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QFD METHODOLOGY APPLICATION TO VOCATIONAL TRAINING CENTRES: A CASE STUDY

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ABSTRACT

The main population of the stakeholders comprised of students, faculty members, industry people, alumni, parents and members of the society. Based on the data collected from stakeholders needs and expectations of the specific customers for vocational training were assessed and finally the customer's needs were prioritized and analyzed through QFD technique. For the statistical data analysis, the study used the SPSS software package. The results of the study showed that the QFD technique can be used to develop better understanding of the needs in order to improve, not only all levels of higher educational activities, but also all similar levels of vocational education and training activities. This would help the educational planners and administrators in redesigning the education and training system from program design, to curriculum, to the satisfaction of students. Result of the present study indicated most important needs as Training of faculty in industry, Adequate machinery and tools, No administrative work to teachers, Industry sponsored training to students, and Regular craft instructors with the top ranking needs and least important needs as Up gradation of instructors with increased qualifications, online admissions and Increased pay scales for instructors. Statistical analysis based on t-test (paired) was employed to understand statistically significant difference in opinions of different stakeholders. In majority of the needs, the stakeholders were all emerge to have same opinions. These results have been discussed and final conclusions based on these results were drawn. Finally scope for future work is presented. It is observed that there are two potential beneficiaries of the present study, including permission granting and recognizing agencies of vocational education and vocational education stakeholders. The present study can support ITI management in analyzing their strengths and weaknesses, and also help in identifying the opportunities and threats against the competing systems.

KEYWORDS: Quality Function Deployment, Voice of the Customer, Vocational Education.

INTRODUCTION

Academic institutions offering higher education are undergoing a process of change similar to what business organizations have undergone a few decades ago when they were confronted by competition. Demands from industry, information-age mind set of the students, increased competition and the renewed quest among academic community are some of the factors driving this change. To ensure that higher education is able to deal with market and technological changes coupled with global requirements, it is important for institutions offering higher education to use appropriate curricula, course materials and teaching methodologies that are not only up-to-date, but also effective from learner's point of view. The exponential growth of knowledge, exploding instructional technologies, enhanced access to practices of premier institutions, accessibility to knowledge, globalization of education etc require educators and faculty members to continuously evaluate themselves and improve upon their effectiveness (Sudha, 2013).

The present study is an effort to find the expectations of the stakeholders of Vocational Training particularly Industrial training Institutes (ITIs) by using Quality Function Deployment (QFD) which is a Total Quality Management tool that can be used for this purpose. QFD is a planning tool used to fulfill customer expectations. It focuses on customer expectations or requirements, often referred to as the voice of the customer (VOC). It is a management tool in which customer expectations are used to drive the product development process. By implementing QFD, an organization is guaranteed to implement the voice of the customer in the final product (Jnanesh & Hebbar, 2008). Total Quality Management has been used successfully in a variety of organization viz., health care organizations, government

agencies, educational institutes, banks, library, transportation facility etc. To serve the interest of the stakeholders, institutes realize the importance of TQM principles.

In this current era of globalization customers look for the standards and environment which will satisfy their needs. Quality movement in almost every country usually starts with quality improvement projects at manufacturing companies. TQM spreads later to service companies such as banks and insurance companies, and eventually to nonprofit organizations such as health care, government, and educational institutions.

Application of principles of TQM in Higher Education has been used to achieve excellence. Universities around the globe have improved the quality of their products and services by applying Total Quality Management. However the application of QFD in vocational training appears to have been employed to a limited extent only. This study is an effort to use the voice of customers (VOC) through the application of Quality Function Deployment (QFD) to fulfill customer expectations and hence to improve the effectiveness of Vocational Training in Industrial Training Institutes (ITIs).

LITERATURE REVIEW

According to a recent study conducted by the Associated Chambers of Commerce and Industry of India (ASSOCHAM), there will be a deficit of 40 million working professionals by the year 2020 and about 41% of the employers will face the difficulty of filling positions because of the dearth of suitable talent and skill in their industry. The lack of a formal degree and the belief that the vocational track is only suitable for people from a lesser financial back ground has resulted in the declining popularity of this area. While students from a middle-class background are lured into academic pursuits and take up conventional degrees, pursuing a vocational education has remained a less-explored arena.

Vocational education is primarily non-academic in nature and offers practical training and skills needed to pursue an occupation straightaway. It provides students with courses directly aligned to land a job in a chosen profession or a skilled trade. The end result of vocational education is to enable an individual to attain self-employment.

Vocational education offers a wide variety of options in administrative, business, computer technology, printing, agriculture, automobile, craftsmanship, laboratory, library and cosmetic fields. Specifically, these courses include such trades as typewriting, secretarial practices, computer operation, desktop publishing and personnel like Laboratory Technician, Librarian, Mechanic, Electrical Technician, Plumber, Refrigeration and Air Conditioning mechanics, Tailors, Beautician, etc. Candidates with vocational training can find work in several state and central government organizations, non-profit groups, and academic institutions. Further, candidates with strong vocational education background, also opt as instructors in the polytechnic colleges and vocational training institutes which match the government job scales.

