Quality Function Deployment in Higher Education Institutes of Pakistan

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Abstract: Quality of higher education is its ability to produce a steady flow of people with high intelligence and commitment to learning that will continue the process of transmission and advancement of knowledge. Quality Function Deployment (QFD) is one of the Total Quality Management (TQM) techniques which can be applied for process and design improvement. This study uses QFD as a tool for quality improvement and benchmarking in higher education institutions of Pakistan. The study is based on primary data collected from five hundred students which is considered as customers and five hundred teachers, considered as technical describers from six Pakistani national degree awarding universities. A self designed questionnaire was used for data collection. The data was analyzed using the techniques of QFD on higher education institutes of Pakistan. On the basis of these feedback, a house of quality is developed, which highlighted the major concerned areas of quality improvements in teaching and also highlighted some benchmarks where other institutions are more productive.

Key words: Quality Function Deployment · Higher education · Relationship matrix · House of quality · Pakistan

INTRODUCTION

Quality is the most important factor of competition worldwide and this competition intensified the demand for quality products and services. To meet these challenges, many businesses have adopted the strategies of total quality management (TQM). TQM is effort to achieve quality organization-wide. TQM refers to managing quality aspirations which involves every department to achieve excellence in business, with regard to customer satisfaction. TQM focuses on the improvement of quality of products and services in business corporations [1, 2], organizations of health care [3] and also at government agencies level [4]. To meet the needs of quality in education, higher education institutions have also adopted TQM principles to improve the education quality [5, 6, 7].

Universities are the main source of provision of higher education, so they are very concerned about their quality of services to bring a quality product in market [8]. Universities strive to improve the quality of their education system which makes them distinctive from the rest [9, 10]. Educations services are often difficult to measure because of they are intangibles, because the outcome are in the transformation of knowledge in individuals, change in their characteristics and behavior. Therefore, there is no mutually accepted definition of quality which can be applied to the higher education sector specifically [11].

Further more, in assessing quality of higher education institutions, issues like autonomy and independence make complications for the whole process [12]. In this context, each country has accreditation agencies that are assessing the quality of education offered by the higher education institutions by accrediting and evaluating their degrees and also the educational work offered by the universities. However, these agencies have not influenced the quality perception in the education sector and didn’t clarify the main issues on the assessment of quality of institutes [13]. Quality in higher education institutions is not a simple issue [14].

This purpose of the study is to measure the determinants of service quality within the Higher Education sector of Khyber Pakhtoonkhawa (KPK)
province of Pakistan. Furthermore, the study focuses on establishing and testing dimensions to measure service quality in higher education institutions which assess the student’s preferences and perceptions regarding the available educational services. This study is organized as follows: after introduction in section 1, literature review is carried out in section 2. Research methodology is mentioned in section 3. Result and discussion is provided in section 4. Final section concludes the study.

**Literature Review:**

The word “Quality” is actually derived from the Latin word which is “qualis”, means, “what kind of”. As quality has a variety of connotations and meanings attached to it that’s why quality is a sort of difficult term to define. It is usually referred as a “slippery concept” [15]. The term quality is defined from different orientations and perspectives, according to the definition making at individual level, the applied measures and with reference to the context within which it is taken [16]. Different researchers defined quality differently like, Peters and Waterman, 1995 defined quality as “excellence”, according to Feigenbaum, [17], quality is “value”, Juran and Gryna, [18], defined as “fitness for use”, according to Crosby, [19], quality is “conformance to requirements”, “defect avoidance” [20] and [14, defined quality as “meeting and/or exceeding customers expectations.

As TQM is currently widely practiced but in fact a single and a homogenous theory and concept of TQM is lacking. While in theories, broadly in compliance with one another, it’s been noted a significant differences do exist. TQM is of course considered as a tool to underpin the facilitation of quality. TQM seem to be explained in terms of the organizational culture to “quality” and further improvements. From the consumers/users point of view, defining quality on the basis of product or service is considered more useful.

