

## A QFD Framework for Translating Customer Requirements into Key Operational Activities in Technical Education Sector

Somadatta B. Karanjekar  
Wainganga College of  
Engineering and Management,  
Nagpur 441108

Dr. Ramesh R. Lakhe  
Shreyas Quality Management  
System, Nagpur 440 010

Dr. Vishwas S. Deshpande  
Shri Ramdeobaba College of  
Engineering and Management,  
Nagpur 440 013

### Abstract

*This paper provides a general concept of service quality in technical education system and applications of Quality Function Deployment (QFD) in enhancing the quality by fulfilling customer requirements. It is also revealed that QFD is the most applicable technique for quality design, customer needs analysis and customer satisfaction. The traditional House of Quality (HOQ) is modified to fit the requirements of service sector, through three consecutive translations from service planning to process planning and to activity planning. A step-by-step scheme is presented for recognizing important applications & customers, identifying customers' requirements and prioritizing them. The process of translating of customer requirements into key managerial implications is also systematically mentioned.*

*Keywords: Service Quality, Technical Education, Quality Function Deployment, QFD, Voice Of Customers, House of Quality, Customer requirements identifications.*

### 1. Introduction.

This mushroom growth of the technical education instates in India is mostly in unplanned manner and has lead to other problems including faculty shortage, rising rate of unemployment, decline in standards and many more. It is imperative to look critically into the present continuing trends in technical education to ensure its quality and utility to face the challenges that the exciting 21st century will provide in the wake of globalization [25]. In current scenario the supply

of engineering seats is more than that of the demand and that is the reason more than two Lakhs of seats are vacant in the Engineering colleges all around the country ([www.myengg.com](http://www.myengg.com) and [www.successcds.net](http://www.successcds.net), last accessed on 27/09/2012); and viability of many engineering colleges is a big problem through out the country in almost all states. On the other hand various reports by reputed bodies and consultancies recently reveal following facts.

Only 25 % IT graduates readily employable: Nasscom

Newly hired engineering graduates in India lack skill sets: World Bank

Only one in ten students from Tier 2, 3 engineering colleges are readily employable: PurpleLeap survey

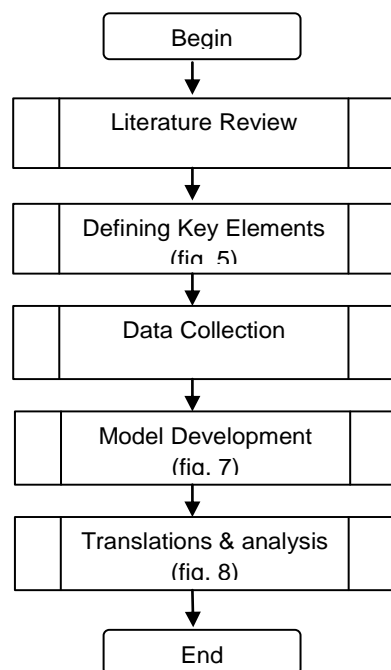
Lack of practical experience among job applicants is a big worry for engineering companies: Institution of Engineering and Technology

At least 83% of engineering graduates in our country are unfit for employment. Merely 4.22% of engineering graduates are employable in product companies and only 17% in IT services: 2011 National Employability Report by aspiring minds

Weak quality-assurance structures, especially accreditation procedure; and lack of cooperation and interaction between industry and the classroom are major problems of engineering education in india: The U. R. Rao Committee Report, established by Ministry of HRD, Govt. of India

Moreover, there has been overall dissatisfaction about the academic standards, administration, operations, course delivery, facilities provided and training & placement of these institutes amongst the

students, faculties, parents, industry and society in general. In spite of the best efforts by the permission granting and recognizing agencies like AICTE, Directorate of Technical Education (DTE) and University through various norms and standards the quality of technical education does not seem to be improving. Also, there is a huge investment made by the organizations to run these Institutes, and many institutes have poor response from the students, which is causing frustration amongst the management of technical education institutes.



**Figure 1: Flow chart for research process**

One of the reasons for this is the development of whole technical education system without active participation of its stakeholders such as students, teaching staff, non teaching staff, parents, industry, society, etc. This paper aims to provide a model using the voice of customers (VOC) through the application quality function deployment (QFD) to prepare the operational strategies for managing the technical education Institutes to overcome the above said problems.

