

Organizational training needs Design by QFD: productivity improvement approach

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Abstract

The Quality Function Deployment concept has been first developed in Japan in 1966 by Yoji Akao and disseminated through a paper, in 1972. It arrived in the United-States in 1984 and latter on in other industrial countries (Clausing, 1994). Quality Function Deployment (QFD) is a strategic management tool, which is capable of measuring, managing, and improving the quality of the product design process by listening to the customer's voice. What has differentiated our arena from the other times are the speed and complexity of changes. Most of these changes show themselves in the wants and desires of customers. On the other side, one of the most important factors in management success is quick responding to the changes. While customers and their satisfaction guarantee the sustainability of the corporate, managers must coordinate all their activities and investments in tune with the customers' satisfaction. Managers relying on the human resources, as the most important resource to the organization, must respond to the environment and customers' satisfaction.

This paper is trying to distinguish the educational needs of Satcom Company based on the customer needs. So we have used one of the most useful techniques, called QFD. Of the results of this paper we can name: education needs, ranking these needs, coordination courses with the company processes. Of the other side result are of coordinating processes and service characteristics and customer needs.

Key words: QFD, Training needs, voice of customer, improving education quality, improving service quality

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Introduction

Increasing competition in service markets and innovation in production and services processes needs attention to new strategies and policies leading to innovation in quality improvement and expenditures decline. Looking to the changes in Technology of today's organization, especially technology oriented service organizations, we will find out that the organizations must cope with the changes in the Environment or creates some changes in the surrounding Environment.

Today's market has many rapid changes in supplying goods that are rooted in the changes of customer needs.

To sustain and make profit, organizations must evaluate and improve the process of production and services and deploy innovative approaches. Coordination with these changes comes from human resources in the management that is able to be competitive. Knowledge organizations formulate their strategies on the training that includes training of target market and training human resources inside the organization. In fact new strategy of penetrating in target markets is called "training strategy".

Considering the specifications of service industries, like Intangibility, unutterable, simultaneous production and consumption ... this strategy will be more important.

One of the Basic a specification of service industries is the high dependency of product or service quality to the capability of service provider. For example services in a bank are highly dependent to the person providing services through improving employee's empowerment. There are different approaches for evaluating and improving services providing. These approaches are of different range of quantitative and qualitative methods. One of the most famous methods is quality function deployment (QFD) that translates customer needs in to service specifications. Two important dimensions of QFD are voice of customer and specification of products and devices that are used in this process. In this article we try to use this technique in improving training of SATCOM Company. With this technique customer needs are identified at first, products and

services specifications are distinguished, then the improvable areas in education are determined.

Literature review:

In a research in higher education with the goal of translating voice of customers to the operation necessities, registration system of the university was modified with QFD technique (Cantina Theo and brain wareng, 1999). They used Idea of Juan's Trilogy or TRIPROL. With this model not only identifying different customers in education Environment is easy, but also explanations of different stakeholders' roles are facilitated. They designed an automatic computer based system for student training needs as a result.

In another research by Koukin lam Shinxao (1998); QFD and AHP are used to evaluate the effectiveness of training sources in Hong Kong City University. They evaluated the courses according to students, in spite of other times that evaluations have been done by teachers.

In another re search by Goal pitman et al (2000), they used QFD in education environment. They used this approach based in TQM philosophy to evaluate MBA programs in state university of Grandly. Inputs of QFD are colleted throughout different brain storming sections with 30 students of this program, 5 faculty members, 3 executives and other related people. The result show that customers need integration, team working, discussions, quantitative skills, real case studies and practical projects are very important.

In another research by Edi Esinprouch (2001), QFD was applied for improving social. Services to disable people. The result shows that to obtain reasonable results all the intervening variables in providing quality services must be identified and managed.

David B Hay, 2003 conducted a research determining Skills Gaps and Training Needs for Information and Communications Technology in Small and Medium Sized Firms in the South East of England, he detailed skills audit and skills gap analysis among some 380 people from 38 small or medium sized companies in the South East of England, The results are discussed in the context of the widely held

contention that lifelong learning and skills development is key to the competitiveness and sustainable growth of firms in the UK.

