APPLYING QFD TO IMPROVE IMPLEMENTATION TIME OF POS SYSTEM

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Abstract

This paper is to reduce implementation time of POS system by applying QFD. All the related elements are classified by the hierarchical structure into three phases: expected quality, weight and evluation. The mentioned about includes the first and second improvement, and the case study of POS system of petrol stations in Taichung.

The results of this research are shown in the following.

1. the first improvement was from average 76 days/station to 48 days/station.
2. the second improvement was from average 48 days/station to 36 days/station.
3. the ratio of target achievement was 162%

Keywords:QFD ، Implementation time ، POS system..

1. Introduction

Since August 1993, the Chinese Petroleum Corp. united the company's internal human resources from information and business departments to develop a POS system of petrol station to improve the business performance of petrol stations network. This developed POS system was then introduced to 592 existing petrol stations within the Taiwan to increase the customer satisfaction, enhance the operational performance and maintain the competitiveness in the petrol

station market. After the privatisation of petrol station network, the private own petrol stations were being integreted into the existing petrol station POS information network to share the valuable resources and information [2,6].

Quality Function Deployment(QFD)has been implemented successfully for many years in USA and Japan. It is a structured methodology used to speed up the development process of product cycle.

This research will apply the QFD method to analyse the POS information system. The total system will be evaluated based on three important phases: expected quality, weight and evluation. The main purpose of this case study is to analyse and predict the possible problems and impact during the implementation of the POS system and to find out the system operational bottlneck and thus, reduce the average time of each station.

2.Literature Review

Petrol Station Automation System[2], also known as 'Point of Sales(POS)' , is an integrated information network system which connect the personal computer with major facilities of petrol station, sach as oil pump, cash register, oil measurer etc. The overall conceptual framework of POS system is illustrated in Figure 1.