VOCATIONAL TRAINING IN INDIA: AN OVERVIEW

According to a National Sample Survey Organization (NSSO, 2003) report two types of vocational trainings are available in India: a) Formal and; b) Non-formal. Formal vocational training follows a structured training program and leads to certificates, diplomas or degrees, recognized by State/Central Government, Public Sector and other reputed concerns. Non-formal vocational training helps in acquiring some marketable expertise, which enables a person to carry out her/his ancestral trade or occupation.

EXPERIMENT SETUP

The demographic characteristics of respondents are presented in Table 4.1:

Table 4.1: Percentage distribution of respondents

Stakeholder	No. of Questionnaire	No. of Respondents	% of Respondents
Students	35	31	88.6
Faculty	35	27	77.1
Industry	20	09	45.0
Alumni	20	08	40.0
Parents	20	11	55.0
Society	20	11	55.0

Total	**150**	**97**	**64.7**

Out of 150 questionnaires distributed a total of 97 responses (64.7%) received. 88.6% students, 77.1% faculty members, 45% Industry, 40% Alumni, 55% Parents and 55% from Society.

The occupation distribution of respondents is presented in Table 4.2:

Table 4.2: Occupation distribution of respondents

Occupation	No. of Respondents	% of Respondents
Teaching	34	35.1
Non Teaching	10	10.3
Student	35	36.1
Self Employed	14	14.4
Unemployed	04	4.1
Total	**97**	**100**

The majority of respondents were students (36.1%) and teaching professionals (35.1%). Non teaching professionals were 10.3%, self employed 14.4% and un-employed were 4.1% only.

The qualification distribution of respondents is presented in Table 4.3:

Table 4.3: Qualification distribution of respondents

Qualification	No. of Respondents	% of Respondents
Ph D	Nil	Nil
Post Graduate	10	10.3
Graduate	25	25.8
Below Graduate	62	63.9
Others	Nil	Nil
Total	**97**	**100**

The majority of respondents were below graduates (63.9%). There were 25.8% graduates, 10.3% post graduates and none PhD or others.

The age group distribution of respondents is presented in Table 4.4:

Table 4.4: Age group distribution of respondents

Age group	No. of Respondents	% of Respondents
20-25 yrs	33	34.0
25-30 yrs	12	12.4
30-35 yrs	05	5.2
35-40 yrs	07	7.2
Above 40 yrs	40	41.2
Total	**97**	**100**

The majority of the respondents were in the age group of above 40 years 41.2%. It was followed by the age group of 20-25 years 34%, age group of 25-30 years 12.4%, age group of 35-40 years and 7.2% and age group of 30-35 years 5.2%.

The gender distribution of respondents is presented in Table 4.5:

Table 4.5: Gender distribution of respondents

Gender	No. of Respondents	% of Respondents
Male	75	77.3
Female	22	22.7
Total	**97**	**100**

The majority of respondents were male 77.3% and only 22.7% were female.

Ranking of Customer's Needs:

The closed-ended questionnaires, designed to get information from the stakeholders of vocational training, is studied and the customer's requirements or needs are selected defining various dimensions of quality. The following needs were selected:

Table 4.6: Customer's Needs

Sr. No.	NEED	Quality Dimension
N-1	Online admissions	Tangibles
N-2	Preference to neighboring candidates	Attitude
N-3	Reservation for girls	Attitude
N-4	Reduced fee structure	Tangibles
N-5	Regular Craft Instructors	Competence
N-6	Separate teachers for theory and practical	Competence
N-7	OHP/LCD classrooms	Tangibles
N-8	Adequate machinery and tools	Tangibles
N-9	Basic facilities in the institute	Tangibles
N-10	Industry sponsored training	Content
N-11	Grade based evaluation	Delivery
N-12	Increased pay scales for Instructors	Tangibles
N-13	Performance linked promotions only	Reliability
N-14	Up gradation with increased qualification	Reliability
N-15	No administrative work to teachers	Attitude
N-16	Summer/ Winter vacations	Attitude
N-17	Job Placement	Reliability
N-18	Special courses for Industrial Workers	Attitude
N-19	Training for Faculty in Industry	Competence
N-20	Participation of Industry in Academics	Attitude

The next step is to rank the customer's needs in order of their relative importance. The responses collected from the stakeholders were used to assign each need a value between 1 and 5, where 1 is unimportant and 5 is very important. Each group of stakeholders used the individual scores of each of their team members to calculate the mean for each need. These calculated means were used as a representation of the relative importance of each need. Ranking of customer's needs by different stakeholders are as under: Student's responses on customer's needs are presented in Table 4.7:

Table 4.7: Responses on Customer's Needs by Students

(Ranking Scale 1 to 5, where 1 is unimportant and 5 is very important)

Students	N 1	N 2	N 3	N 4	N 5	N 6	N 7	N 8	N 9	N 10	N 11	N 16
1	5	2	5	4	2	1	5	5	5	5	1	5
2	5	4	5	4	4	5	5	5	5	5	4	5
3	5	3	5	3	4	5	4	5	4	4	3	2
4	5	1	5	1	5	5	5	5	5	4	1	1