The timeouts training and development of staff can avert problems, improve productivity and motivation and encourage staff retention and recruitment. The effective provision of training and development opportunities by the Training and Development Unit, the Information Services Training Team and the Coalition for Learning Innovation depends on the receipt of information concerning the training needs identified by departments. The central training and development programs are planned in late Spring/early summer for delivery in the next academic year; input from managers at the planning stage will help to ensure that departmental training needs are met. (Tan.C.; Xie & Chia. 1998)

Training Needs assessment methodologies

There are two methods for training needs assessment - the problem-analysis method and the competency-based method.

Other methods are variations of these two. (Crowe & Cheng 1996)

Problem-analysis method

A key aspect of the problem-analysis method is the "collection and analysis of existing organizational data to extract meaningful conclusions about the needs for training." (Habitat, 1987). The problem-analysis method involves organizational self examination aimed at discovering discrepancies in individual, unit or organizational performance. The problem-analysis method also considers changes in policies, programmes and services that will require new knowledge or skills if they are to be carried out effectively. The problem analysis method is designed for use at the organization level. Typically, it is reactive, responding to what has occurred in the past, e.g., what has gone wrong.

Competency-based method

In this method of training needs assessment, emphasis is on locating and describing characteristics or "competencies" critical to successful performance and applicable to clusters of jobs in all types of

organizations. These characteristics, in turn, can be used to measure actual performance. The results can be used in planning appropriate training for categories of workers with similar job requirements.

Unlike the problem-analysis method, the competency-based method is proactive. It attempts to create standards of excellence that provide organizations and institutions with a common language about performance. According to one authority, "the competency concept may be the most exciting and potentially promising idea to hit the training field since behavioral objectives." (Madu, kuei, 1994)

In this paper we try to design a new method based on QFD technique and the customer orientation philosophy that will be discussed in detail in the methodology section.

Quality Function Deployment:

Quality Function Deployment is a team-based technique that provides a means of Identifying and translating customer requirements into technical specifications for product planning, design, process, and production. The term Quality Function Deployment is a loose translation from the Japanese name for this methodology, *him shitsu* (quality), *kinou* (function), *ten kai* (deployment) [2]. The methodology consists of a structured procedure that starts with the qualities desired by the customer, leads through the functions required to provide these products and/or services, and identifies the means for deploying the available resources to best provide these products and/or services.

It uses a cross functional team to determine customer requirements. QFD is a systematic and analytical technique for meeting customer expectation. QFD is a planning process for translating customer requirements (voice of the customer) into the appropriate technical requirements for each stage of product development and production (i.e. marketing strategies, planning, product design and engineering, prototype evaluation, production process development, production, sales) (Sullivan, 1986) and (Revelle, 1998).

QFD has its roots in Japan of the late 60's and early 70's [2]. The Japanese created a methodology to support the development process for complex products, such as super tankers, by linking the planning elements of the design and construction processes to specific customer

requirements. By employing this methodology, numerous Japanese companies enabled their product development efforts to more effectively focus on meeting customer needs, thus building a distinct competitive advantage. The successes in Japan helped lead to the adoption of QFD by companies in the United States starting in the early 80's. Since then, with applications across many different manufacturing and service based companies in the US, QFD has led to some dramatic success stories: reductions in overall project costs (e.g. 50%), reductions in project cycle time (e.g. 33%), and major increases in productivity (e.g. 200%) [2].

2. Guinta, L. R. and Praizler, N. C. *The QFD Book, the Team Approach to Solving Problems and Satisfying Customers through Quality Function Deployment*. AMACOM Books. 1993.