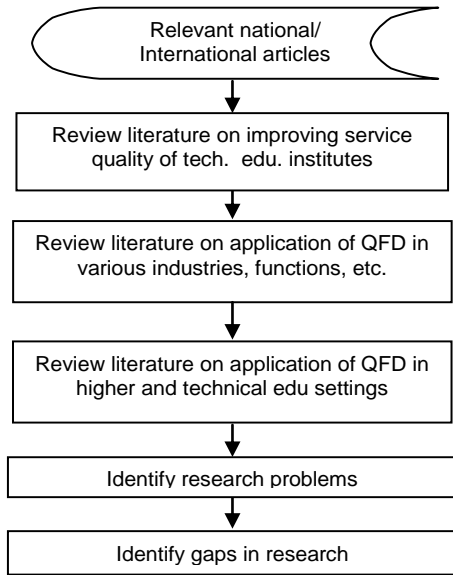
The concepts and principles of quality management, which are effectively used in today's

competitive production and business environments, have become indispensable in today's business of higher education [13]. There is a strong correlation between a country's competitiveness and the quality of higher education provided within that country [2]. Today's most advanced economies are based on the greatest availability of knowledge. Comparative advantage is increasingly determined by the competitive use of knowledge and of technological innovations. This centrality makes of knowledge a pillar of the wealth and power of the nations [3].

Service quality may be viewed from three perspectives: the performance of the product, behavior of service provider's personnel and attitude of customers [20]. To improve service quality of education service sector is utmost important for the overall development of an individual stakeholder, society and the nation. Various techniques like SERVQUAL [1], TQM [16], QFD [13], six sigma [23], ISO [27], and Academic Quality Improvement Program (AQIP) [9] are used in higher education system for its quality improvement.

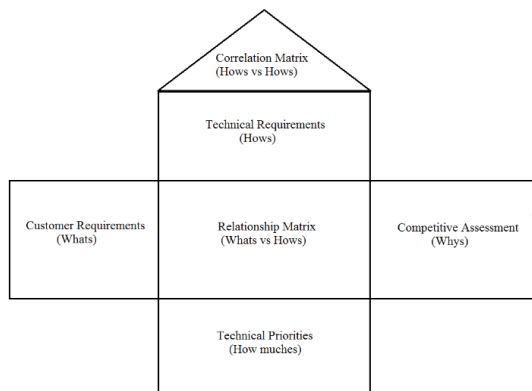
### What is QFD

QFD is a method used to translate customer requirements and expectations into product or service attributes and quality [24]. The approach is used for planning products and services, which is a process starting with the voice of the customer. The methodology was introduced in Japan and was developed at Mitsubishi's Kobe Shipyard in 1972 [15]. The QFD process is a sequence of activities for processing customer values so that these values can directly shape the design and production of the product or service. The fundamental steps of this process are: (1) to identify the customer; (2) to identify what the customer wants; and (3) how to fulfill what the customers want [22]. The QFD process determines and prioritizes customer values so that the voice of the customer can direct the design of the product or service. The QFD process involves a cross-functional team that works to define the customer, and the customer's wants – the 'whats'. Next, the team determines the 'hows' – the mechanisms to satisfy the customer's wants. Finally, the team determines the relationships between these 'whats' and 'hows' and assigns value weights to each using a matrix known as a 'house of quality (HOQ)' [22].



**Figure 2: Literature review sub process flow chart**

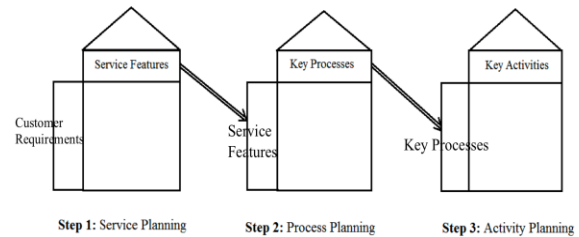
The common format of HOQ is made up of six components as shown in figure 3. These include customer requirements (whats), technical requirements (Hows), competitive assessment (whys), relationship matrix (whats vs Hows), correlation matrix (Hows vs Hows), and technical priorities section (How much) [5]; [14]. Application of QFD requires: (1) a cross-functional team; (2) the QFD process itself, and; (3) the visual matrix that guides the process [21]. QFD is not only a technical tool, but also a managerial philosophy that can help enhance the organizational and managing effects [5].