5	3	4	3	5	5	5	5	5	5	5	3	5
6	1	2	3	1	5	5	5	5	5	5	5	5
7	5	5	3	1	1	5	5	5	3	5	1	5
8	3	4	4	1	5	5	4	5	5	4	5	4
9	5	3	3	5	4	5	5	5	4	4	3	2
10	5	4	5	1	5	5	3	5	5	5	4	5
11	5	3	5	1	5	5	5	5	5	3	4	4
12	5	2	2	2	3	5	5	4	5	5	4	5
13	5	2	1	3	2	5	5	4	5	5	3	5
14	5	1	1	1	4	5	5	4	4	5	1	5
15	1	1	1	2	5	3	5	5	5	5	5	5
16	5	1	3	2	5	5	5	5	4	5	5	1
17	1	1	1	4	5	5	5	5	5	5	5	5
18	1	2	1	1	4	5	5	2	1	1	4	1
19	1	1	2	3	1	5	5	3	3	5	1	1
20	4	1	2	4	4	5	5	5	5	5	1	1
21	1	1	1	2	3	4	5	4	5	5	1	1
22	5	5	3	5	5	5	5	3	1	5	4	5
23	1	5	1	4	3	5	4	2	1	5	4	1
24	5	5	5	5	3	5	5	5	1	5	1	5
25	5	4	1	1	5	5	5	3	1	5	5	5
26	1	1	1	4	1	5	5	1	1	5	3	5
27	1	4	5	5	1	5	5	1	1	5	5	5
28	5	5	5	5	1	5	5	1	1	5	1	5
29	5	3	4	2	5	5	2	1	3	3	1	2
30	4	3	5	1	3	2	5	2	5	4	2	3
31	4	1	4	1	5	2	5	2	5	4	2	2
Total	112	84	95	84	113	142	147	117	113	141	92	111
Mean	**3.61**	**2.71**	**3.06**	**2.71**	**3.65**	**4.58**	**4.74**	**3.77**	**3.65**	**4.55**	**2.97**	**3.58**

Faculty member's responses on customer's needs are presented in Table 4.8:

Table 4.8: Responses on customer's needs by faculty members

(Ranking Scale 1 to 5, where 1 is unimportant and 5 is very important)

Faculty Members	**N 5**	**N 6**	**N 7**	**N 10**	**N 12**	**N 13**	**N 14**	**N 15**	**N 16**
1	5	1	1	1	4	1	1	4	2
2	5	5	5	2	5	2	5	5	1
3	5	5	3	5	5	5	5	5	5
4	3	5	5	5	5	5	5	5	5
5	5	5	5	2	5	5	5	5	5
6	1	5	4	3	5	2	4	5	1
7	2	3	4	3	5	5	5	5	5

8	5	3	5	5	5	4	5	5	4
9	5	4	5	5	5	4	5	5	5
10	3	2	3	4	4	1	5	4	2
11	4	3	5	4	5	4	5	5	5
12	5	5	5	5	5	4	4	5	1
13	5	1	5	5	5	1	1	3	5
14	5	4	5	5	5	4	4	5	5
15	5	5	5	5	5	1	1	5	5
16	4	3	5	4	5	4	5	5	5
17	5	5	5	5	5	1	3	5	1
18	4	5	5	2	4	3	4	4	4
19	5	5	5	5	1	4	5	5	5
20	4	3	4	4	5	5	5	3	4
21	5	5	5	5	1	5	2	5	5
22	4	5	5	5	3	5	5	4	3
23	5	5	5	5	2	4	2	4	5
24	4	5	5	4	2	4	5	4	3
25	3	4	5	5	3	3	3	4	3
26	3	5	5	4	2	4	4	4	1
27	5	5	5	5	3	5	5	4	5
Total	114	111	124	112	109	95	108	122	100
Mean	**4.22**	**4.11**	**4.59**	**4.15**	**4.04**	**3.52**	**4.00**	**4.52**	**3.70**

Industry's responses on customer's needs are presented in Table 4.9:

Table 4.9: Responses on customer's needs by industry

(Ranking Scale 1 to 5, where 1 is unimportant and 5 is very important)

Industry	**N 10**	**N 18**	**N 19**	**N 20**
1	4	5	5	4
2	5	4	4	5
3	5	4	5	5
4	4	3	4	5
5	5	4	5	4
6	4	5	5	4
7	4	4	5	3
8	4	5	5	4
9	4	4	4	3
Total	39	38	42	37
Mean	**4.33**	**4.22**	**4.67**	**4.11**

Alumni's responses on customer's needs are presented in Table 4.10:

Table 4.10: Responses on Customer's Needs by Alumni

(Ranking Scale 1 to 5, where 1 is unimportant and 5 is very important**)**

Alumni	**N 1**	**N 6**	**N 9**	**N 10**	**N 11**	**N 17**	**N 18**
1	5	3	4	4	2	5	3
2	4	1	5	5	4	5	4
3	5	2	4	5	3	4	4
4	5	2	4	5	3	4	5
5	4	5	3	3	1	4	4
6	3	5	5	5	5	5	5
7	4	4	4	4	3	4	4
8	4	4	4	4	3	4	4
9	4	3	5	4	4	3	4
10	4	4	5	4	4	3	4
11	4	3	5	4	4	3	4
Total	46	36	48	47	36	44	45
Mean	**4.18**	**3.27**	**4.36**	**4.27**	**3.27**	**4.00**	**4.09**

Parent/Guardian's responses on customer's needs are presented in Table 4.11:

Table 4.11: Responses on Customer's Needs by Parents/Guardians

(Ranking Scale 1 to 5, where 1 is unimportant and 5 is very important)

