SPCRD GLOBAL PUBLISHING Sustainable Solutions
READS Review of Economics and Development Studies
Journal homepage: http://reads.spcrd.org ISSN (Print): 2519-9692 ISSN (Online): 2519-9706

Enhancing the Academic Performance of Students: A Real-Life Application of Quality Function Deployment

[a] Zafar Iqbal, [b] Lubna Shoukat, [c] Muhammad Waheed, [d] Laraib Zafar

[a] Assistant Professor, Department of Statistics, The Islamia University of Bahawalpur
[b] Assistant Professor, Department of Educational Training, The Islamia University of Bahawalpur
[c] Assistant Professor, Department of Educational Training,The Islamia University of Bahawalpur
[d] (M.Phil Student) Department of Statistics, The Islamia University of Bahawalpur

ARTICLE DETAILS

History:
Accepted 14 May 2020
Available Online 15 June 2020

Keywords:
Secondary schools, Quality Education, Quality Function Deployment (QFD), House of Quality (HOQ), Voices of Students, Technical Solutions, Relationship Matrix

JEL Classification:
P36, I31

DOI: 10.47067/reads.v6i2.227

ABSTRACT

Quality Function Deployment (QFD) is a fastidious method to acclimatize what the customers wish to achieve and how their desiderata should be incorporated into final technical solutions. QFD as a structured approach is widely acknowledged; and has been adopted successfully in almost every field of knowledge and services like engineering, service quality, education quality, planning, decision making, etc. Students, through Education, internalize high level qualities of social and cultural importance, intellectual well-beings, emotionally stable and physically improved skills. Quality education refers to the level of accomplishment of these qualities. This paper addresses the Voices of Students (VOSs) (student's needs and demands) regarding their educational requirements at secondary school level. The objective is accomplished by recognizing significant VOSs; and then determining their Technical Solution called Solution of VOSs, (SVOSs) to resolve VOSs. Finally, the guideline for the SVOSs is provided addressing which SVOSs is most important and which one is least. The recommended methodology also provides a guideline for secondary schools to identify problems and their solution for improved standard and improved quality of education.

Corresponding author's email address: mwlubna@hotmail.com

1. Introduction

Education is believed to be the right of a person. In Islam, this right is emphasized in the first revelation received by the last Prophet Muhammad (PBUH) which starts from the word 'read'. The verse says "Recite in the name of your Lord who created man from a clinging substance. Recite, and your Lord is the most Generous - Who taught by the pen - Taught man that which he knew not!" (Quran 96:1-5 translated by Dr. Asad). Later, the mankind also learned that education was essential for everyone to bring about prosperity for every person in life, and in society on the whole.

The right to education of human being has been accepted and declared as an obligation by a number of international conventions including the International Covenant on Economic, Social and Cultural Rights (ICESCR). The Articles 13 of ICESCR emphasizes that "The States Parties to the present Covenant recognize the right of everyone to education" ("OHCHR | International covenant on economic, social and cultural rights," n.d.). The 14 of ICESCR states that the parties which are not been able to provide free compulsory primary education require "to work out and adopt a detailed plan of action for the progressive implementation" within two years ("OHCHR | International covenant on economic, social and cultural rights," n.d.). The Article 26 of the Universal Declaration of Human Rights adopted by United Nations **s**tates that "Everyone has the right to education ("Universal Declaration of Human Rights," n.d.). Education shall be free, at least in the elementary and fundamental stages". The 18th constitutional amendments in Pakistan adopted §25A which ensures 'Right to Education' "for all children of the age of five to sixteen years" ("Chapter 1: "Fundamental rights", n.d.).

Keeping in view the vital need of education, every country develop plans and systems for imparting quality education to its people so that their personalities may be developed in a way that they may be harmonized with the value system of the society. The formal education system of Pakistan consists of elementary education (primary up to 5^{th} grade and middle up to 8^{th} grade), secondary education (9^{th} and 10^{th} grade), higher secondary education or intermediate (11 and 12 levels), and then higher education. (Blood, 1994; Nordic Recognition Information Centres, 2006)

Education in Pakistan has various problems. How these problems can be resolved requires extensive research? One of these problems that how to enhance the academic performance of students is the main concern of every stakeholder of the education in Pakistan; and this is main focus of this research. A scientific way to resolve these problems is that if we know the problem from the right person. In the research under study, right persons are the student. QFD, as an extensive research methodology, helps us to know potential needs and demands of the students and also helps finding their solutions in a systematic way. In next sections, we provide literature review, description of the objectives of this study, methodology of to achieve these objectives and also, illustrate how each QFD methodology helps by explaining its various sections.

