

# Top Ten Skills Demanded by the Private Sector of the Labour Market Using Quality Function Deployment (QFD)

Abdulaziz Alrowaih<sup>1</sup>

<sup>1</sup>Constructional Training Institute, South Sabahya – Kuwait  
tig3070[at]gmail.com

**Abstract:** *The purpose of this paper is to develop a system to enhance the quality of vocational training programs in Kuwait by using the concept of Quality Function Deployment (QFD). The approach starts by investigating the private sector of the labour market. Interviewing of a sample group of the private sector companies was done to know their expectations of the performance of vocational training outcomes. Then, QFD was applied to find the technical requirements, which will help in satisfying the market's expectations to design new programs that lead to enhance the quality of the outcome of the Vocational Training. The house of quality technique allows prioritizing the technical descriptors based on the technical difficulty, target value, absolute weight, and relative weight.*

**Keywords:** Engineering education, Systems engineering for training quality, Vocational training management, House of quality for training

## 1. Introduction

This paper provides a scheme to enhance the quality of vocational training outcome to satisfy the labour market demands in Kuwait by using Quality Function Deployment (QFD) Method for program development. A study done by California Department of Education (2007) highlights the twenty-first century workforce requirements in light of three new challenges: (1) the need for an increase in the quality and quantity of skilled workers; (2) the need for employees who are lifelong learners and have transferable skills; and (3) the need for flexible, adaptable career technical education systems.

Kathrin Hoeckel, et. al define the Vocational Training as preparing the learners for jobs that are based in manual or practical activities, traditionally non-academic and totally related to a specific trade, occupation or vocation. It is sometimes referred to as technical education, as the learner directly develops expertise in a particular group of techniques or technology.

Studies show that Vocational Training organizations began movements for the assurance of quality in vocational training from the beginning of the 1990s in Europe.

Sector Skills Councils on Developing (SSDA) (2007), explains that Occupational Standards specify standards of performance that people are expected to achieve in their work, and the knowledge and skills they need to perform effectively. That can be done by identifying and grouping tasks associated with a particular occupation and describe the knowledge and skills that a worker must demonstrate to be considered competent in that occupation.

### 1.1. Practical implication

The practical implication is to modify a vocational training program, by adapting new technologies and application sequences of activities and strategies within the time limit.

## 1.2. Value

The value of this paper is to explain how a training program can be modified in order to satisfy the labour market requirements.

## 2. Methodology

The first step is to have a solid feedback and a measure to know the present status of the labour market. How many of the local vocational training outcomes are there in the private sector of the labour market? What is the percentage of that outcome among the total workers of the market? Manpower Government Reconstructing Program (MGRP) record shows (see Index 1) a record of the percentage of the vocational Kuwaiti outcomes in local market demand of private sector in Kuwait. The next step is to scan the market to evaluate how strong the reception of the private sector of the labour market on the outcomes of the local vocational training.

### 2.1 Questionnaires

The questionnaires were distributed to the graduated students of the past three years. The first questionnaire was distributed to 40 graduated students for the period (2006-2009) from public vocational training authority in Kuwait. These surveys and questionnaires concentrate on the following aspects:

1. The waiting time to be accepted to work for a company.
2. The missing skills needed to be competed at the workplace.
3. Number of companies refuses the graduate employment application.
4. Reasons of rejections.
5. The relation between the current job and the subject trained for.

2.2. Surveys and interviews

Interviews have been made with the Vocational Center’s Alumnae Relation Offices to check their database for information required. An analysis study was done on the collected data that clarified the level of difficulties that graduate students’ faces before entering the labour market. Also, sets of surveys and interviews were distributed among the private labour market companies to evaluate the productivity of the workers from the vocational training providers in Kuwait.

3. Investigating the private labor market

Sets of surveys were designed and distributed into the labour market covering the main three size categories of companies. Large companies those have more than 250 employees, middle size companies those have less than 200 employees and small size companies which have less than 50 employees. The study covers the services sector, industrial sector, constructional sector, as well as technology sectors. The focus on this stage is to get direct answers to specify skills required from vocational training providers. The survey was assessed using a 5-point scale (5pt = Very important, 4pts = important, 3pts Average, 2pts not important, 1pts sure not important). For fifty companies were investigated, nearly 40 skills were specified and then reduced to Top Ten Important skills (TTS) based on the highest variance.