Parents / Guardians	**N 1**	**N 2**	**N 3**	**N 4**
1	4	5	3	4
2	3	4	3	5
3	4	1	5	2
4	5	2	5	4
5	5	4	5	2
6	5	2	5	2
7	1	2	3	4
8	2	4	3	2
Total	29	24	32	25
Mean	**3.63**	**3.00**	**4.00**	**3.13**

Society's responses on customer's needs are presented in Table 4.12:

Table 4.12: Responses on Customer's Needs by Society

(Ranking Scale 1 to 5, where 1 is unimportant and 5 is very important)

Society	**N 2**	**N 3**	**N 9**	**N 10**	**N 11**	**N 18**
1	3	3	4	5	1	4
2	2	3	5	5	2	4
3	5	3	3	3	3	3

4	3	3	4	5	1	5
5	3	2	4	4	2	4
6	1	1	5	4	4	4
7	1	4	5	5	2	3
8	2	3	5	5	4	5
9	2	2	5	5	5	5
10	2	3	5	4	2	4
11	5	4	5	5	4	5
Total	29	31	50	50	30	46
Mean	**2.64**	**2.82**	**4.55**	**4.55**	**2.73**	**4.18**

Ranking of customer's needs by all stakeholders is presented in Table 4.13:

Table 4.13: Ranking of Customer's Needs by Stakeholders

Sr. No.	NEED	Rank by Students	Rank by Faculty	Rank by Industry	Rank by Alumni	Rank by Parents	Rank by Society
N-1	Online admissions	**7**			**3**	**2**	
N-2	Preference to neighboring candidates	**11**				**4**	**6**
N-3	Reservation for girls	**9**				**1**	**4**
N-4	Reduced fee structure	**12**				**3**	
N-5	Regular Craft Instructors	**5**	**3**				
N-6	Separate teachers for theory and practical	**2**			**6**		
N-7	OHP/LCD classrooms	**1**	**1**				
N-8	Adequate machinery and tools	**4**					
N-9	Basic facilities in the institute	**6**			**1**		**1**
N-10	Industry sponsored training	**3**	**4**	**2**	**2**		**2**
N-11	Grade based evaluation	**10**			**7**		**5**
N-12	Increased pay scales for Instructors		**5**				
N-13	Performance linked promotions only		**8**				
N-14	Up gradation with increased qualification		**6**				
N-15	No administrative work to teachers		**2**				
N-16	Summer/ Winter vacations	**8**	**7**				
N-17	Job Placement				**5**		
N-18	Special courses for Industrial Workers			**3**	**4**		**3**
N-19	Training for Faculty in Industry			**1**			
N-20	Participation of Industry in Academics			**4**			

Overall ranking of customer's needs based on calculated mean is presented in Table 4.14:

Table 4.14: Overall Ranking of Customer's Needs

Sr. No.	NEED	Calculated Mean	Rank
N-1	Online admissions	3.81	**12**
N-2	Preference to neighboring candidates	2.78	**20**
N-3	Reservation for girls	3.29	**18**
N-4	Reduced fee structure	2.92	**19**

N-5	Regular Craft Instructors	3.93	**11**
N-6	Separate teachers for theory and practical	3.72	**13**
N-7	OHP/LCD classrooms	4.12	**6**
N-8	Adequate machinery and tools	4.55	**2**
N-9	Basic facilities in the institute	3.96	**10**
N-10	Industry sponsored training	4.18	**4**
N-11	Grade based evaluation	3.52	**16**
N-12	Increased pay scales for Instructors	3.50	**17**
N-13	Performance linked promotions only	3.52	**15**
N-14	Up gradation with increased qualification	4.00	**8**
N-15	No administrative work to teachers	4.52	**3**
N-16	Summer/ Winter vacations	3.64	**14**
N-17	Job Placement	4.00	**9**
N-18	Special courses for Industrial Workers	4.16	**5**
N-19	Training for Faculty in Industry	4.67	**1**
N-20	Participation of Industry in Academics	4.11	**7**

RESULT

In the present study Data collected from questionnaire were analyzed using the Statistical Package for Social Sciences (SPSS) for Windows, version 21. Descriptive statistics were used to describe the demographic characteristics of the respondents and to find out the distributions of respondents in the different categories. The Paired-Samples T Test procedure compares the means of two variables for a single group. The procedure computes the differences between values of the two variables for each case and tests whether the average differs from zero.

T-Test

Need-1 (Online admissions)

Table 4.15: Paired Samples Statistics (Need-1)

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	STUDENT	4.2727	11	1.34840	.40656
	Alumni	4.1818	11	.60302	.18182
Pair 2	STUDENT	4.0000	8	1.51186	.53452
	Parents	3.6250	8	1.50594	.53243
Pair 3	Alumni	4.2500	8	.70711	.25000
	Parents	3.6250	8	1.50594	.53243

Table 4.16: Paired Samples Correlations (Need-1)

		N	Correlation	Sig.
Pair 1	STUDENT & Alumni	11	.671	.024
Pair 2	STUDENT & Parents	8	-.314	.449
Pair 3	Alumni & Parents	8	.101	.813

Table 4.17: Paired Samples Test (Need-1)

		Paired Differences					t	Df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	STUDENT - Alumni	.09091	1.04447	.31492	-.61077	.79259	.289	10	.779
Pair 2	STUDENT - Parents	.37500	2.44584	.86474	-1.66978	2.41978	.434	7	.678
Pair 3	Alumni - Parents	.62500	1.59799	.56497	-.71095	1.96095	1.106	7	.305

(From table, value of t-test at 5% level of significance, for df 10 = 2.23, for df 7 = 2.36)

In Table 4.15 & 4.17, T-test analysis shows that at 95% confidence interval for the difference of the means includes the value of zero. This indicates that the difference of means is not significantly different from zero and hence the means are not significantly different from each other. It shows that at 5% level of significance the opinion of Students, Alumni and Parents about need-1 (Online admissions) is almost same.