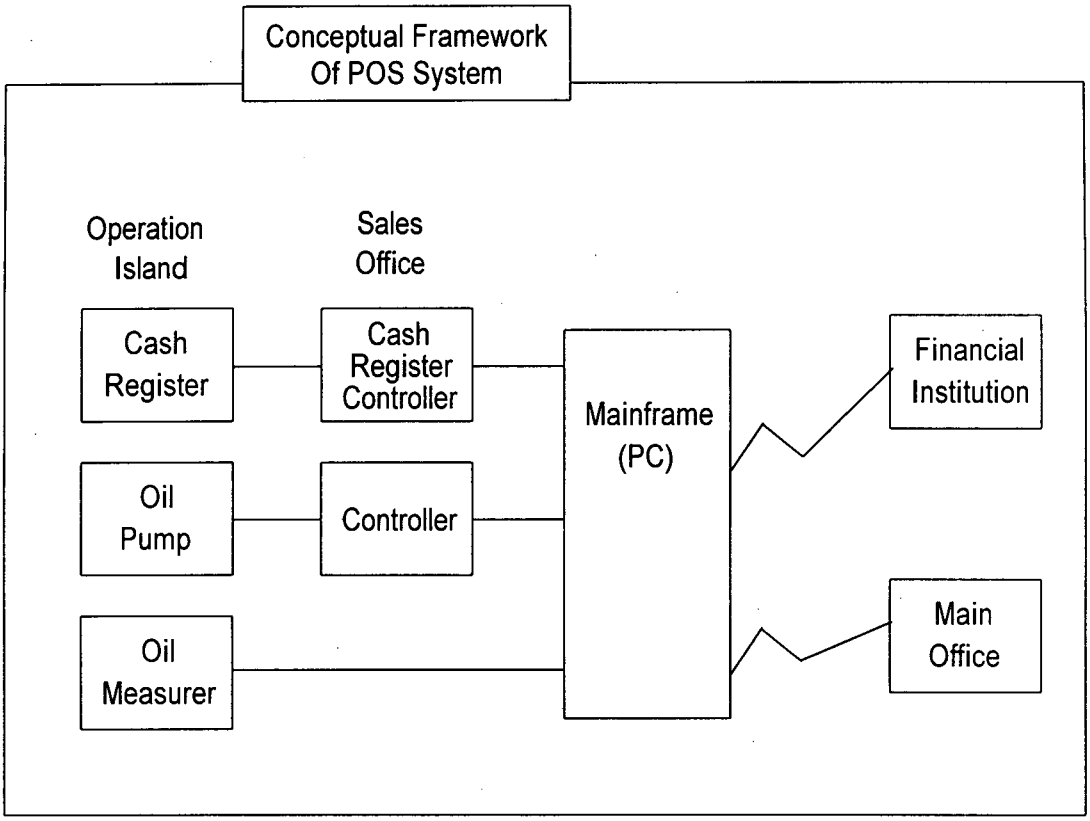

Figure 1. Conceptual Framework of POS System

Quality Function Deployment(QFD)is a structured methodology that uses several layers of matrices to translate customer requirements into specific quality design and manufacturing requirements for total customer satisfaction[1,3,4].

Shen, T. Shi, and Q. Luh (1994)mentioned that improvement of POS implementation time was from average 98 days/station to 40 days/station in Taipei, and the target value was 55 days/station by using brainstorm approach[5].

3.'Quality Function Deployment'Approach

During the planning process, several major procedures of QFD can be outlined as follow:

(1) Expected quality deployment

The survey results from questionnaire survey using KJ method will be orgnised into several categories based on the natural relationship between each requirement item. The

expected quality deployment can be illustrated in Figure 2.

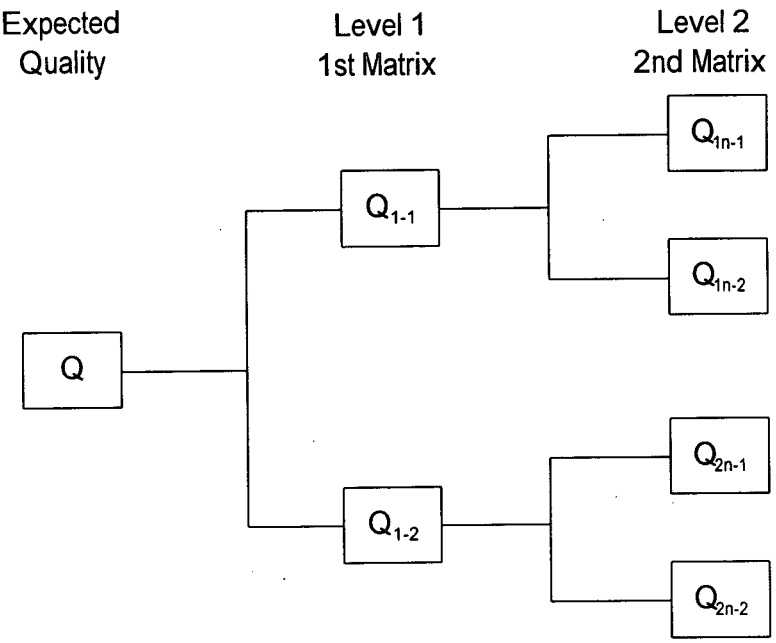

Figure 2. Expected Quality Deployment

(2) Decide the weight using survey data

Based on the survey results, each user's desire is assigned an importance rating, ⊙ (important), △(less important) and ×(irrelevant).

(3) Reality check and evaluation for improvement

(4) Assessment and the results comparison

4.Case Study

This research uses 16 POS petrol stations located in the Taichung area as the sample for this case study. The average time each station needed for the implementing process is 76 day originally[Appendix]. Its improvement procedures are outlined as follow:

(1) Expected quality deployment and importance rating

To reduce the implementation time for each station, it is necessary to use practice and operating categories for further analysis. The importance rating of 5 main factors and 18 Sub—factors are evaluated in following table 1:

Table 1. Expected Quality

Expected Quality—Reduce the Implementation Time						weight
No.	First time	No.	Second time	No.	Third time	
1	Operating Practice	11	Psychology factor	111	computer phobia are fairly common among the staff	⊙
				112	the staff can not make use of what they have been trained for	⊙
				113	lack of confidence in using computer	⊙
				114	the shifting system does not allow consistent training	⊙
				115	staffs are resistant to learn the new technology	△
				116	different attitude among the staff toward new system	△
		12	Operation factor	121	lack of crisis handling ability	⊙
				122	a lot of data input mistakes	⊙
				123	staffs do not familiar with nonroutine operations	⊙