4. Results and discussions

The survey of the labour market demand shows the top ten important skills most demanded, which were verified and inserted into the HOQ matrix. The calculation parameters prioritized the technical descriptors to be deployed into a training program to help each of the top ten skills to be achieved.

4.1. Top Ten Skills (TTS)

Based on the highest values received for labour market survey of each skill, the most demanded top ten skills by the private sector in Kuwait is shown in (table1):

Table 1: Top Ten Skills most demanded by the private sector of labour market in Kuwait.

No	Skills	Variance
1	Multi-purpose workers.	422.333
2	Work with minimal supervision.	389.333
3	Solve problems effectively and quickly.	386.333
4	Strong work ethic.	386.333
5	Willingness to work.	385.333
6	Dependability/Reliability/Responsibility.	358.333
7	Punctuality.	358.33
8	Use of CAD/CAM.	354.333
9	Ability to learn new skills and behavior.	352.333
10	Inventory skills and knowledge.	352.333

4.2. The house of quality (HOQ) Analysis

In the house of quality shown in (figure 1), the left horizontal column presents the customer’s needs and the voice of customer (VOC) as they were identified and reduced to the top ten requirements and skills demanded for the private sector of the labour market. The top vertical columns present the technical approaches to reach the requirements often called (HOWs). The middle part of the house of quality represents the relations between the VOC and the HOWs. The top triangle often called the roof of the house of quality that represents the relations between the (HOWs). Also, the HOQ provides more parameters to be measured from different perspective, such as the level of difficulties, customer importance, importance rates, and relevant weight.

4.3. Determining the Voice of the Customer (VOC)

To begin a QFD process, the voice of the customer was identified and prioritized by the survey report and placed on the horizontal part of the HOQ shown in (figure 1).

The following equations needed to find some important parameters:

$$\text{Scale-UP-Factor} = (\text{The Target Value}) \div (\text{Customer Rating}) \text{ -----(1)}$$

$$\text{Absolute weight} = (\text{Importance to Customer})(\text{Scale-UP-Factor}) \text{ -----(2)}$$

$$\text{Relative weight} = bj = \sum_{i=1}^n Rij di \text{ -----(3)}$$

*b* = row vector of relative weights for technical descriptors

*di* = column vector of absolute weights for the customer requirements

*Rij* = weight assigned to the relationship matrix.

Equations 1, 2 and 3. Source: Besterfield, D. H., Besterfield, C., Besterfield, G. H. and Besterfield, M. (2003).

The importance rate for this demand gained one point from the scale of five. This skill can be obtained by deploying at least three technical descriptors, Managing tasks and meeting deadlines – Team activities - inventory activities.

The relation strength of the inventory skills and knowledge demand and the approach Managing tasks and meeting deadlines is one point in a scale of five. Team activities approach and Inventory activities to deploy this demand got 5 points in a scale of five for the relation strength. The following parameters show the rating of this demand:

-Customer importance = 1 (This parameter is set by the customer)

- Scale-UP-Factor = (Target value ÷ Customer Comparative) = (2÷2) = 1

-Absolute weight = (Customer importance × Scale-up)  
= (1×1)=1

**4.4. The Technical Descriptors to Deploy the Skills into a Program (HOWs)**

The vertical column of the House of Quality (HOQ) presents the approaches to be deployed to satisfy the customer needs. The more an approach receives from the correlation matrix, the more weight it will have to be considered for the prioritization stage.

**4.5. The Roof of the House Of Quality (HOQ)**

The roof of the house of quality (HOQ) defines the relationships between the technical descriptors (HOWs) strength and how they are related to each other. Based on the strength of the relations, priorities to deploy these approaches can be clarified. The approaches (HOWs) can be classified as Primary and Secondary. The primary approaches those encouraged to be used for more than one of the voice of customer’s demands and they are general in nature. These are the core approaches to deploy the skills needed, while the secondary approaches can be used to enrich the deployment of the skills needed to satisfy the customer needs and they are in more details.

**4.6. The relationships between the technical descriptors (HOWs)**

Measuring the relation between the approaches (HOWs) is a very important stage to prioritize the approaches to be deployed in a program. The priority would be for the approaches that have stronger relationships first followed by the weaker ones.