T-Test
Need-2 (Preference to neighboring candidates)

Table 4.18: Paired Samples Statistics (Need-2)

		Mean	*N*	*Std. Deviation*	*Std. Error Mean*
Pair 1	*Student*	*3.1250*	*8*	*1.35620*	*.47949*
	Parent	*3.0000*	*8*	*1.41421*	*.50000*
Pair 2	*Student*	*3.1818*	*11*	*1.16775*	*.35209*
	Society	*2.6364*	*11*	*1.36182*	*.41060*
Pair 3	*Parent*	*3.0000*	*8*	*1.41421*	*.50000*
	Society	*2.5000*	*8*	*1.30931*	*.46291*

Table 4.19: Paired Samples Correlations (Need-2)

		N	Correlation	Sig.
Pair 1	Student & Parent	8	.149	.725
Pair 2	Student & Society	11	-.269	.424
Pair 3	Parent & Society	8	-.154	.715

Table 4.20: Paired Samples Test (Need-2)

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Student - Parent	.12500	1.80772	.63913	-1.38629	1.63629	.196	7	.850
Pair 2	Student - Society	.54545	2.01810	.60848	-.81032	1.90123	.896	10	.391
Pair 3	Parent - Society	.50000	2.07020	.73193	-1.23073	2.23073	.683	7	.516

(From table, value of t-test at 5% level of significance, for df 10 = 2.23, for df 7 = 2.36)

In Table 4.18 & 4.20, T-test analysis shows that at 95% confidence interval for the difference of the means includes the value of zero. This indicates that the difference of means is not significantly different from zero and hence the means are not significantly different from each other. It shows that at 5% level of significance the opinion of Students, Alumni and Parents about need-2 (Preference to neighboring candidates) is almost same.

T-Test
Need-3 (Reservation for girls)

Table 4.21: Paired Samples Statistics (Need-3)

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Student	4.1250	8	.99103	.35038
	Parent	4.0000	8	1.06904	.37796
Pair 2	Student	4.1818	11	.98165	.29598
	Society	2.8182	11	.87386	.26348
Pair 3	Parent	4.0000	8	1.06904	.37796
	Society	2.7500	8	.88641	.31339

Table 4.22: Paired Samples Correlations (Need-3)

		N	Correlation	Sig.
Pair 1	Student & Parent	8	-.135	.750
Pair 2	Student & Society	11	.509	.110
Pair 3	Parent & Society	8	-.603	.114

Table 4.23: Paired Samples Test (Need-3)

		Paired Differences					t	Df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Student - Parent	.12500	1.55265	.54894	-1.17305	1.42305	.228	7	.826
Pair 2	Student - Society	1.36364	.92442	.27872	.74261	1.98467	4.892	10	.001
Pair 3	Parent - Society	1.25000	1.75255	.61962	-.21517	2.71517	2.017	7	.083

(From table, value of t-test at 5% level of significance, for df 10 = 2.23, for df 7 = 2.36)

In Table 4.21 & 4.23, T-test analysis shows that for pair 1 & pair 3, at 95% confidence interval for the difference of the means includes the value of zero. This indicates that the difference of means is not significantly different from zero and hence the means are not significantly different from each other. It shows that at 5% level of significance the opinion of Pair 1 (Student- Parent) and Pair-3 (Parent- Society) about need-3 (Reservation for girls) is almost same. However, there was a significant difference in mean score between Students and Society (pair-2). This indicates that for students "Reservation for girls" is more important compared to the society as their mean score are 4.1818 and 2.8182 respectively.

T-Test
Need-4 (Reduced Fee Structure)

Table 4.24: Paired Samples Statistics (Need-4)

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Students	2.5000	8	1.69031	.59761
	Parents	3.1250	8	1.24642	.44068

Table 4.25: Paired Samples Correlations (Need-4)

		N	Correlation	Sig.
Pair 1	Students & Parents	8	.102	.811

Table 4.26: Paired Samples Test (Need-4)

		Paired Differences					t	Df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Students - Parents	-.62500	1.99553	.70553	-2.29331	1.04331	-.886	7	.405

(From table, value of t-test at 5% level of significance, for df 7 = 2.36)

In Table 4.24 & 4.25, T-test analysis shows that at 95% confidence interval for the difference of the means includes the value of zero. This indicates that the difference of means is not significantly different from zero and hence the means are not significantly different from each other. It shows that at 5% level of significance the opinion of Students, and Parents about need-4 (Reduced Fee Structure) is almost same.