2. Literature Review

Quality Function Deployment (QFD), initially developed for a specific orientation, has now become a frequently used a methodology in a variety of fields that provides an extensive procedure of examining the problems of customers/users and leads to a systematic way in determining technical solutions for the improvement of quality of the product or services with less time and effort. Educational Practitioners and researchers have employed QFD to enhance the quality of teaching-learning process in educational institutions, quality of syllabus, management and administration of every level of the course of imparting education. For example, Abuzid (2017) conducted a research study by applying QFD methodology for the improvement of quality in Curriculum design and teaching strategies to meet the learners' needs by considering the point of views of relevant teachers, staff, and students for achieving the program's final goals. He concluded that the actual learning needs of students and related teaching policies indicated a perceptual gap with the eventual learning consequences. He suggested the need to reduce the gap between the educational services and actual learning needs of students.

Sahney et al. (2004) pointed out that educational institutes like other establishments also took into account the importance of consumers' expectations by adopting methodologies like Total Quality

Management (TQM) to achieve their goals of businesses. They (Sahney et al., 2004) used the QFD procedure to uncover the set of minimal layout of quality constituents that could fulfill the requirements of learners as consumers of the learning organization. Lee and Ko (2000) described the strategy formulated by the Vocational Training Council of Hong Kong Institute of Vocational Education; and suggested the structure that assimilated three extensively utilized deliberated implements of business administration collectively with the education. Hwarng and Teo (2001) demonstrated how an organization in higher education can apply the three-phased, service-based QFD methodology to translate the VOC. These steps included Service Planning in which the stakeholders' requirements (SRs) are related to service features; Process Planning that related with key processes (KP); and Activity Planning that is concerned with and translates to key activities, i.e., what is required to be done for the satisfaction of stakeholders' requirements (SRs).

Karanjekar (2019) used the Comprehensive Quality Function Deployment (CQFD) model that provides definite and systematic procedure of decision making to the management of the institutes which enables them to fulfill the expectations of the stakeholders and also facilitate them and, therefore, acts as good model to enhance the quality of the technical institutions. Chan et al. (2002) described how the QFD technique was used to progress a distance-learning program of government training organization in Hong Kong for junior staff in the clothing manufacturing industry. They (Chan et al., 2002 classified twelve suitable modules for amending the course content; and also categorizes help-offerings that assisted the learners to study the course. The assessment of the elements and help-offerings proved to be efficacious. Raharjo et al. (2007) conducted a research by using QFD and Analytical Hierarchy Process (AHP) to progress higher education quality. Their research described that it was imperative to know the nature of consumers and their interests in formulating the customer-driven strategies.

The preceding discussion proves that QFD along with some other suitable techniques have been used in the context of education. Therefore, this technique is applied to study the various aspects of education in Pakistan because it provides practical solution of the problems. The present study is one of those and is relevant to the academic performance of the secondary school students.

3. Objectives

The following are the objectives of this research work.

i. To investigate the Voices of Students (VOSs) (Students needs and demands) that they think contribute in enhancing their academic performance at secondary school level.
ii. To determine the Solutions of the explored Voice of Students (SVOS) or technical solutions (TSs) with the help of teachers, head of schools, owners of schools and educational experts.
iii. To prioritize these SVOSs by determining the order among these through a procedure specified by QFD.
iv. To make recommendations about SVOSs those come out as the most important ones and those which are of least consideration.