**Figure 3: House of Quality**

**Applications of QFD in Service Sector**

QFD has been introduced successfully to the service sector. The reported implementations are in various service area such as healthcare [4]; [19], public sector [7]; [11], [28]; [8], retail [29]; [26], spectator event [10], technical libraries and information services [6], education [17]; [18] and e-banking [12] 2004) etc.



**Figure 4: House to house translation for adopted QFD methodology**

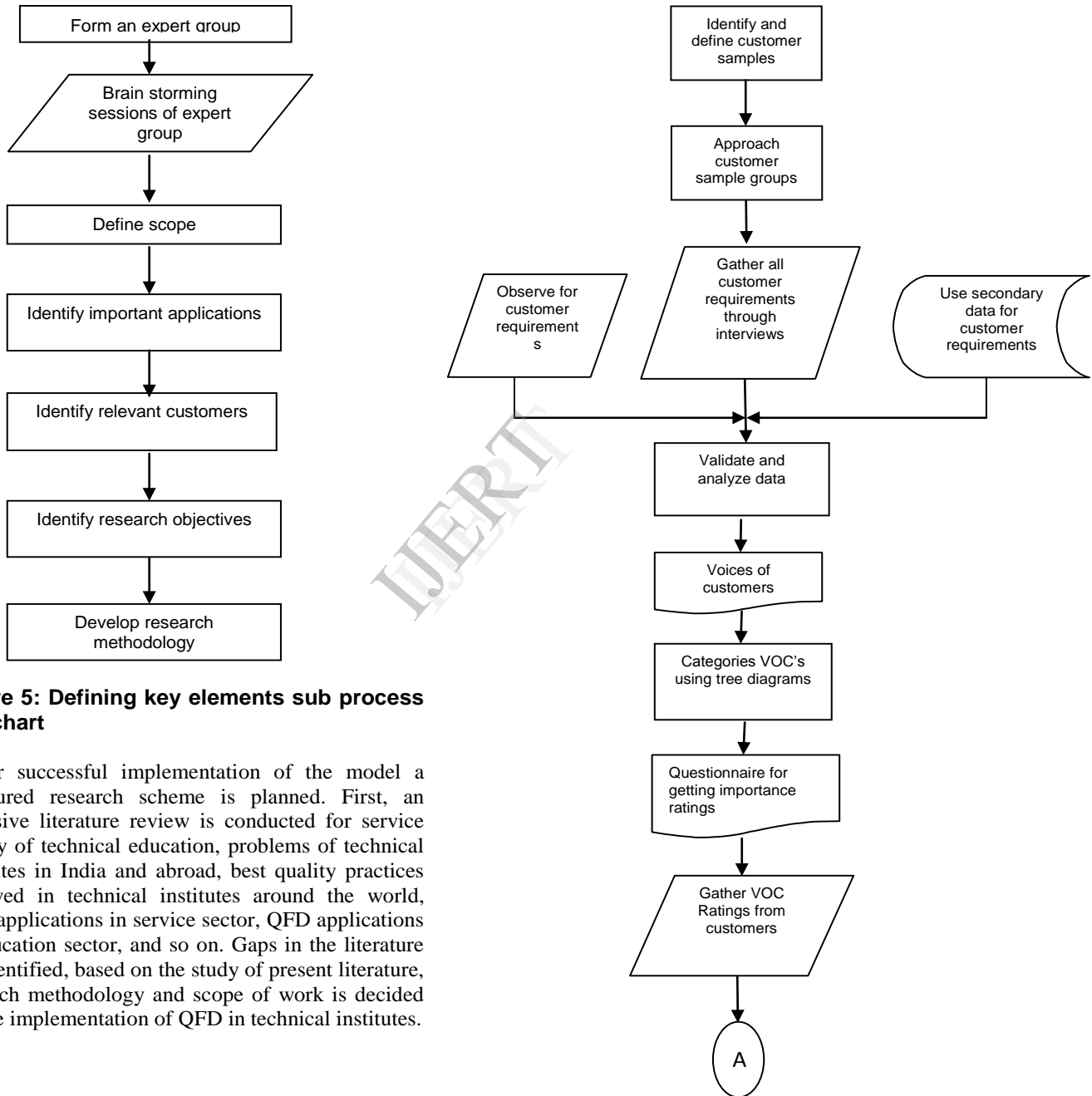
The modified methodology for service sector is three phased and service based. Figure 4 shows the adapted model involving three phases: service planning, process planning, and activity planning.