T-Test
Need-5 (Regular Craft Instructors)

Table 4.27: Paired Samples Statistics (Need-5)

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Students	3.6667	27	1.46760	.28244
	Faculty	4.2222	27	1.08604	.20901

Table 4.28: Paired Samples Correlations (Need-5)

		N	Correlation	Sig.
Pair 1	Students & Faculty	27	-.097	.632

Table 4.29: Paired Samples Test (Need-5)

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Students - Faculty	-.55556	1.90815	.36722	-1.31039	.19928	-1.513	26	.142

(From table, value of t-test at 5% level of significance, for df 26 = 2.06)

In Table 4.27 & 4.29, T-test analysis shows that at 95% confidence interval for the difference of the means includes the value of zero. This indicates that the difference of means is not significantly different from zero and hence the means are not significantly different from each other. It showsthat at 5% level of significance the opinion of Students, and Faculty about need-5 (Regular Craft Instructors) is almost same.

T-Test
Need-6 (Separate teachers for theory and practical)

Table 4.30: Paired Samples Statistics (Need-6)

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Students	4.6364	11	1.20605	.36364
	Alumni	3.2727	11	1.27208	.38355

Table 4.31: Paired Samples Correlations (Need-6)

		N	Correlation	Sig.
Pair 1	Students & Alumni	11	.071	.835

Table 4.32: Paired Samples Test (Need-6)

		Paired Differences					t	Df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Students - Alumni	1.36364	1.68954	.50942	.22859	2.49868	2.677	10	.023

(From table, value of t-test at 5% level of significance, for df 10 = 2.23)

In Table 4.30 & 4.32, T-test analysis shows that at 95% confidence interval for the difference of the means, there is significant difference in mean score between Students and Alumni. It shows that at 5% level of significance the opinion of Students and Alumni about need-6 (Separate teachers for theory and practical) is significantly different. This indicates that for student need-6 is more important compared to Alumni as their mean score are 4.6364 and 3.2727 respectively.

T-Test
Need-7 (OHP/LCD classrooms)

Table 4.33: Paired Samples Statistics (Need-7)

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Students	4.8148	27	.48334	.09302
	Faculty	4.5926	27	.93064	.17910

Table 4.34: Paired Samples Correlations (Need-7)

		N	Correlation	Sig.
Pair 1	Students & Faculty	27	.339	.084

Table 4.35: Paired Samples Test (Need-7)

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Students - Faculty	.22222	.89156	.17158	-.13047	.57491	1.295	26	.207

(From table, value of t-test at 5% level of significance, for df 26 = 2.06)

In Table 4.33 & 4.35, T-test analysis shows that at 95% confidence interval for the difference of the means includes the value of zero. This indicates that the difference of means is not significantly different from zero and hence the means are not significantly different from each other. It shows that at 5% level of significance the opinion of Students, and Faculty about need-7 (OHP/LCD classrooms) is almost same.

T-Test
Need-9 (Basic facilities in the institute)

Table 4.36: Paired Samples Statistics (Need-9)

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Students	4.6364	11	.67420	.20328
	Alumni	4.3636	11	.67420	.20328
Pair 2	Students	4.6364	11	.67420	.20328
	Society	4.5455	11	.68755	.20730
Pair 3	Alumni	4.3636	11	.67420	.20328
	Society	4.5455	11	.68755	.20730

Table 4.37: Paired Samples Correlations (Need-9)

		N	Correlation	Sig.
Pair 1	Students & Alumni	11	.100	.770
Pair 2	Students & Society	11	.039	.909
Pair 3	Alumni & Society	11	.608	.047

Table 4.38: Paired Samples Test (Need-9)

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Students - Alumni	.27273	.90453	.27273	-.33495	.88040	1.000	10	.341
Pair 2	Students - Society	.09091	.94388	.28459	-.54320	.72502	.319	10	.756
Pair 3	Alumni - Society	-.18182	.60302	.18182	-.58693	.22330	-1.000	10	.341

(From table, value of t-test at 5% level of significance, for df 10 = 2.23)

In Table 4.36 & 4.38, T-test analysis shows that at 95% confidence interval for the difference of the means includes the value of zero. This indicates that the difference of means is not significantly different from zero and hence the means are not significantly different from each other. It shows that at 5% level of significance the opinion of Students, Alumni and Society about need-9 (Basic facilities in the institute) is almost same.

T-Test
Need-10 (Industry sponsored training)

Table 4.39: Paired Samples Statistics (Need-10)

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Students	4.6296	27	.88353	.17004
	Faculty	4.1481	27	1.19948	.23084
Pair 2	Students	4.5556	9	.52705	.17568
	Industry	4.3333	9	.50000	.16667
Pair 3	Students	4.4545	11	.68755	.20730
	Alumni	4.2727	11	.64667	.19498
Pair 4	Students	4.4545	11	.68755	.20730
	Society	4.5455	11	.68755	.20730
Pair 5	Faculty	3.4444	9	1.58990	.52997
	Industry	4.3333	9	.50000	.16667
Pair 6	Faculty	3.5455	11	1.43970	.43408
	Alumni	4.2727	11	.64667	.19498
Pair 7	Faculty	3.5455	11	1.43970	.43408
	Society	4.5455	11	.68755	.20730
Pair 8	Industry	4.3333	9	.50000	.16667
	Alumni	4.3333	9	.70711	.23570
Pair 9	Industry	4.3333	9	.50000	.16667
	Society	4.5556	9	.72648	.24216
Pair 10	Alumni	4.2727	11	.64667	.19498
	Society	4.5455	11	.68755	.20730

Table 4.40: Paired Samples Correlations (Need-10)