4. Methodology

In this article, Quality Function Deployment (QFD) method is adopted to address the issues related to the academic performance of secondary school students. QFD provides a technique that systematically analyses the Voice of Customers (VOC) and process those towards finding the SVOSs in order to improve the phenomenon under investigation. Chan & Wu (2002) explains that "QFD was originally proposed, through collecting and analyzing the voice of the customer, to develop products with higher quality to meet or surpass customer's needs" (P.467). The product development,

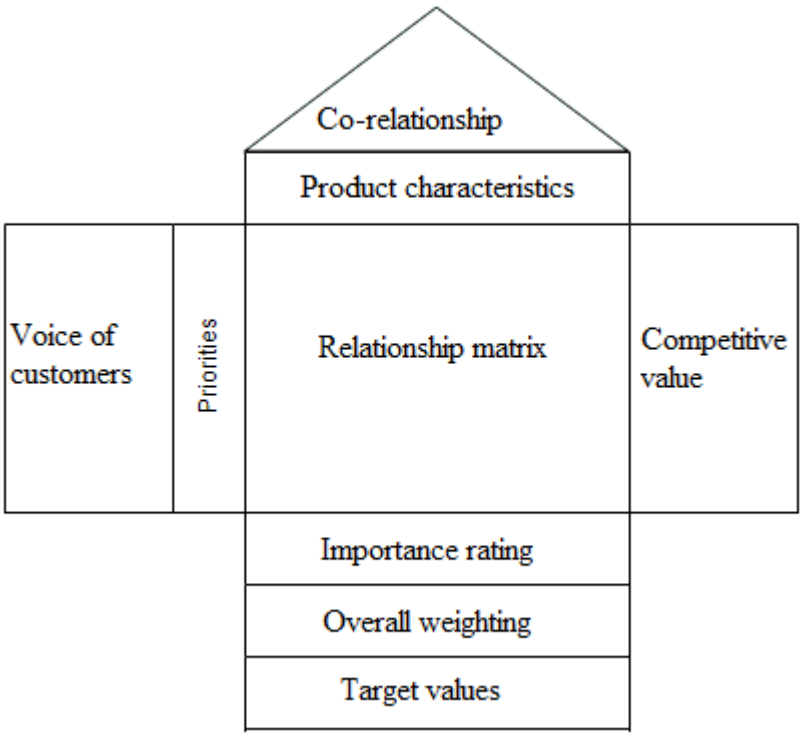
improvement and quality management are the fundamental concerns of QFD. However, its use has been expanded to almost every field of knowledge (Chan and Wu, 2002). QFD provides a statistical mechanism employed to transform attributes into quantitative values that can be easily applicable to improve any aspect under study like manufacturing (Tidwell & Sutterfield, 2012). Now, in the following section, we see various factors of QFD and their explanation as a methodology to achieve the objective of this research.

5. Quality Function Deployment (QFD) Factors and House of Quality (HOQ)

As a structured method, QFD uses techniques to identify customers' needs and expectations, and then prioritizes these needs and expectation effectively. House of quality that resembles the structure of a house, shown in Figure-1, is the central planning matrix of QFD methodology built to represent the customers' requirement and how these requirement be achieved (Bergquist and Abeysekera, 1996).

QFD leads to establish a "HOQ" that represents the reflection of customers' desires and wows which ultimately help producing improved products and services accordingly (Temponi et al., 1999). The different segments of QFD and their inter-relationships is diagrammed in the following figure 1.

Figure 1: Showing various sections of the most commonly used QFD-HOQ.



Each segment of HOQ has a specific role but also relates with the next segment or section and so gives a holistic picture for the development of the product and process of services as per needs and requirements of the respondents (customers).

6. Voice of customers (VOCs) Section: Voice of Students, (VOSs)

Voice of customer, here the Voice of students (VOSs), is the initial step in developing the HOQ under the format of QFD. The identification of customers' (secondary school students) needs, their structuring and then prioritization refer to as Voice of the customer (Griffin and Hauser, 1991). HOQ comprises of Voice of Customers (VOCs)- their importance ratings (I) and the associations between

them. VOCs (here VOSs) is the significant variable in HOQ. Customer needs are determined by asking them what they want to see in a product or service. The customer needs are evaluated by the relevant professionals of that specific field of the product or services, and then the technical solutions are developed trying to meet the customer demands or requirement developed from the VOC. Interviews and the focus groups are mainly used to collect the VOC on the basis of which questionnaire is developed that is used to conduct survey from relevant customers (Dias Júnior et al., 2020). 20-30 customers from a homogeneous population may be enough to search out customers' needs of 90% or more customers (Griffin & Hauser, 1991).