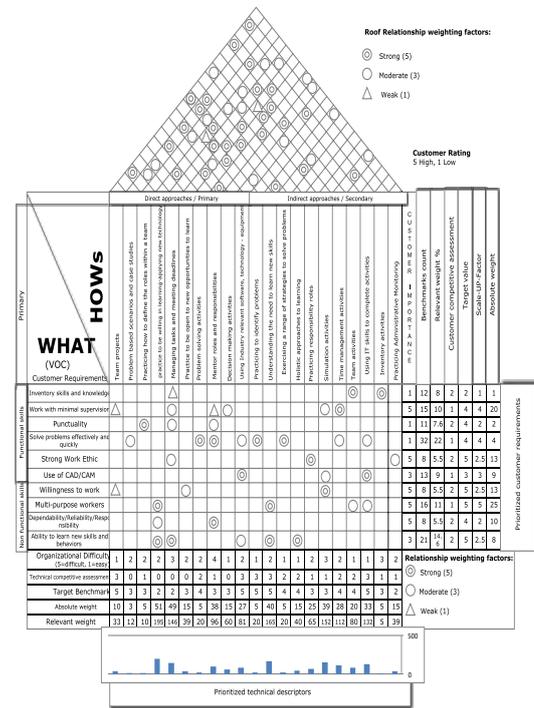
**4.7. The Technical Descriptors Priorities**

The house of quality technique allows prioritizing the technical descriptors based on the parameters technical difficulty, target value, absolute weight, and relative weight. The QFD team identifies technical descriptors most needed to fulfil customer requirements and need improvement. Higher absolute and relative rating identity areas where engineering efforts need to be concentrated.

Based on the House of Quality analysis priorities formed as the following:

- **The first priority** that the QFD team should consider is practice to be willing in learning- applying new technologies because it received 195 points for the relative weight followed by 165 points for Understanding the need to learn new skills. These two technical descriptors meet at the roof of the HOQ and form the first priority.
- **The second priority** that the team of QFD should consider is Simulation activities because it received 152 points followed by 146 points for managing tasks and meeting deadlines. These two technical descriptors meet at the roof of the HOQ and form the second priority.

- **The third priority** that the team of QFD should consider is Using IT skills to complete activities because it received 132 points followed by 112 for Time management activities. These two technical descriptors meet at the roof of the HOQ and form the third priority.



**Figure1:** Applied HOQ for top ten skills of vocational training in Kuwait

**4.8. Organizational difficulties**

The organizational difficulties parameter in the HOQ is to measure the difficulty of each technical descriptor to be deployed in the program. The level of difficulties is based on the evaluation of the QFD team with correlations for the demands in the matrix section. Setting difficulty rate helps identifying the ability to implement certain quality improvement.

**4.9. Deployment difficulties**

Deployment difficulties are a parameter to be set by the organizations’ experts. Depending on the ability of an organization, a program can be designed and targets can be set. The range of the deployment difficulties in this study is ranked from one to five, where one is easy and five is very difficult. The followings are some examples of the situational analysis for this parameter:

- The deployment of the approach of Team projects into the demand Inventory skill was ranked easy, because it gets only one point in a scale of five.
- The deployment of the approach of Problem based scenarios and case studies into the demand Solve problems effectively and quickly need more effort because it received 2 point out of five.
- The deployment of the approach of Practicing how to define the roles within a team to satisfy the demand Punctuality Skills need more effort because it received two point out of five.

- The deployment of the approaches of Exercising a range of strategies to solve problems to satisfy the demand Solve problems effectively and quickly is easy because it received one point out of five.
- The deployment of the approach Practicing to identify problems to satisfy the demand Solve problems effectively and quickly is easy, because it received one point out of five.
- The deployment of the approach of practice to be willing in learning-applying
- The deployment of the approach of Practicing Administrative Monitoring to satisfy the demand of Strong Work Ethics received two points out of five. Thus deployment needs more effort.

**5. Conclusion**

The application of QFD and benchmarking system together with the analysis tools is kind of a unique approach, that because the information is analyzed simultaneously from different perspectives. Finding detailed skills required for future manpower for the labour market can reduces the potential gap between vocational training outcome and employers expectations.

This research has several important contributions:

1. It suggests a useful solution to the design of an academic framework, where all the expectations of the private sector can be satisfied.
2. It presents a methodology for analyzing the voice of customer (VOC) expectations, as a clear identification of customer expectations as an important factor in customer satisfaction.
3. It opens the door for future research in the area of vocational training and education to solve ongoing problems.

This paper demonstrates the use of an approach that takes advantage of benchmarking & QFD analysis in order to design an approach that satisfies the real needs of the labour market.