		N	Correlation	Sig.
Pair 1	Students & Faculty	27	.199	.320
Pair 2	Students & Industry	9	.158	.685
Pair 3	Students & Alumni	11	-.082	.811
Pair 4	Students & Society	11	-.154	.652
Pair 5	Faculty & Industry	9	-.210	.588
Pair 6	Faculty & Alumni	11	.254	.451
Pair 7	Faculty & Society	11	-.129	.706
Pair 8	Industry & Alumni	9	.000	1.000
Pair 9	Industry & Society	9	-.574	.106
Pair 10	Alumni & Society	11	-.143	.675

Table 4.41: Paired Samples Test (Need-10)

		Paired Differences					t	Df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Students - Faculty	.48148	1.34079	.25804	-.04892	1.01188	1.866	26	.073
Pair 2	Students - Industry	.22222	.66667	.22222	-.29022	.73467	1.000	8	.347
Pair 3	Students - Alumni	.18182	.98165	.29598	-.47766	.84130	.614	10	.553

Pair 4	Students - Society	-.09091	1.04447	.31492	-.79259	.61077	-.289	10	.779
Pair 5	Faculty - Industry	-.88889	1.76383	.58794	-2.24469	.46691	-1.512	8	.169
Pair 6	Faculty - Alumni	-.72727	1.42063	.42834	-1.68166	.22712	-1.698	10	.120
Pair 7	Faculty - Society	-1.00000	1.67332	.50452	-2.12415	.12415	-1.982	10	.076
Pair 8	Industry - Alumni	.00000	.86603	.28868	-.66569	.66569	.000	8	1.000
Pair 9	Industry - Society	-.22222	1.09291	.36430	-1.06230	.61786	-.610	8	.559
Pair 10	Alumni - Society	-.27273	1.00905	.30424	-.95062	.40516	-.896	10	.391

(From table, value of t-test at 5% level of significance, for df 8 = 2.31, for df 10 = 2.23, for df 26 = 2.06)

In Table 4.39 & 4.41, T-test analysis shows that at 95% confidence interval for the difference of the means includes the value of zero. This indicates that the difference of means is not significantly different from zero and hence the means are not significantly different from each other. It shows that at 5% level of significance the opinion of Students, Faculty, Industry, Alumni and Society about need-10 (Industry sponsored training) is almost same.

T-Test
Need-11 (Grade based evaluation)

Table 4.42: Paired Samples Statistics (Need-11)

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Students	3.0909	11	1.51357	.45636
	Alumni	3.2727	11	1.10371	.33278
Pair 2	Students	3.0909	11	1.51357	.45636
	Society	2.7273	11	1.34840	.40656
Pair 3	Alumni	3.2727	11	1.10371	.33278
	Society	2.7273	11	1.34840	.40656

Table 4.43: Paired Samples Correlations (Need-11)

		N	Correlation	Sig.
Pair 1	Students & Alumni	11	.522	.099
Pair 2	Students & Society	11	.650	.030
Pair 3	Alumni & Society	11	.525	.097

Table 4.44: Paired Samples Test (Need-11)

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Students - Alumni	-.18182	1.32802	.40041	-1.07399	.71036	-.454	10	.659
Pair 2	Students - Society	.36364	1.20605	.36364	-.44660	1.17387	1.000	10	.341
Pair 3	Alumni - Society	.54545	1.21356	.36590	-.26983	1.36074	1.491	10	.167

(From table, value of t-test at 5% level of significance, for df 10 = 2.23)

In Table 4.42 & 4.44, T-test analysis shows that at 95% confidence interval for the difference of the means includes the value of zero. This indicates that the difference of means is not significantly different from zero and hence the means are not significantly different from each other. It shows that at 5% level of significance the opinion of Students, Alumni and Society about need-11 (Grade based evaluation) is almost same.

T-Test
Need-16 (summer/ winter vacations)

Table 4.45: Paired Samples Statistics (Need-16)

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Students	3.6667	27	1.79743	.34592
	Faculty	3.7037	27	1.61280	.31038

Table 4.46: Paired Samples Correlations (Need-16)

		N	Correlation	Sig.
Pair 1	Students & Faculty	27	-.500	.008

Table 4.47: Paired Samples Test (Need-16)

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Students - Faculty	-.03704	2.95455	.56860	-1.20582	1.13174	-.065	26	.949

(From table, value of t-test at 5% level of significance, for df 26 = 2.06)

In Table 4.55 & 4.47, T-test analysis shows that at 95% confidence interval for the difference of the means includes the value of zero. This indicates that the difference of means is not significantly different from zero and hence the means are not significantly different from each other. It shows that at 5% level of significance the opinion of Students, and Faculty about need-16 (summer/ winter vacations) is almost same.