QFD Methodology:

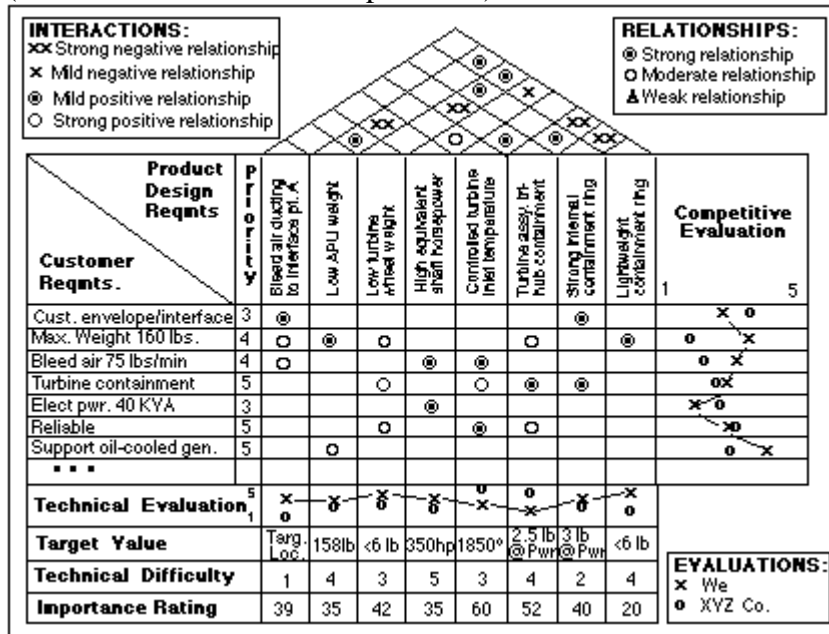
QFD uses a matrix format to capture a number of issues pertinent and vital to the planning process. The QFD matrix consists of six parts. The first step starts with constructing a list of product demands as voiced by the customer. The second part of the house of the quality is customers' competitive evaluations. The next step is to determine the quality characteristics. These quality characteristics, which are measurable, controllable that will impact on one or more customer demands.

The forth phase is the correlation matrix to identify the interrelationship of each quality characteristic. The fifth step is an evaluation of the strength of the relationship between the customer demand and the technical requirements. The last step is the technical assessment. The output of the house of quality is not a product design but merely the requirements of the end product (Vonderembse, 1997).

The basic Quality Function Deployment methodology involves four basic phases that occur over the course of the product development process. During each phase one or more matrices are prepared to help plan and communicate critical product and process planning and design information.

Once customer needs are identified, preparation of the product planning matrix or "house of quality" can begin. The sequence of preparing the product planning matrix is as follows:

1. Customer needs or requirements are stated on the left side of the matrix as shown below. These are organized by category based on the affinity diagrams. Insure the customer needs or requirements reflect the desired market segment(s). Address the unspoken needs (assumed and excitement capabilities).



2. Evaluate prior generation products against competitive products. Use surveys, customer meetings or focus groups/clinics to obtain feedback. Include competitor's customers to get a balanced perspective.
3. Establish product requirements or technical characteristics to respond to customer requirements and organize into related categories. Characteristics should be meaningful, measurable, and global. Characteristics should be stated in a way to avoid implying a particular technical solution so as not to constrain designers.
4. Develop relationships between customer requirements and product requirements or technical characteristics. Use symbols for strong, medium and weak relationships. Be sparing with the strong

relationship symbol. Have all customer needs or requirements been addressed? Are there product requirements or technical characteristics stated that don't relate to customer needs?

5. Develop a technical evaluation of prior generation products and competitive products. Get access to competitive products to perform product or technical benchmarking. Perform this evaluation based on the defined product requirements or technical characteristics.
6. Develop preliminary target values for product requirements or technical characteristics.
7. Determine potential positive and negative interactions between product requirements or technical characteristics using symbols for strong or medium, positive or negative relationships. Too many positive interactions suggest potential redundancy in "the critical few" product requirements or technical characteristics.
8. Calculate importance ratings. Assign a weighting factor to relationship symbols (9-3-1, 4-2-1, or 5-3-1). Multiply the customer importance rating by the weighting factor in each box of the matrix and add the resulting products in each column.
9. Develop a difficulty rating (1 to 5 point scale, five being very difficult and risky) for each product requirement or technical characteristic. Consider technology maturity, personnel technical qualifications, business risk, manufacturing capability, supplier/subcontractor capability, cost, and schedule.