However, if we put light on quality from the perspective of the organization which provides goods or services, the perspective more relevant to TQM, is referred to the process-perspective which is more useful. In quality management, organizations need to have a proper mechanism to meet customer expectations and requirements within available resources. The last decade of the century has observed the increase in acceptance and utilization of TQM in the services sector [21], especially considering service quality as an important factor of growth, organizational survival and success [22, 23, 24, 25]. Just like quality is difficult to define [26], so more complications arise to define the quality in service sector [27] owing to the properties that differentiates services from goods. However, when most of the quality definitions are applied to services sector usually turn to customer-centered [27], so customer satisfaction is considered as a function of perceived quality [23].

A definition for the “quality in education” falls in the category of the general quality definition. Thus, different researchers defined the term in their own way like “excellence in education” by [28]; “value addition in education” by [17]; “fitness of educational outcome and experience for use” by [18]; “conformance of education output to planned goals, specifications and requirements” by [29, 30]; “defect avoidance in the education process” by [19]; and “meeting or exceeding customer’s expectations of education” by [14]. Thus Quality in Education has variability of concepts and this creates problem in formulating a single and much comprehensive definition. According to Sahney et al. [31, p.3], the definition of TQM in Education as follows:

“Total quality management in education is multifaceted. It includes within its ambit the quality of inputs in the form of students, faculty, support staff and infrastructure; the quality of processes in the form of the learning and teaching activity; and the quality of outputs in the form of the enlightened students that move out of the system.”

Like in other services sector, education sector stakeholders consist of students, staff, faculty, organizations, parents and society - so they all have an interest to deliver quality of education being by educational institutions. According to Madu et al. [32] customers can be classified into input customers, transformation customers and output customers. So in education system parents and students can be categorized as input customers, faculty and staff can be treated as transformation customers and output customers are corporations and the society. Customers of higher education can be classified into two groups i.e., primary and secondary groups usually done on the basis of their locations like internal or external and on the basis of frequency of interactions between institution and customers [10]. Educator is the primary internal customer and the student is considered as the secondary internal customer. The students are considered as the primary external customer and their parents as secondary external customers.
In appraising the previous studies, higher education institutions have a number of complementary and also contradictory “customers”. However it is also essential that customers should be identified and then processes be established accordingly in order to find out the specific needs and also to maintain customer-oriented service [33, 34]. It is important to identify the customer’s requirements in order to better satisfy them. The customer requirements are referred to the expectations made by customers from an educational system. The design characteristics are referred as the design elements that contribute to make a system and then act on or are acted on by the transformation system. If a higher educational institution adopts and implements the components/elements and then designs its system considering these as bases, the requirements made by various customers should be met easily and educational system will provide satisfaction.

The debate on the crucial and important role of service quality in Higher Education Institutions and its measurement has been discussed in a number of studies. A most commonly approach for evaluating quality in Higher Education Institutions is called quality function deployment (QFD). QFD is one of the important tool of total quality management (TQM), which is most often used for process and design improvement [35, 36, 31]. The main purpose of QFD is to visualize the cause-and-effect relationships taking a start from the customer needs and then all the way down till the production process. Number of reports has documented the benefits and results gained by adopting TQM principles in many colleges and universities [36]. QFD is a structured approach to find out the customer requirements, specified with products and service design. The benefits of design are focused on customer requirements, prioritizing design activities and it also reduces the design cycle.

QFD is referred as a process which includes (a) identifying and ranking the relative importance of customer requirements; (b) identifying design parameters (or engineering characteristics) that contribute to the customer requirements; (c) estimating the relationship between design parameters and customer requirements and among different design parameters and (d) setting target values for the design parameters to best satisfy customer requirements. A QFD matrix which is also called house of quality is used to help the decision makers to make the design decisions and predict the right one. QFD has been successfully used for both product and service design by many organizations [20, 37, 38].