**References**

[1] Besterfield, D. H., Besterfield, C., Besterfield, G. H., & Besterfield, M. (2003). Total quality management. New Jersey: Prentice Hall, Inc.

[2] Franceschini, F., & Terzag, M., (1998). An Application of Quality Function Deployment to Industrial Training Courses. International journal of Quality & Reliability Management, 15(7), 753-768. doi:10.1108/02656719810226924

[3] Gonzalez, M.E., Quesada, G., Gourdin, K., & Hartley, M. (2008). Designing a supply chain management academic curriculum using QFD and benchmarking. USA Quality Assurance in Education, 16 (1), 36-60. doi:10.1108/09684880810848404

[4] Alrowaih, A. S. (2010). Enhancing Quality of Vocational Outcome to satisfy the labour market demands in Kuwait by using Quality Function Deployment Method. M. Sc. thesis In Industrial Engineering & Management,

[5] College of Engineering, Gulf University.

[6] Hoeckel, K., & Field, S. (2008). Learning for Jobs OECD Reviews of Vocational Education and Training. Retrieved February 10th, 2010 from <http://www.oecd.org>

[7] Maguad, B. A. (2009). Using Quality Function Deployment to evaluate government services from the customer’s perspective. ASBBS Annual Conference: Las Vegas 16 (1). Retrieved from [www.asbbs.org/files/2009/PDF/M/MaguadB.pdf](http://www.asbbs.org/files/2009/PDF/M/MaguadB.pdf)

[8] Mazur, G. E. (1994). QFD for Small Business. A Shortcut through the Maza of Matrices. Transactions from the Sixth Symposium on Quality Function Deployment Novi, Michigan. Retrieved from [http://www.mazur.net/works/sme\\_qfd.pdf](http://www.mazur.net/works/sme_qfd.pdf)

[9] Noonan, K., Bloom, R., Aschwanden, J., Bersin, A., Chan, Y., Fisher D., Green, R. E., Lopez, D., Nuñez, J., Williams, J., & Estep, A.(2007). Career Technical Education Framework for California Public Schools Edited by Ed O’Malley of CDE Press.

**Author Profile**

**Abdulaziz Alrowaih** received the B.S. and M.S. degrees in Mechanical Engineering from Temple University and De Montfort university in 2001 and 2018, respectively. During 2001 - 2018, he worked as a faculty member at the constructional training institute of Kuwait. He started as trainer in the Mechanical engineering department until 2006. In 2006 he became the head of the department.

**Index 1:** Percentage of the vocational outcomes in the private sector in Kuwait”. Manpower Government Reconstructing Program (MGRP)

Occupations	Percentage				Total
	KW Voc. Outcome		Other Source Outcome		
	Count	%	Count	%	
Technician	94	1.1%	8127	98.9%	8221
Carpenter	0	0%	4426	100.0%	4426
Electrician	27	0.6%	4165	99.4%	4192
Metal Technician	0	0%	3098	100.0%	3098
Mechanics	40	2.0%	1971	98.0%	2011
Constructional Vehicle Operators	0	0%	1704	100.0%	1704
Painter	0	0%	1540	100.0%	1540
Welder	4	0.3%	1498	99.7%	1502
A/C Technician	3	0.2%	1433	99.8%	1436
Accountant	14	1.0%	1375	99.0%	1389
Concrete Frame work	0	0%	1236	100.0%	1236
Technician Assistant	30	3.0%	973	97.0%	1003
Supervisor	109	13.0%	728	87.0%	837
Mechanic	20	2.7%	715	97.3%	735
Plumber	2	0.3%	696	99.7%	698
Decoration	0	0%	634	100.0%	634
Super Attendance	10	1.6%	600	98.4%	610
Mechanic assistance	2	.3%	572	99.7%	574
Inventory	8	1.5%	532	98.5%	540
Arc Welder	0	0%	495	100.0%	495
Maintenance	16	5.9%	256	94.1%	272
Electrical Assistances	2	0.7%	265	99.3%	267
Equipment Operator	1	0.4%	264	99.6%	265

Sale Representative	13	5.0%	249	95.0%	262
Engineering Drawing	2	0.8%	257	99.2%	259
Gas Welding	0	0%	258	100.0%	258
Project Manager	5	2.1%	235	97.9%	240
Drafter	0	0%	225	100.0%	225
Computer Programmer	4	1.8%	217	98.2%	221
Receptionist	71	37.8%	117	62.2%	188
Total	694		44695		45389