T-Test
Need-18 (Special courses for Industrial Workers)

Table 4.48: Paired Samples Statistics (Need-18)

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Industry	4.2500	8	.70711	.25000
	Alumni	4.1250	8	.64087	.22658
Pair 2	Industry	4.2500	8	.70711	.25000
	Society	4.0000	8	.75593	.26726
Pair 3	Alumni	4.0909	11	.53936	.16262
	Society	4.1818	11	.75076	.22636

Table 4.49: Paired Samples Correlations (Need-18)

		N	Correlation	Sig.
Pair 1	Industry & Alumni	8	-.394	.334
Pair 2	Industry & Society	8	.000	1.000
Pair 3	Alumni & Society	11	.202	.551

Table 4.50: Paired Samples Test (Need-18)

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Industry - Alumni	.12500	1.12599	.39810	-.81635	1.06635	.314	7	.763
Pair 2	Industry - Society	.25000	1.03510	.36596	-.61536	1.11536	.683	7	.516
Pair 3	Alumni - Society	-.09091	.83121	.25062	-.64932	.46750	-.363	10	.724

(From table, value of t-test at 5% level of significance, for df 7 = 2.31, for df 10 = 2.23)

In Table 4.48 & 4.50, T-test analysis shows that at 95% confidence interval for the difference of the means includes the value of zero. This indicates that the difference of means is not significantly different from zero and hence the means are not significantly different from each other. It shows that at 5% level of significance the opinion of Industry, Alumni and Society about need-18 (Special courses for Industrial Workers) is almost same.

DISCUSSION

The analysis of respondents revealed that a total of 64.7% responses were received. The percentage of received responses were mainly shared by students (31%) followed by the faculty members (28%). The remaining 41% responses were shared by other four stakeholders i.e. industry, alumni, parents and society. It shows that the students and faculty members are important and more responsible among the stakeholders. The same results were also reflected from the occupation and age distribution of respondents. The female responses were lesser (22.7%) as compared to male responses (77.3%).

When the Overall Ranking of Customer's needs were examined, it was observed that the most important expectation was "Training of faculty in industry". It means that the knowledge of faculty members should be updated periodically by giving them exposure to the latest technology being used in the industry. Rank two is given to "Adequate machinery and tools" followed by "No administrative work to teachers" at rank three, "Industry sponsored training to students" at rank four and "Regular craft instructors" at rank five. The expectations with high importance should be given priority when designing curriculum and developing policies for Industrial Training Institutes (ITIs). Besides, expectations with comparatively low importance points are "Up-gradation with increased qualifications", "online admissions" and "Increased pay scales for instructors". These expectations can be interpreted in a similar manner according to the importance score and should also be taken care when developing policies for Industrial Training Institutes (ITIs).

When the statistical analysis of data was undertaken, it was observed that irrespective of variables (needs), stakeholders have not shown any significant differences in their opinions. The results of t-test analysis shows that except for Need-3 (Reservation for girls) and Need-6 (Separate teachers for theory and practical) at 95% level of confidence interval (α=0.05), there is no significant difference in the opinions of different stakeholders. However, there is a significant difference in mean score between Students and Society. This indicates that for students Need-3 (Reservation for girls) is more important compared to the society as their mean score are 4.1818 and 2.8182 respectively. Similarly the opinion of Students and Alumni about need-6 (Separate teachers for theory and practical) is significantly different. This indicates that for student need-6 is more important compared to Alumni as their mean score are 4.6364 and 3.2727 respectively.

CONCLUSION

In the present study, concepts of quality in education in general and vocational education & training in particular are studied in detail. The quality dimensions in vocational training are identified which show the fundamental requirement and their relationship. The implementation of QFD for improving the quality of education system is studied thoroughly. The utmost advantage of implementing the QFD approach in an educational institution is that it considers both tangible and intangibles aspects, and results can be utilized to have academic reforms in any educational institute. In the present work, 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. It was 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.

In conclusion, the QFD technique can be used to improve, not only all levels of higher educational activities, but also all similar levels of vocational education and training activities, in similar way from program design, to curriculum, to the satisfaction of students.

There are two potential beneficiaries of the present study, including permission granting and recognizing agencies of vocational education and vocational education stakeholders. First of all, the present study can support the permission granting and recognizing agencies like The Directorate General of Employment & Training (DGE&T) and Directorate

of Technical Education (DTE) in reviewing their existing systems and determining whether it is necessary to replace the existing systems by a better one. Besides, the present study can support those who are planning to set up an ITI, in evaluating and selecting the best system. This is beneficial to its stakeholders in terms of teaching and learning. Finally, the present study can support ITI management in analyzing their strengths and weaknesses, and also identifying the opportunities and threats against the competing systems.

SCOPE FOR FUTURE WORK

The framework developed with the application of QFD in an educational institute will help in establishing the present improvement and set priorities for future scope of improvement. In the present work importance ratings of customer's needs are calculated. This further opens the scope of future research by having a survey among the stakeholders and finding out the actual importance rating/ranking and validating those results with the present one.

The present study was conducted only among different stakeholders of one training institutes. Future studies might be conducted with detailed comparisons between stakeholder's opinions. The future research may be focused on other vocational institutes in India and abroad and try to find out if the findings are similar. There is a large scope for further research on other dimensions of service quality in vocational education and training among various faculties.

The present study contributes to the QFD literature with the aim of understanding the profile of the literature in terms of the mixture of subjects, varieties of methodologies, approaches, and models. Hence, the present study helps to advance and sharpen our understanding of QFD research. From the findings of the present study it is recommended that future studies should be more focused toward integration of some existing tools in the QFD literature.

In the present study statistical analysis and QFD based analysis were employed for obtaining the results. A more refined technique analytical hierarchical process (AHP) has recently emerged in literature (Tsinidou et al, 2010). Perhaps this emerging tool of analysis could be utilized by future researchers to establish a more realistic ranking of the needs of different stakeholders pertaining to the future education and training system in India.

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