In course of conducting survey, the participants rate various aspects of the product or any service to be evaluated. The participants are also requested to weight each of the customer's consequences. From this data, a weighted rating can be calculated that help prioritizing the customers' consequences. (Sivaloganathan and Evbuomwan, 1997).

Literature review shows that the use of either three, five, seven, nine or ten points scales (Majid & David, 1994; Bouchereau & Rowlands, 2000). However, the scale of one to five point is thought more suitable because it discriminates evenly, where 1 represents very low importance and 5 represents very high importance (Sivaloganathan & Evbuomwan, 1997).

7. Technical Solutions (TSs) Section: Solution of Voice of Students (SVOS)

After figuring out the VOSs and establishing their importance ratings, the next process is to work out the Solution of the Voice of Students (SVOSs) that is the technical requirement to satisfy the VOCs. The SVOSs is the step towards achieving the satisfaction of customers (here the students) (Bouchereau & Rowlands, 2000). Each SOVS should satisfy at least one VOS (Hauser & Clausing, 1988). VOSs are considered a significant aspect of the QFD approach (Govers, 1996).

8. Relationship Matrix (RM), Section

Both VOSs and SVOSs are used to develop the Relationship Matrix (RM) consisting of a table of rows (VOSs) and columns (SVOSs). The RM indicates, the strength of relationship between every VOSs and the SVOSs and how this matrix contributes towards final decision (Han et al., 2001)

9. Determination of the Weighted Matrix

The following formula was used to compute the relative weight of each SVOS with its respective VOSs.

$$W_j = R_{i,j} * I_i , \qquad i = 1,2, \dots, r, \quad j = 1,2, \dots, c \qquad (1)$$

10. Determination of the Final Weights of SVOSs

There is no single method mentioned in the literature to determine the final weights of SVOSs. The final weights in this study were calculated by using the following equation (Jeong & Oh, 1998; Iqbal, et al., 2014)

$$FW_j = \sum_{i=1}^{r} R_{ij} * I_i \qquad i = 1,2, \dots, r, \quad j = 1,2, \dots, c \qquad (2)$$

Here 'FW' represents the Final Weight of SVOSs, '*R*' represents Relationship Matrix, '*I*' represents the customer priority rating, 'i' is the number of Voice of Student and 'j' is the number of SVOSs.

11. Procedure

Following the above organized step of QFD methodology, the procedure of this study is explained in the

following.

- Identification of the quality (on the basis of needs and expectations) required by consumers as Voice of Students (VOSs).
- The importance for each VOS is scaled from 1 to 5. 1 means very low importance and 5 means highly important.
- The degree of importance and verification of each VOS is calculated.
- Deciding upon the solution (SVOS) for each VOS by teachers, stakeholder, education experts etc.
- Developing the relationship Matrix by determining the strength of relationship of every SVOS with VOS.
- The weighted-matrix was found by multiplying each of VOS importance rating with each of RM ratings by using equation 1.
- Final weights and ranking SVOS were determined by using equation 2.

The population of this study was secondary school students taken from the secondary schools of Bahawalpur City. Out of 38 schools, 8 schools were selected randomly. A sample of 400 students was taken on the basis of availability of students and their consent of being the part of this study as respondent. In this way, their personal willingness was thought to be valuable in collecting valid data.

12. Data and its Explanation: Application of the Developed Methodology

A preliminary survey was conducted to collect all possible needs and demands of the secondary school students as respondents (or typically the customers). The following VOSs were finalized along with their importance ratings. Importance ratings were determined on ordinal rating scales from one to five.

Table 1: Shows the Voice of Students, (VOSs) and their ratings

Voice of Students (VOSs)	Importance Ratings
Fix timing for studies	4.65
Teachers' role in academic performance	4.54
Excursion tour/picnic	3.55
Special Place for studies	4.18
Extra-Curricular Activities	3.71
Limited students' strength in class	3.96
Punctuality of teachers in class	4.69
Qualification and skills of teachers	4.73
All students treated equally by teachers	4.73
Interest developed in studies by teachers	4.54
Practical implementation by Models	4.07
Monthly parents teacher meeting	4.08

After finalizing the VOSs, and then holding the meetings with teachers, head of institutes, owners of institutes and parents of students as stakeholders, following SVOS were finally determined.