[39 examined that how to make students’ evaluations of teaching more effective. According to the researchers, they found that students’ evaluation of teaching is multidimensional, stable, reliable, related with instructors and unaffected by factors like workload, class size, module difficulty, etc. Similarly, researchers like [36] have used the tool of quality function deployment (QFD), mainly for services sector, to transfer the voice of customers (students) in stages into operations requirements. [40] presented a systematic approach for the courses development process, which focuses mainly on student satisfaction and learning. The technique QFD is also used by some other researchers like [41, 42], where QFD is complemented by Analytical Hierarchical Process (AHP) for creating priorities after applying “Voices of Customer” and for each group of customer separately.

MATERIALS AND METHODS

Quality Function Deployment (QFD) is a structured method for listening to the customers and optimizing designs, materials and processes to ensure the customers’ expectations are best satisfied. Quality function deployment (QFD) is a method to transform user demands into design quality, to deploy the functions forming quality and to deploy methods for achieving the design quality into subsystems and component parts and ultimately to specific elements of the manufacturing process, as described by [43]. QFD is designed to help planners focus on characteristics of a new or existing product or service from the viewpoints of market segments, company, or technology-development needs. The technique yields graphs and matrices. QFD helps transform customer needs (the voice of the customer [VOC]) into engineering characteristics (and appropriate test methods) for a product or service, prioritizing each product or service characteristic while simultaneously setting development targets for product or service. The present study focus the customers demand (students perceptions about teaching quality) and its relationship with teachers requirements from the institution. Data is collected through the feedback of questionnaire filled by the five hundred students and five hundred teachers of different universities of Pakistan. Students requirement are categorized as:

- Knowledge
- Use of instructional material
- Practical skills
- Appreciation
• Motivation from teacher
• Practical experience
• Opportunity
• Self regulated learning
• Feed back
• Teacher personality

While Teachers Requirements are categorized though:

• Knowledge
• Communication skills
• Performance evaluation
• Course Development
• Learning Environment
• Work load
• Encouragement
• Flexible working
• Methodology
• Quality Standards

On the basis of students and teachers requirement, the present study develops a framework of house of quality.

RESULTS AND DISCUSSIONS

The following steps are used to construct house of quality i.e.,

Table 1: Demanded Quality from Customers

<table>
<thead>
<tr>
<th>Demanded Quality (a.k.a. “Customer Requirements” or “Whatis”)</th>
</tr>
</thead>
<tbody>
<tr>
<td>knowledge</td>
</tr>
<tr>
<td>use of instructional material</td>
</tr>
<tr>
<td>practical skills</td>
</tr>
<tr>
<td>appreciation</td>
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<tr>
<td>motivation from teacher</td>
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<tr>
<td>Practical experience</td>
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<td>opportunities</td>
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<td>self regulated learning</td>
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<tr>
<td>feed back</td>
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<tr>
<td>teacher personality</td>
</tr>
</tbody>
</table>

Table 2: Customer Rating

<table>
<thead>
<tr>
<th>Row</th>
<th>#</th>
<th>Mat Relationship</th>
<th>Row Value</th>
<th>Row Weight</th>
<th>Weight Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>9</td>
<td>9.9</td>
<td>6.2</td>
<td>knowledge</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>9</td>
<td>9.2</td>
<td>6.4</td>
<td>use of instructional material</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>10.9</td>
<td>10.9</td>
<td>7.6</td>
<td>practical skills</td>
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<tr>
<td>4</td>
<td>4</td>
<td>10.0</td>
<td>10.0</td>
<td>7.0</td>
<td>appreciation</td>
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<tr>
<td>5</td>
<td>5</td>
<td>10.3</td>
<td>10.3</td>
<td>7.2</td>
<td>motivation from teacher</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>10.0</td>
<td>10.0</td>
<td>7.0</td>
<td>infrastructure</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>10.3</td>
<td>10.3</td>
<td>7.2</td>
<td>opportunities</td>
</tr>
<tr>
<td>8</td>
<td>8</td>
<td>3.2</td>
<td>3.2</td>
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<td>self regulated learning</td>
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<td>9</td>
<td>9</td>
<td>10.3</td>
<td>10.3</td>
<td>7.2</td>
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<tr>
<td>10</td>
<td>10</td>
<td>10.3</td>
<td>10.3</td>
<td>7.6</td>
<td>teacher personality</td>
</tr>
</tbody>
</table>