Analyze the matrix and finalize the product development strategy and product plans. Determine required actions and areas of focus. Finalize target values.

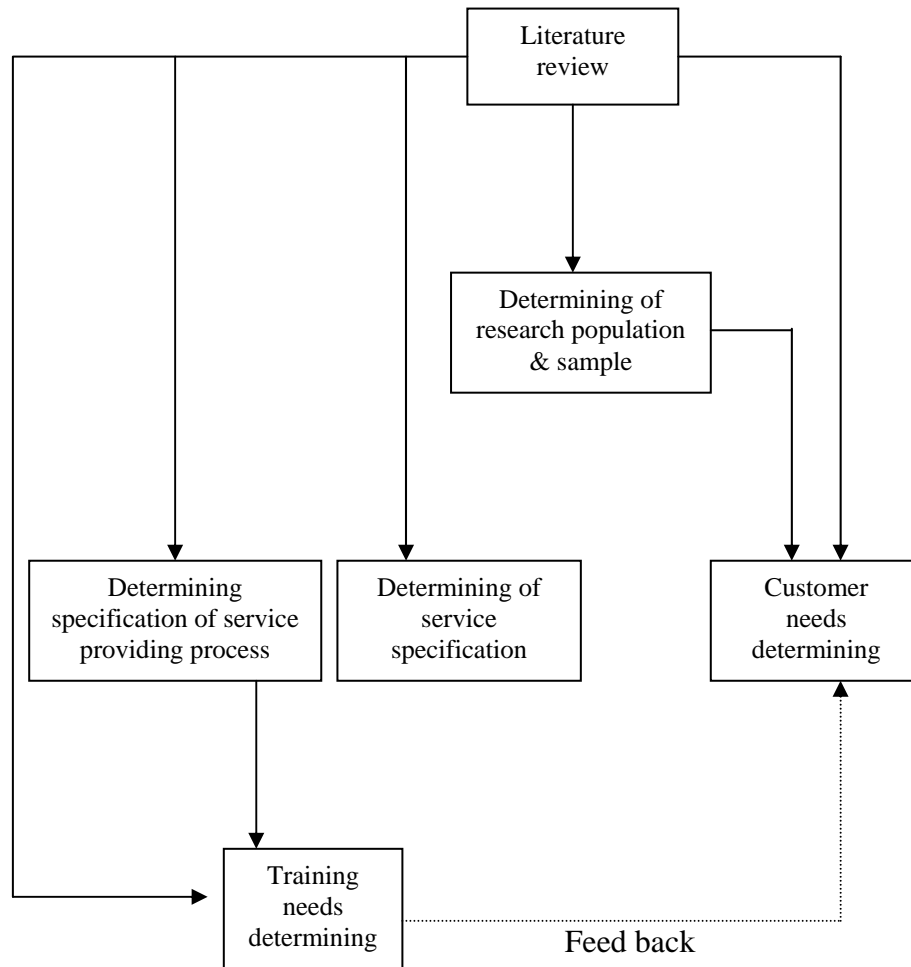
SATCOM Background

SATCOM engineering company with the goal of applying new ICT technology in industries. E- Commerce, Education, culture, service and production sectors is established in 1998 in IRAN. Goals of this company are improving usage of new ICT technologies in Iran (internet, intranet, extranet); encouraging p manufactures merchant and executives to be online. Company services are website design, E-

commerce, software development, ICT consulting, web hosting, domain registration and implementing LAN and WAN.

Research Methodology

Research processes are shown in figure 6.



As shown by figure through literature review, key service specifications, customer needs specification of service processes and training needs are determined.