Phase I (service planning). This phase corresponds to “product planning” of the manufacturing-based QFD. Customer requirements are first identified then related to service feature.

Phase II (process planning). This phase corresponds to “parts planning” of the manufacturing-based QFD and links the service features identified in Phase I to Key process operations.

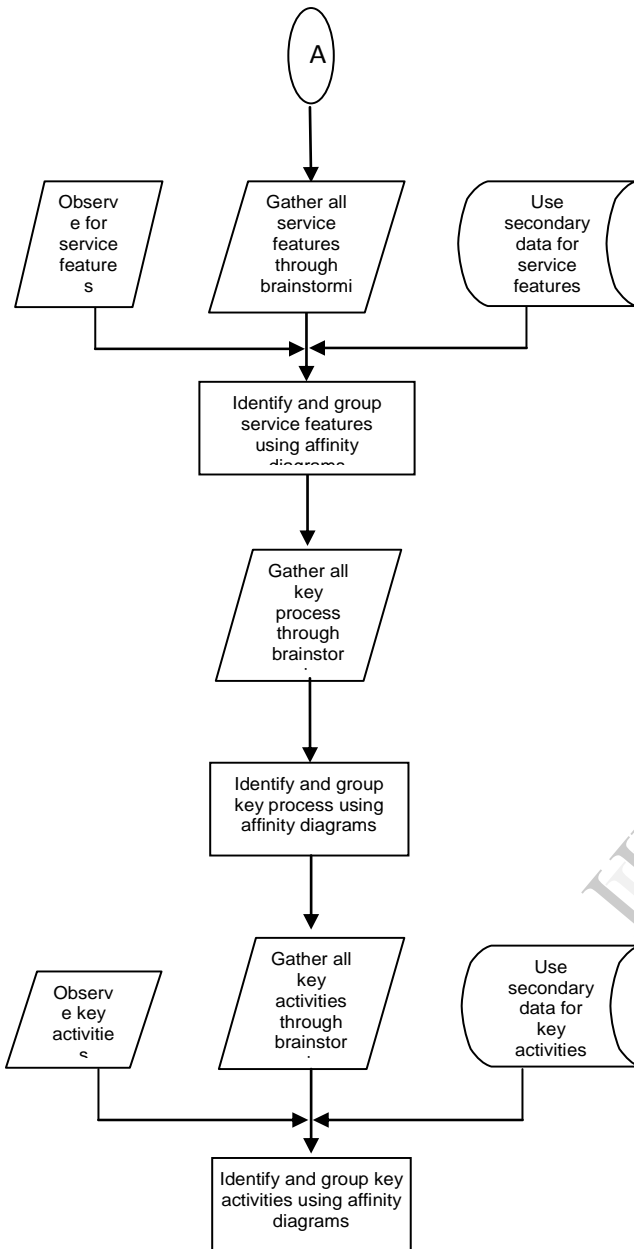
Phase III (activity planning). This phase corresponds to “production planning” of the manufacturing-based QFD and links key process operations to key activities to be performed.