Table 3: Customer’s Competition

<table>
<thead>
<tr>
<th></th>
<th>CUST</th>
<th>Iqra University</th>
<th>BUITEMR</th>
<th>Jubail University</th>
<th>Qassim University</th>
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<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>1</td>
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Step 1: Customer Requirement: The first step in QFD is to analyze the customers and develops the questionnaire regarding teachers which is considered as a technical expert and student as customer requirement. Following information is gathered from the customers by distributing these questionnaires which shown in QFD matrix 1.

Step 2: Data Gathering from Customers: The questionnaires were distributed among students from Engineering and management departments of different universities. A total of 500 questionnaires were found to be complete and valid for analysis from the student side.
Table 4: Relationship Matrix Symbols

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Commercial Skills</th>
<th>Perception Evaluation</th>
<th>Course Evaluation</th>
<th>Teaching Method</th>
<th>Environment</th>
<th>Reinforcement</th>
<th>All around</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>★★★★★</td>
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<td>★★★★</td>
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Table 5: Correlation matrix scale and symbols used

<table>
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<tr>
<th>Description</th>
<th>Scales</th>
<th>Symbols</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong positive correlation</td>
<td>0.5--1</td>
<td>++</td>
</tr>
<tr>
<td>Positive correlation</td>
<td>0--0.5</td>
<td>+</td>
</tr>
<tr>
<td>Negative correlation</td>
<td>-0.5--0</td>
<td>-</td>
</tr>
<tr>
<td>Strong negative correlation</td>
<td>-1-- -5</td>
<td>-5</td>
</tr>
</tbody>
</table>

Step 3: Sampling Technique: The present study used convenient sampling technique for data gathering and collecting response from students as well as teachers of different departments.

Step 4: Customer Rating: On a scale from 1-10, customers then rate the importance of each requirement. These scales will be used later in the relationship matrix, however, it depicts in Table 2.

Step 5: Customer’s Competition: In the next step of QFD process, customer rates their competition with the other universities which are shown in Table 3.

Step 6: Technical Descriptors - "Voice of the Teachers":
The study further develops the questionnaire for the technical descriptors to know their needs in order to measure the quality performance.

Step 7: Data Gathering from Technical Descriptors:
The questionnaires were distributed among Faculty. A total of 29 questionnaires were found to be complete and valid for analysis from the teacher.
Step 8: Relationship Matrix: The study determines the relationship between the variables on QFD matrix in terms of symbols which representing scales, then assign signs to them.

- Strong relation
- Medium relation
- Weak relation

Table 4 shows the symbols for relationship matrix.

Step 9: Organizational Difficulties: Rate the organizational difficulties that is basically ‘technical expert’ responses which ranges from 0 to 10.

Step 10: Correlation Matrix: In final step, the study calculates correlation coefficient between technical requirements. The description of correlation matrix is given in Table 5.

The most commonly used categories of ‘strong’, ‘medium’, ‘weak’ and no relationship with the values of 9, 3, 1 and 0 respectively were applied. In order to rank the specified enablers according to students and teachers. The importance rating given by each group were considered in the Table 6, the importance rating were multiplied by weight and accumulated to give an overall score for each process. The result of the QFD application shows very high score for 1st enablers; it can be attributed to the fact that knowledge is the most important aspect from the customer point of view for each process.

CONCLUSION

QFD is a useful technique for the improvements in quality in the manufacturing industry; however, it does not mean that its effectiveness can be neglected in the service industry as well. Modern research showed its effectiveness in the service industry. Higher education institutions have a concern with their quality improvement and these institutions are continuously looking new methodologies for the betterment of their teaching quality. The present study used QFD as a tool for improvement of teaching quality and also for the Benchmarking to improve their overall quality. QFD assessment showed the comparison of different universities in certain areas of their quality teaching. Result shows the area in which a university is performing best, so other universities can use this performance as a benchmark for their improvement in certain area.

REFERENCES