To determine customer needs, we used a questionnaire that was designed according to company's managers, experts and some

customers. This questionnaire includes 16 questions about the most important criteria affecting providing quality services. Likert scale 1 to 5 is used. Research population is the customers who have used company services. Since the population is indefinite, we didn't use census but we used simple sampling method.

The size of sample is determined according to:

$$n = \frac{z^2 pq}{d^2}$$

$$P: 0/5$$

$$q: 1-p: 0/5$$

$$\alpha = 0.05$$

$$d=0/07$$

$$n = \frac{(1/96)^2(0/25)}{(0/07)^2} = 196$$

As we see size of sample is 196. That for more confidence we distributed 210 questionnaires. 140 questionnaires are collected that 120 of them are evaluated. Simple mean and standard deviation are used to analyze the most important factors affecting services quality. 4 factors of 16 factors that averaged less than 3.5 are omitted.

Table 1: Mean and standard deviation of the basic factors.

NO	Variable	Mean	Standard deviation
1	Wide spread advertising	4.63	0.81
2	Time of service delivery	4.55	0.78
3	Service supporting	4.50	.064
4	Commitment to finish the project on time	4.36	0.91
5	Suitable price	4.33	.092
6	Service diversity	4.25	0.99
7	Quick response to customer	4.25	1.05
8	Caring to customer privacy	4.25	0.97
9	Confidentiality.	4.05	1.02
10	Electronic services security	3.96	1.02
11	. Ease of use	3.90	1.06
12	Providing services as package	3.85	0.99
13	Using new technology.	3.09	1.33
14	Consulting to the customers	3.09	1.36
15	Knowledge transfer	3.05	1.23
16	Training services	2.71	1.25

QFD Matrices formation & calculations:

In this stage, as shown in research methodology section, questionnaire of affecting factors on desire services, (VOC) is distributed among the research sample. Below table shows mean and standard deviation of the responses.

Since the factors 13 to 16 averaged below 3.5, they are omitted and we continue our research with the first 12 factors.

Table 2:

Row weights		Filling electronic forms	Competitive price	Customer oriented design	Ease of use	Relationship with service providers	Suitable timing	Specialized supporting	After sales services	Keeping secrets	Flexibility in design	Average	Service specifications Voice of customer
Relative	Absolute												
6	102	1		3		9			9			4.63	Wide spread advertising
4	114	3		3	3	3	9	3			1	4.55	Time of service delivery
1	189		1	3	9	9	1	9	9		1	4.50	Service supporting
8	78	1		3	1	3	9	1				4.36	Commitment to finish the project on time.
5	104	1	9	3	3	3	3	1	1			4.33	Suitable price.
2	166		3	9		9	3	3	3		9	4.25	Service diversity
3	136	1			9	1		9	3		9	4.25	Quick response
12	60			3				1		9	1	4.25	Caring to customer privacy
10	69			3	1			3		9	1	4.05	Confidentiality
9	71					3		3	9	3		3.96	Electronic services security
7	90	1		3	9		1	3	3		3	3.90	Ease of use
11	65	1				9		1	3		3	3.85	Providing services as package
	34208	917	1622	3907	4533	5937	2818	4760	4734	1369	3612	Absolute	Column weights
		10	8	5	4	1	7	2	3	9	6	Relative	
	100	2.68	4.74	11.42	13.25	17.36	8.24	13.92	13.84	4.00	10.56	%	

Factors of voice of customers and service specifications are shown in table 2. Voc are in the rows and factors of service specifications are in the columns. Service specifications are selected according to

managers and experts view of point. From interaction of the columns and rows of the table the relationship between affecting factors and service specifications are defined. Figures mentioned in cells of the table show the intensity of variables relationship. 1 shows weak relationship, 3 mediums and 9 shows strong relationship.

To relate service specification and key service processes we designed QFD matrix 2, that shown in table 3. To distinguish needed training courses according to voice of customers, QFD matrix 3 is designed. Dimensions of this matrix key weighted process resulted from last table and training necessities according to expert view.