Table 2: Shows Solution of the Voice of Students, (SVOSs).

Followed Proper time table by teachers
Teachers inspiration
Arranged tours/picnics by institutes
Library/ Computer labs
Teachers arranged extra-curricular activities
Students more than 20 then make section
Checked through Technical devices
Hired qualified teachers
Conduct trainings for teachers by institute
Teacher equally treat all students
Teachers behavior
Conducted weekly or monthly test
Conducted practical practice of subjects
Meeting hours provided to parents

In the next phase, RM was developed by considering each of the SVOS and its degree to resolve each of the VOS on a rating scale of zero to seven. Zero expresses no role or involvement to resolve while seven mean highest involvement to resolve the VOS.
The following table-3 explains the strength of each of the SVOS relative to each of VOSs.

Table 3: Shows the strength of VOSs with each of the SVOSs.

Technical Requirements / Students Requirements	Ratings	Followed Proper time table by teachers	teachers inspiration	Arranged tours/picnics by institutes	Library/ Computer labs	Teachers arranged extra-curricular activities	Students more than 20 then make section	Checked through Technical devices	Hired qualified teachers	Conduct trainings for teachers by institute	Teacher equally treat all students	Teachers behavior	Conducted weekly or monthly test	Conducted practical practice of subjects	Meeting hours provided to parents
Fix timing for studies	4.65	5	0	0	0	0	0	6	0	0	0	0	0	0	0
Teachers' role in academic performance	4.54	0	5	0	0	0	0	0	0	0	0	5	6	0	0
Excursion tour/picnic	3.55	0	0	6	0	5	0	0	0	3	0	0	0	3	0
Special Place for studies	4.18	0	0	0	6	0	0	0	0	0	0	0	0	0	0
Extra-Curricular Activities	3.71	0	0	0	0	6	0	0	0	0	0	0	0	0	0
Limited students' strength in class	3.96	0	0	0	0	0	5	0	0	0	0	0	0	0	0
Punctuality of teachers in class	4.69	7	0	0	0	0	0	6	0	0	0	0	0	0	0
Qualification and skills of teachers	4.73	0	0	0	0	0	0	0	7	6	0	0	0	0	0
All students treated equally by teachers	4.73	0	0	0	0	0	0	0	0	0	6	5	0	0	0
Interest developed in studies by teachers	4.54	0	0	0	0	0	0	0	0	0	0	6	0	0	0
Practical implementation by Models	4.07	0	0	0	0	0	0	0	0	0	0	0	0	6	0
Monthly parents teacher meeting	4.08	0	0	0	0	0	0	0	0	0	0	0	0	0	5

Now using VOSs, Importance Ratings and SVOS relationship matrix strength rating, the weighted matrix by using equation 1 was determined. This weighted matrix (Table: 4) represents total strength of the each VOS with respect to each of the SVOS.

Table 4: Shows the House of Quality with Final Weights of SVOS

Technical Requirements / Students Requirements	Ratings	Followed Proper time table by teachers	teachers inspiration	Arranged tours/picnics by institutes	Library/ Computer labs	Teachers arranged extra-curricular activities	Students more than 20 then make section	Checked through Technical devices	Hired qualified teachers	Conduct trainings for teachers by institute	Teacher equally treat all students	Teachers behavior	Conducted weekly or monthly test	Conducted practical practice of subjects	Meeting hours provided to parents
Fix timing for studies	4.65	5	0	0	0	0	0	6	0	0	0	0	0	0	0
Teachers' role in academic performance	4.54	0	5	0	0	0	0	0	0	0	0	5	6	0	0
Excursion tour/picnic	3.55	0	0	6	0	5	0	0	0	3	0	0	0	3	0
Special Place for studies	4.18	0	0	0	6	0	0	0	0	0	0	0	0	0	0
Extra-Curricular Activities	3.71	0	0	0	0	6	0	0	0	0	0	0	0	0	0
Limited students' strength in class	3.96	0	0	0	0	0	5	0	0	0	0	0	0	0	0
Punctuality of teachers in class	4.69	7	0	0	0	0	0	6	0	0	0	0	0	0	0
Qualification and skills of teachers	4.73	0	0	0	0	0	0	0	7	6	0	0	0	0	0
All students treated equally by teachers	4.73	0	0	0	0	0	0	0	0	0	6	5	0	0	0
Interest developed in studies by teachers	4.54	0	0	0	0	0	0	0	0	0	0	6	0	0	0
Practical implementation by Models	4.07	0	0	0	0	0	0	0	0	0	0	0	0	6	0
Monthly parents teacher meeting	4.08	0	0	0	0	0	0	0	0	0	0	0	0	0	5
		22	0	0	0	0	0	28	0	0	0	0	0	0	0
		0	22	0	0	0	0	0	0	0	0	23	26	0	0
		0	0	22	0	18	0	0	0	12	0	0	0	11	0
		0	0	0	23	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	23	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	20	0	0	0	0	0	0	0	0
		33	0	0	0	0	0	29	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	33	27	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	30	24	0	0	0
		0	0	0	0	0	0	0	0	0	0	25	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	23	0
		0	0	0	0	0	0	0	0	0	0	0	0	0	22
Final Weights		**55**	**22**	**22**	**23**	**41**	**20**	**57**	**33**	**39**	**30**	**71**	**26**	**34**	**21**