2	Concurrent Operations	21	Equipment factor	211	do not have stable communication network	△
				212	old and out-of-date system and equipment	△
		22	Management factor	221	no standardized operating methods	⊙
				222	do not have clear management hicrarehy and job description	⊙
				223	A lot of mistakes in file processing system	⊙
				224	do not have thorough and accurate Accounting processing system	⊙
				225	The format of document do not consistant	⊙
		23	Other factor	231	Do not have enough back up system	×
				232	High mobility of the staff	△

(2) The first improvement

The main focus of first improvement is to ensure the successful promotion and introduction of POS system. The data of pre—and post—improvement can therefore be summarised as the following table 2:

Table 2 .First Improvement

Comparison Items	Personnel Training	Operating Practice (day)		Concurrent Operation (day)	Total (day)
		On Site Guidance	Self Operating		
Before Improvement	1	15	7	54	76
First Improvement	2	12	14	20	48
Variance	+1	-3	+7	-34	-28

(3) The second improvement

After the first improvement, the average time has been reduced from 76 days to 48 days. However, there still exist some space for further improvement. In conclusion, these two attempts of improvement can be summarised in following table 3:

Table 3 .Second Improvement

Comparison Items	Personnel Training	Operating Practice (day)		Concurrent Operstion (day)	Total (day)
		On Site Guidance	Self Operating		
Before Improvement	1	15	7	54	76
First Improvement	2	12	14	20	48
Second Improvement	2	10	16	8	36
Average	2	11	15	14	42

5.Conclusion

This research uses QFD to reduce the implementation time of POS system, its results and major achievement are outlined as follow:

(1) first improvement: the average time per station was reduce from 76 days to 48 days.

(2) second improvement: the average time per station was reduced from 48 days to 36 days.

In Conclusion, one important tangible result has been accomplished, in which the achievement rate reaches 162%(55days as target). It is based on the following calculation:

(76days－42days)/(76days－55days)×100%=162%

References

1. Akao, Y., 1990, "Quality Function Deployment" *Integrating Customer Requirement into Product Design,* Productivity Press, Massachusetts.
2. Chinese Petroleum Corp., *Handbook*, Taipei, 1997.
3. Hauser, J. R. and Clausing, D. 1988, "The House of Quality" *Harvard Business Review*, 66(3), pp. 63-77.
4. Lawrence P. Sullivan, 1986, "Quality Function Deployment" *Quality Progress*, Vol, No.6, pp. 39-41.
5. Shen, T. Shi, and Q. Luh, 1994, "Improvement of POS Implementation time by QCC" The *43th Quality Coference*, Taipei.
6. Takei, F., 1988, "POS System Now Used in Wide Range of Store" *Business Japan*, 33(10), pp. 53-56.

Appendix :Implementation time of 16 petrol stations POS in Taichung

No.	Name of station	Finish Day of Set-up	Personnel Training	Operating Practice		Start Day of Test	Concurrent Operation (day)	Start Day of Implementation	Total (day)
				Guidance	Self-Operate				
1	Chungmig	2/1/95	1	28	32	3/1	62	6/27	123
2	Chnha	2/8	1	20	19	3/27	72	7/30	112
3	Fuhsing	4/7	1	19	15	5/16	50	8/8	85
4	Kuokuag	4/15	1	32	20	5/12	52	8/9	105
5	Wenhsin	4/23	1	18	12	4/25	42	8/3	73
6	Yungping	5/8	1	8	5	6/16	50	9/8	64
7	Wuchuan	5/10	1	11	3	5/22	30	8/18	46
8	Peitun	5/26	1	22	35	7/20	29	9/3	87
9	Chiencheng	6/5	1	10	11	7/17	27	10/9	49
10	Lushun	6/13	1	11	4	6/24	40	9/21	56
11	Shenyang	6/25	1	10	3	7/6	56	9/29	70
12	Houkou	7/7	1	20	26	8/28	52	9/21	97
13	Taya	7/18	1	25	6	8/20	60	9/21	92
14	Nantun	7/26	1	18	11	8/23	38	9/29	68
15	Szuping	8/10	1	14	13	9/14	34	10/7	62
16	Tunghsing	8/28	1	10	5	9/8	11	10/18	27
Total			16	272	220		705		1,216
Average			1	17	14		44		76