Total Quality Management System Evaluation based on the Quality Consciousness of the Participants
-참여자 품질인식에 근거한 종합적품질경영시스템 평가 -

Jeong, Sang Ho*
정 상 호
Kim-Nung Jin**
김 능 진

요 지

최근 국제무역질서에 있어 국제화, 세계화는 가속화되어가고 있으나 국내 산업계의 생산성과 효율성등은 이에 미치지 못하고 있는 실정이다. 따라서 경영층의 강력한 리더십 및 종업원의 자발적인 참여를 바탕으로 종업원과 고객의 만족을 동시에 추구하여 궁극적으로는 조직의 장기적 발전에 초점을 맞추고 있는 TQM개념[Richard, 1993]의 도입이 급박한 상황이며, 실제로 많은 기업이 이의 도입을 추진 또는 완료하였다. 이미 도입이 완료된 기업에 대해서는 지속적인 평가 및 개선이 요구된다 하겠다. 본 논문에서는 대덕연구단지내의 K 엔지니어링사를 대상으로, 조직구성원들의 품질시스템에 대한 인식 및 자체적인 평가에 근거하여, K 엔지니어링사 품질경영시스템상의 문제점도출 및 이의 개선책을 제시하고자 하였다. 본 논문에 적용된 평가모델은 TQM을 적용하는 유사기업들에서도 활용할수 있으리라 사료된다.

1. Introduction

The recent international tendency, toward rapid opening and globalization in the economic and trade industries forces countries to expedite the approach to quality management in order to overcome the fierce economic and trade competition. The use of past quality control activities are no longer germane to the present quality environment. In Korea, our government is also trying to turn over to quality management from previous quality control through the revision and rearrangement of the related laws.

In this research, K company, which had already established a quality management system using international quality assurance codes (ASME NQA-1) [4] similar to the present ISO 9001 codes [5], was selected and a questionnaire survey concerning the personal consciousness for total quality and quality system evaluation was conducted. For the personal consciousness concerning total quality, questions were asked about three personal characteristics, personal leadership, planning, and improvement [Craig, 1993]. The quality system evaluation is based upon an assessment of seven different factors concerning the company's quality management system : leadership, information and analysis, strategic quality planning, human resource development and management, quality

* QE Dept., Korea Atomic Energy Research Institute
** Dept. of Business Administration, Chungnam National University

assurance products and services, quality results, and customer satisfaction [Mark, 1990].

In the response analysis, the verification for reliability of each factor was determined in advance and then the response was analyzed based on the demographic characteristics.

The correlation between the personal consciousness for total quality and quality system evaluation result was reviewed.

Finally, the notable problems from the survey were summarized and some remedial actions were suggested.