Table 5: Shows the Final Weights of Solution of the Voice of Students, (SVOSs).

Solutions of Students Requirements	Followed Proper time table by teachers	Teachers inspiration	Arranged tours/picnics by institutes	Library/ Computer labs	Teachers arranged extra-curricular activities	Students more than 20 then make section	Checked through Technical devices	Hired qualified teachers	Conduct trainings for teachers by institute	Teacher equally treat all students	Teachers behavior	Conducted weekly or monthly test	Conducted practical practice of subjects	Meeting hours provided to parents
Final Weights	**55**	**22**	**22**	**23**	**41**	**20**	**57**	**33**	**39**	**30**	**71**	**26**	**34**	**21**

Table 6: Shows the Final Weights of SVOSs with their respective ranking.

Solutions of Students Requirements	Followed Proper time table by teachers	Teachers inspiration	Arranged tours/picnics by institutes	Library/ Computer labs	Teachers arranged extra-curricular activities	Students more than 20 then make section	Checked through Technical devices	Hired qualified teachers	Conduct trainings for teachers by institute	Teacher equally treat all students	Teachers behavior	Conducted weekly or monthly test	Conducted practical practice of subjects	Meeting hours provided to parents
Final Weights	**55**	**22**	**22**	**23**	**41**	**20**	**57**	**33**	**39**	**30**	**71**	**26**	**34**	**21**
Ranking	**3**	**11**	**11**	**10**	**4**	**13**	**2**	**7**	**5**	**8**	**1**	**9**	**6**	**12**

13. Discussions and Conclusion

The final results show that 'Teaching Behavior' is most important SVOSs with final weight of 71 while 'Checked through Technical devices' is the second most important SVOSs with final weight 57. On the other hand, 'Students more than 20 then make section' is the least important SVOS (Table-6). In the VOS section (table-1), we see both 'Qualification and skills of teachers' and 'All students treated equally by teachers' has the highest importance rating, of 4.73, and 'Punctuality of teachers in class ' is the second highest important VOS with importance rating of 4.69. On the other hand 'Excursion tour/picnic' and 'Extra-Curricular Activities' is the least important VOSs with importance ratings, 3.55

and 3.71 respectively.

In this article, how needs and demands of customers (students) related to a problem can be defined analytically, and then how these complications can be resolved by substantiating their technical solutions. This case study to improve the performance of students of secondary level of government is a model study and provides way to improve other dimensions of educational institutes. Implementation of the findings of this research may contribute to improve the academic performance of secondary school students because the findings are based on the views of students who are the real and direct stakeholder-a real-life application

References

Abuzid, H. F. T. (2017). Applying QFD tools for Quality Improvements in Curriculum Design and Teaching Strategies to meet with the Customer (Learner) Needs. Journal of Engineering and Applied Sciences, 12 (3), 684-690.

Bergquist, K., & Abeysekera, J. (1996). Quality function deployment (QFD) — A means for developing usable products. International Journal of Industrial Ergonomics, 18(4), 269-275.

Bouchereau, V., & Rowlands, H. (2000). Methods and techniques to help quality function deployment (QFD. Benchmarking: An International Journal, 7 (1), 8-20.