**Application of QFD in technical education**



**Figure 5: Defining key elements sub process flowchart**

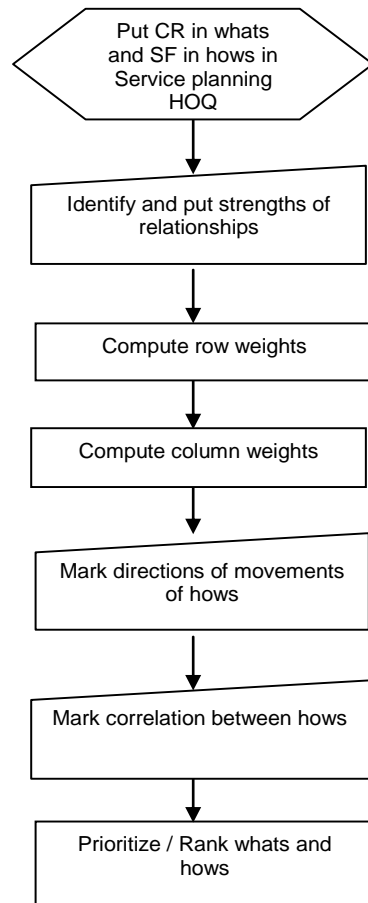
For successful implementation of the model a structured research scheme is planned. First, an extensive literature review is conducted for service quality of technical education, problems of technical institutes in India and abroad, best quality practices followed in technical institutes around the world, QFD applications in service sector, QFD applications in education sector, and so on. Gaps in the literature are identified, based on the study of present literature, research methodology and scope of work is decided for the implementation of QFD in technical institutes.



**Figure 6: Data collection sub process flow chart**

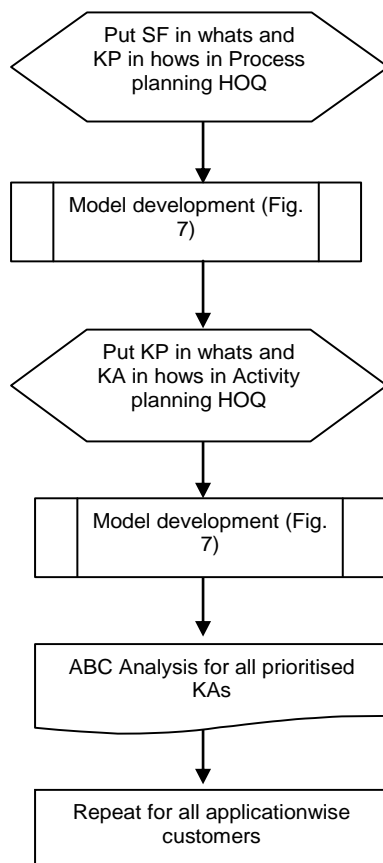
Then expert group members and expert group moderator are decided; and they are interviewed for getting inputs regarding important applications and important customers in technical institutes. Three important applications can be academic monitoring, course content and delivery, error free administration,

good placements, etc. Important relevant customers were can be students, teaching staff, non-teaching staff, parents, regulatory bodies and industry. Then, the research problems and research objectives are decided. Customers are identified and their sample sizes are decided. Inputs regarding customer’s requirements are gathered from interview of these customers and from other secondary sources. These customer requirements are called as voice of customers and the data hence gathered were validated and analyzed. Genuine needs are retained over unnecessary wants. The VOC hence gathered are categorized using tree diagrams. Then a questionnaire was designed to get the importance ratings of VOC as compared to each other.



**Figure 7: Model development sub process flow chart**

After brainstorming various design specifications in terms of service features are identified and they are grouped using affinity diagrams. Then the strength of relations between service elements and VOC are identified, and mentioned using weighted graphical symbols. Row weights and column weights are then calculated. Further, the directions of movement of service features are mentioned. The correlation between each service feature is then mentioned at the roof of House of Quality (HOQ). Service features and VOC are then prioritized. This HOQ is called as service planning.



**Figure 8: Translations and Analysis sub process flow chart**

Service features are then translated to second HOQ, and after discussions and brainstorming key processes are identified and second HOQ process planning is built. Then key processes are translated to

third HOQ, and key activities were identified to build third HOQ activity planning. Hence we get exactly 'what to carry out' in terms of key activities or actions. This process is repeated for other applications. The system is also set to continuous improvement, by deciding the frequency of QFD applications and review.

## 2. Conclusion.

In this paper, concepts of service quality, and implementation of QFD for improving the service quality of education system are studied thoroughly. Gathering voice of customer is a very important task in QFD implementations. QFD methodology and its proposed model for implementation in education sector is also discussed in detail. It is also found that QFD has played a vital role in identifying true customer requirements, prioritizing requirements and meeting the needs of all customers in order to achieve excellence in various fields and functions of businesses and also in different educational settings across the world.

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