2. Questionnaire on quality management system of K company and analysis.

2.1 Outline of K company and its QA System

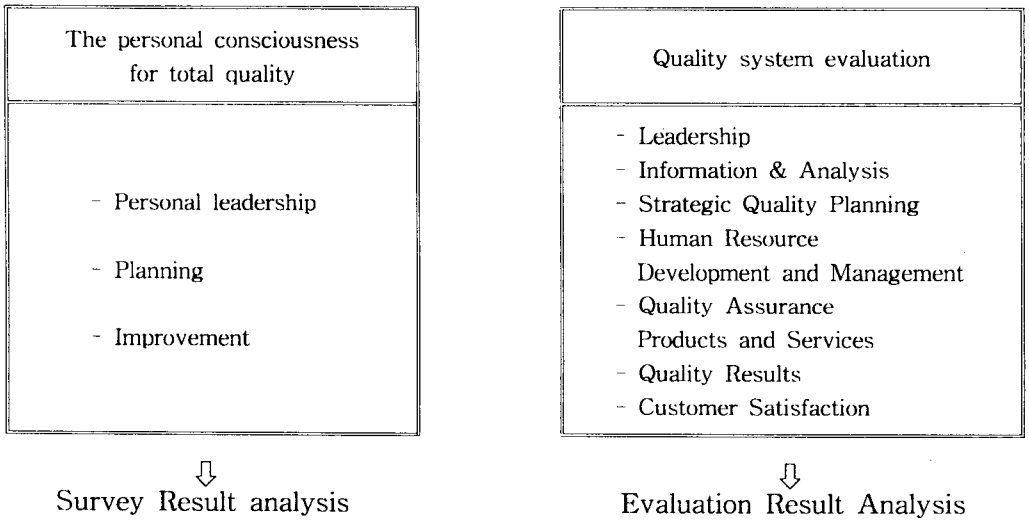
K company is one of the Korean engineering companies whose main activity has been to design and develop the core parts of nuclear power plants since the latter half of the 1980's. The QA activity of the K company is carried out in accordance with the QA program which reflects the requirements of Korean nuclear law, the American ASME NQA-1 (American Society Of Mechanical Engineers Nuclear Quality Assurance) and contract with the customer. Among them, ASME NQA-1 is the principal code which was reflected in the QA program. Even though the K company does not follow the ISO 9000 requirements directly, the ASME NQA-1 code which was reflected on their QA program is greatly analogous with ISO 9000 codes, especilly with ISO 9001 code which is the most inclusive code among the ISO 9000 series except for some factors such as contract review, customer supply control, after service and statistical technique. So it will be appropriate to regard the QA system which meets the ASME NQA-1 code requirements as the QA system which meets the ISO 9001 code requirements [2]. <Table 1> shows the comparison between ISO 9001 code and ASME NQA-1 code.

<Table 1> Comparison table between ISO 9001 and ASME NQA-1

No.	Elements in the ISO 9001	Corresponding parts in ASME NQA-1
1	Management responsibility	B-1, 1S-1
2	Quality system	B-2
3	Contract review	
4	Design control	B-3 3S-1
5	Document and data control	B-5, B-6, 6S-1
6	Purchasing	B-4, B-7, 4S-1, 7S-1
7	Control of customer-supplied product	
8	Product identification and traceability	B-8, 8S-1
9	Process control	B-9, 9S-1
10	Inspection and testing	B-10, B-11, 10S-1, 11S-1&2
11	Control of inspection,measuring and test equipment	B-12, 12S-1
12	Inspection and test status	
13	Control of nonconforming product	B-14,
14	Corrective and preventive action	B-15, 15S-1
15	Handling, storage, packaging, preservation and delivery	B-16 B-13, 13S-1
16	Control of quality records	
17	Internal quality audits	B-17, 17S-1
18	Training	B-18, 18S-1
19	Servicing	B-2, 2S-1,2,3 & 4
20	Statistical techniques	

2.2 Questionnaire survey

In this study, a questionnaire survey was conducted on the people who perform quality related activities based on the QA system which meets the requirements of ASME NQA-1 code to ascertain the evaluation result of participants for the QA system of K company. Also, questions about the personal consciousness for total quality were given and results were reviewed for several features. <Figure 1> shows the schematic outline for this study.



<Figure 1> Schematic Outline of Study.

The questionnaire items for personal consciousness for total quality were adopted from Craig Nathanson (1993) and shortened from the original 30 questions to 12. The questionnaire for the QA system was adopted from Mark Graham Brown (1990) and shortened from the original 85 questions to 33. The shortening of the questionnaire items was based on the judgement that some questions can be merged into one due to their similarity and will thus enhance the concentration of surveyed people.

In this questionnaire, five point Likert scale (strongly disagree : 1, disagree : 2, neither agree nor disagree : 3, agree : 4, strongly agree : 5) was used. The questionnaire was distributed to 180 persons (56%) out of 323 persons and 138 persons (77%) responded. Among them 120 responses were finally selected after excluding some inconsistent responses. <Table 2> shows demographic characteristics of selected persons.

<Table 2> Demographic characteristics of sample.