Chan, K., Chan, S. F., and Chan. C. (2002). Applying QFD in the clothing manufacturing sector: a case study on improving a distance-learning program in Hong Kong. Managerial Auditing Journal 17(1), 86-91.

Chan, Lai-Kow and Wu , Ming-Lu. (2001). Quality function deployment: A literature review. European Journal of Operational Research,143(3), 463–497

Chapter 1: Fundamental rights of part II: Fundamental rights and principles of policy. (n.d.). The Constitution of Pakistan on pakistani.org.
https://www.pakistani.org/pakistan/constitution/part2.ch1.html

Clausing, D., and Hauser, J. R. (1988). The house of quality. Harvard Business Review, 1-13.

Dias Júnior, A. F., Andrade, C. R., Milan, M., Brito, J. O., Andrade, A. M., &Souza, N. D. (2020). Quality function deployment (QFD) reveals appropriate quality of charcoal used in barbecues. Scientia Agricola, 77(6).

Griffin, A. & Hauser, R.J.(l991). The voice of the customer. Cambridge: Massachusetts Institute of Technology. MA 02139-4307.

Govers, C. P. M. (1996). What and how about quality function deployment (QFD). International Journal of Production Economics, 46(47), 575-585.

Han, Chen, S. K., Ebrahimpour, M. & Sodhi, M. S. (2001). A conceptual QFD planning model. International Journal of Quality & Reliability Management, 18 (8), 796-812.

Hwarng, H.B. and C. Teo (2001). Translating customer's voices into operations requirements-A QFD application in higher education. International Journal of Quality and Reliability Management 18(2), 195-225.

Iqbal, Z., et al. (2014). Statistical comparison of final weight scores in quality function deployment (QFD) studies. International Journal of Quality and Reliability Management, 31(2), 184-204.

Jeong, M. and Oh, H. (1998). Quality function deployment: an extended framework for service quality and customer satisfaction in the hospitality industry. International Journal of Hospitality Management, 17 (4), 375-390.

Karanjekar, S., Lakhe, R., & Deshpande, V. (2019). A comprehensive quality function deployment model for improving academics of technical institutes. International Journal of Electrical Engineering & Education, DOI- 0.1177/0020720919833053

Lee, S.F. and A. S. O. Ko (2000). Building balanced scorecard with SWOT analysis, and implementing

Sun Tzu's The Art of Business Management Strategies on QFD methodology. Managerial Auditing Journal, 15(1), 68-76.

Majid, J., & David, R. (1994). Total quality management applied to engineering education. Quality Assurance in Education, 2 (1), 32-40.

Nordic Recognition Information Centres. (2006). Report on the System of Education in Pakistan NORRIC. https://norric.org/files/education-systems/Pakistan-2006.pdf

OHCHR | International covenant on economic, social and cultural rights. (n.d.). United Nations Human Rights:office of the high commissioner.
https://www.ohchr.org/EN/ProfessionalInterest/Pages/CESCR.aspx

Blood, Peter (ed.).(1994). Pakistan: A Country Study. Washington: GPO for the Library of Congress.
http://countrystudies.us/pakistan/42.htm

Raharjo, H., et al. (2007). A methodology to Improve Higher Education Quality using the Quality Function Deployment and Analytic Hierarchy Process. Total Quality Management and Business Excellence, 18(10), 1097-1115.

Sahney, S., et al. (2004). A SERVQUAL and QFD approach to total quality education: A student perspective. International Journal of Productivity and Performance Management 53(2), 143-166.

Sivaloganathan, S., & Evbuomwan, N. (1997). Quality function deployment-The technique: State of the art and future directions. Concurrent Engineering, 5(2), 171-181.

Temponi, C., Yen, J. & Amos Tiao, W. (1999). House of quality: A fuzzy logicbased requirements analysis. European Journal of Operational Research, 117(2), 340-354.

Tidwell, A. & J. S. Sutterfield (2012). Supplier selection using QFD: a consumer products case study. International Journal of Quality and Reliability Management, 29(3), 284-294.

Universal Declaration of Human Rights. (n.d.).
https://www.ohchr.org/EN/UDHR/Documents/UDHR_Translations/eng.pdf