Table 3: service specifications / key service processes

Row weights		Designing secure electronic archive	Providing specialized EC consulting	Applying knowledge management	Training multifunctional designers	Office automation	CRM implementation	Minimum profit pricing	Implementing project control	Implementing SCM	Average	key service processes	
Relative	Absolute											Service specifications	
7	116.16				9		1		1		10.56	Flexibility in design	
9	44	9		1			1				4	Keeping secrets	
3	346		9	3			9		1	3	13.84	After sales services	
2	348		9	3	3		9			1	13.92	Specialized supporting	
6	131.84				1	1	3	1	9	1	8.24	Suitable timing	
1	468.72		1		9	3	3	1	1	9	17.36	Relationship with service providers	
4	291.5		3		3	3	9		1	3	13.25	Ease of use	
5	216.98	1	3	1	1		9	3		1	11.42	Customer oriented design	
8	71.1			1			1	9	1	3	4.74	Competitive price	
10	40.2	9			1	3		1	1		2.68	Filling electronic forms	
	46082	975	8240	2414	7571	2533	12855	1932	2520	7041	Absolute	Column weights	
		9	2	7	3	5	1	8	6	4	Relative		
	100	2.12	17.88	5.24	16.43	5.50	27.90	4.19	5.47	15.28	%		

Table 4: Key service processes / Training requirement

Row weights		Key service processes															Training requirement
Absolute	Absolute	Online service training	Network marketing training	System thinking training	Network security training	E-commerce package training	Organizational & Human skills training	Teamwork training	Supplier relationship training	Customer relationship training	Target costing training	Activity Base costing training	Knowledge management system training	Marketing training	Project control training	Average	
2	733	1	3	9	1	3	3	9	9	3	1	1	1	3	1	15.28	Implementing SCM
6	109		1	1			1		1	1	3	3			9	5.47	Implementing project control
8	75		1			1			1	1	3	9	1	1		4.19	Minimum profit pricing
1	1786	1	9	9	1	9	3	3	3	9	3	1	3	9	1	27.9	CRM implementation
7	77	1	1				3	9								5.5	Office automation
4	296	3			3	3	1	3	1	3				1		16.43	Training multifunctional designers
5	136	3	3	1		1	3	3			1	1	9	1		5.24	Applying knowledge management
3	393	9			3	3	1	3						3		17.88	Providing specialized EC consulting
9	51	9	1		9	3		1		1						2.12	Designing secure electronic archive
	172848	7890.14	18992	22917	5044	20702	8995	15178	12438	19394	6781	3662	7392	19958	3504	Absolute	
		9	5	1	12	2	8	6	7	4	11	13	10	3	14	Relative	
	100	4.56	10.99	13.26	2.92	11.98	5.20	8.78	7.20	11.22	3.92	2.12	4.28	11.55	2.03	%	
																	Column weights

According to the calculations of marix3, training courses are a s below (table 5). Some of the courses as a package and can be divided to more derailed courses, for example control project training can be divided to:

Project management.

Project control.

Project control and management software.

Ms Project.

...

Conclusion:

Role of training as the most important factor empowering employees and gaining competitive advantages is inevitable. Importance of this subject is more highlighted in the era of changes and technology orientation, also in the industries that need to knowledge workers.

This research with the approach of TQM and using QFD has tried to determine and design training courses in SATCOM Company Based upon customer needs. Output of the model are training courses that will help to improve services quality and consequently, increasing market share.

This model has a new approach to the organizational training assessment that is viewing from the outside.

Table5: Priority of training courses according to VOC.

Priority	weight	training courses title
1	13.26	System thinking training
2	11.98	E-commerce package training
3	11.55	Marketing training
4	11.22	Customer relationship training
5	10.99	Network marketing training
6	8.78	Teamwork training
7	7.20	Supplier relationship training
8	5.20	Organizational & Human skills training
9	4.56	Online service training
10	4.28	Knowledge management system training
11	3.92	Target costing training
12	2.92	Network security training
13	2.12	Activity Base costing training
14	2.30	Project control training

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