technical Education in the Indian Context

Figure 5.4 First-Order Model Service Quality Study

Next, the Second-Order Factor Model of Service Quality was assessed. The Model that was tested is shown in Figure 5.5 (See Table 5.6 for Item Coding). In this model, Service Quality was the Second-Order construct being measured by seven First-Order constructs which were in turn measured by observed items. The outputs are as follows:

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goodness-of-Fit Index (GFI)</td>
<td>0.873</td>
</tr>
<tr>
<td>Comparative Fit Index (CFI)</td>
<td>0.710</td>
</tr>
<tr>
<td>Non-Normed Fit Index (NNFI)</td>
<td>0.710</td>
</tr>
<tr>
<td>Root Mean Square Error of Approximation (RMSEA)</td>
<td>0.073</td>
</tr>
<tr>
<td>Normed Chi-square</td>
<td>2.305</td>
</tr>
</tbody>
</table>

The above output suggests that the Second-Order Model adequately fit to Service Quality.

Figure 5.5 Second-Order Model Service Quality Study

Next, the Third-Order Factor Model for Service Quality was assessed. The model tested is shown in Figure 5.6 (See Table 5.6 for Item Coding) in this model. Service Quality was the Third-Order construct being measured by two Second-Order constructs, where the first being program Quality and the second was Quality of Student’s Life. These constructs were measured by seven First-Order constructs which in turn were measured by observed items. The outputs are listed as follows:

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goodness-of-Fit Index (GFI)</td>
<td>0.927</td>
</tr>
<tr>
<td>Comparative Fit Index (CFI)</td>
<td>0.903</td>
</tr>
<tr>
<td>Non-Normed Fit Index (NNFI)</td>
<td>0.873</td>
</tr>
<tr>
<td>Root Mean Square Error of Approximation (RMSEA)</td>
<td>0.069</td>
</tr>
<tr>
<td>Normed Chi-square</td>
<td>2.155</td>
</tr>
</tbody>
</table>
For small $N$ where ($N<250$), the RMSEA over-rejects the true models. Also as the number of variables in the model increase; it tends to worsen (Hu and Bentler, 1999; Kenny and Mc Coach, 2003; Fan and Sivo, 2005). As the sample size for the study was 244 and total variables used in the model are quite large, the Third –Order Model with RMSEA of < 0.07 is accepted.

These three Models were compared depending on the result of the Confirmatory Factory Analysis. The RMSEA for the First-Order Model is 0.107, while for the Second-and the Third-Order Model it is 0.073 and 0.069. This Suggests that the Third-and the Second Order Models better explains Service Quality in Technical Education. The Second-and the Third-Order Model were further compared by the Chi-square test for difference of Discrepancy/Degree of Freedom (Satorra and Better 2001). The difference in the Chi-square value for the two models was 173 and difference in Degrees of Freedom was 107. The tabulated value of the Chi-square at 107 degree of freedom, at 0.01 significance level was 143. Thus it can be concluded that the Third – Order Model is a better representation of Service Quality than Second-Order Model. The results of the model testing can be summarized as below listed Table 5.9.

**Table 5.9 Fit Indices of the Three Models**

<table>
<thead>
<tr>
<th>Models</th>
<th>Normed Chi-Square</th>
<th>NNFI</th>
<th>CFI</th>
<th>RMSEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>First-Order</td>
<td>3.769</td>
<td>0.423</td>
<td>0.469</td>
<td>0.107</td>
</tr>
<tr>
<td>Second Order</td>
<td>2.305</td>
<td>0.710</td>
<td>0.710</td>
<td>0.073</td>
</tr>
<tr>
<td>Third-Order</td>
<td>2.155</td>
<td>0.873</td>
<td>0.903</td>
<td>0.069</td>
</tr>
</tbody>
</table>

The regression weights for the dimensions and sub-dimensions are shown in Table 5.10. All the regression weights for the program quality dimension was slightly higher than the quality of students’ life dimension; this suggests program quality to be a little more important dimension than the quality of student life dimension was more than the other three sub-parameters of program quality; thesis suggests that ‘curriculum’ sub-parameter is more important than the other Sub-dimensions of program quality. The regression weights for the interaction quality sub-dimension was more than the other two sub-dimension of quality of students’ life; this suggest that the interaction quality sub-dimension is more important than the other two sub-dimension.
Table 5.10 Regression Weights

<table>
<thead>
<tr>
<th>Path</th>
<th>Standardized Regression Weights Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Quality &lt; Service Quality</td>
<td>0.983</td>
</tr>
<tr>
<td>Quality of Student’s Life &lt; Service Quality</td>
<td>0.977</td>
</tr>
<tr>
<td>Input Quality &lt; Program Quality</td>
<td>0.718</td>
</tr>
<tr>
<td>Industry Interaction &lt; Program Quality</td>
<td>0.600</td>
</tr>
<tr>
<td>Curriculum Facilities &lt; Program Quality</td>
<td>0.920</td>
</tr>
<tr>
<td>Academic Facilities &lt; Program Quality</td>
<td>0.889</td>
</tr>
<tr>
<td>Extra – Curricular Activities &lt; Quality of Student’s Life</td>
<td>0.600</td>
</tr>
<tr>
<td>International Quality &lt; Quality of Student’s Life</td>
<td>0.833</td>
</tr>
<tr>
<td>Supports Facilities &lt; Quality of Studies’ Life</td>
<td>0.770</td>
</tr>
</tbody>
</table>

5. FINDINGS AND CONCLUSIONS

The objective of this study was basically to achieve a better vision and understanding of the factors that are responsible to determine the student’s perceptions of service quality in higher education, and to achieve this through the development and implementation of a multidimensional and hierarchical model. The results of the data analyses validate the hierarchical model of service quality in higher education, it is in line with some recent researches which confirm that complex construct of service quality is better explained by hierarchical model (Pollack, 2009; Lu et al., 2009).

The results provide empirical evidence of service quality dimensions viz., program quality and quality of life, which in turn constitutes of multiple sub-parameters, input quality, curriculum, academic facilities, industry intercommunication and interaction quality, support activities, non-academic measures respectively. The dimensions and sub-parameters proposed in the framework are being supported by the findings of previous service quality research (Angell et al., 2008; Firdaus, 2006). The results also suggest that the institute should put more efforts to improve on Program Quality dimension than on Quality of Life dimension.

This ongoing study approves the fact that the path between service quality and outcome, service quality and reputation and, outcome and reputation, are all significant. The results of structural equation model also prove the same fact. The study also recommends the reconcile nature in the outcome of institute and exfoliates to the service quality—reputation relationship. This further leads to the conclusion that service quality is a significant element to evaluate the outcome of an institute. It is also responsible to determine the reputation of the institute, thus it is reflected in considering the importance of service quality as a decision-making variable.

There is significant difference in the students’ perception of service quality offered by management, engineering and other technical institutes on all the factors of service quality except curriculum. Management institutes had the highest score on extracurricular activities, interaction quality and input quality factor. Engineering institutes had the highest score on academic facilities, industry interaction and support facilities factors. While other technical institutes like pharmacy/hotel management/architecture had the highest score on only one factor that is curriculum, but it is not significantly different from the score of management and engineering institutes.

On outcome and reputation of the institute, again other technical institutes scored minimum and there is significant differences across management, engineering and other technical institutes. This further supports the conclusion that higher service quality will result in better outcome of the institute and this will lead to the institute’s reputation.
6. CONTRIBUTION

The model proposed in this study has an important contribution to theory and practice. It is further attached to the outcomes of customer’s evaluation of service quality. This evaluation is based on at an overall level, a dimensional level, and a sub-dimensional level. The approached service quality model supports a hierarchical structure and this structure somehow fills the gaps between the conceptualization and implementation of service quality in the higher education.

Build upon their information requirements, practitioners can evaluate the service quality with any one or all of these levels. The managers of the institutions are hence offered to several choices of scales as per the implementation of the level of detail to be measured. This further helps to measure the length of scale to be implemented. SSQHE can be helpful as an indicative tool that if helpful in identifying poor and/or excellent service performance. This information is explicitly important based on the perceptions of the service dimensions, which have shown their influence on outcome and reputation of institute and this conclusively affect the market accomplishment and its related advantages.

Management institutes need to put efforts to improve on academic facilities, industry interaction and support facilities factors while engineering institutes need to put efforts to improve on extracurricular activities, interaction quality and input quality factor. Rest of the technical institutes need to improve on almost all the factors of service quality.

REFERENCES

An Exploratory Study on Effects of Service Quality on Technical Education in the Indian Context