Characteristic	Classification
1. Sex	Men 114(95%), Women 6 (5%)
2. Marriage	Married 109 (91%), Unmarried 11 (9%)
3. Age	20's 13(11%), 30's 93(77%), 40's 13(11%), 50's 1(1%)
4. School	Under BS 2(2%), BS 39(32%), MS 69(58%), Ph.D 10(8%)
5. Years of continuous service	0-3 years 28(23%), 4-6 years 28(23%), 7-9 years 54(45%), Above 10 years 10(9%)
7. Position class	Junior 36(30%), Senior 79(66%), Principal 5 (4%)
8. Main job	Design 78(65%), Technology coordination 13 (11%), Project Management 10(8%), QA,QC 14(12%), Others 5(4%)

For verification of the reliability of the questionnaire items, the Cronbach alpha coefficient was checked and the results showed that there is sufficient homogenity between items in each factor. <Table 3> and <Table 4> show the Cronbach alpha coefficient of each factor.

<Table 3> Cronbach alpha coefficient of the items for persnal consciouness for total quality

Factor	Leadership	Planning	Improvement
Cronbach alpha coefficient	0.678	0.657	0.781

<Table 4> Cronbach alpha coefficient of the items for quality system evaluation

Factor	Leadership	Information & analysis	Strategic Quality planning	Human resource development and management	Quality assurance products and services	Quality results	Customer satisfaction
Cronbach alpha coefficient	0.798	0.747	0.843	0.800	0.847	0.821	0.822

2.3 Response Analysis

Personal consciousness for total quality turned up fairly positive in the order of personal leadership, planning, and improvement. However, total results for quality system evaluation indicates a little negativity. Especially the quality assurance system for human resource development and management was evaluated more negatively.

Personal consciousness for total quality shows a declining trend with increasing age. Persons in their 20's evaluated the management leadership most negatively but for 30's

and 40's, the human resource development and management was most negatively evaluated.

Personal consciousness for total quality by academic background does not have significant difference. In quality system evaluation , the Ph.D group tends to evaluate QA system negatively compared to the other groups. Generally the higher their academic background, the more negative their QA system evaluations with the evaluation of human resource development and management by the Ph.D group especially negative.

The result shows the similarity of the personal consciousness for total quality by the participants whose continuous service period is under ten years. However, for those with over ten years service, it dropped slightly. The QA system evaluation is negative according to the increase of continuous service period, and the most negative factor was management leadership for the under 3 years group and human resource development and management for the other groups.

Personal consciousness for total quality by the project management group is relatively low compared to the other groups. For the QA system evaluation, the design and QA, QC groups are comparatively positive but the technology coordination and project management groups are relatively negative.

2.4 Correlation analysis

Between the total personal consciousness for total quality, that is, the total consciousness for the personal leadership, planning, and improvement and the total evaluation of QA system, that is, total evaluation of leadership, information & Analysis, strategic quality planning, human resource development and management, quality assurance products and services, quality results and customer satisfaction, there was a significant correlation as shown in <Table 5>.

<Table 5> Correlation between total personal consciousness for total quality and total quality system evaluation

Correlation coefficient = 0.258
P < 0.05, n = 83

In the position class, the significant correlation between total personal consciousness for total quality and total evaluation of QA system was shown only for the participants whose

position class is above senior as shown in <Table 6>.

<Table 6> Correlation between total personal consciousness for total quality and total quality system evaluation of above senior participants

Correlation coefficient = 0.326
P < 0.05, n = 60

Regarding continuous service period, the significant correlation between total personal consciousness for total quality and total evaluation of QA system was apparent only for the participants whose continuous service period was 7-9 years.

<Table 7> Correlation between total personal consciousness for total quality and total quality system evaluation of participants whose continuous service period is 7-9 years

Correlation coefficient = 0.384
P < 0.05, n = 36

From <Table 6> and <Table 7>, we can see that the correlation between total personal consciousness for total quality and total evaluation for QA system begins to appear after the participants have experienced a fairly long time in the organization and have become accustomed to their QA system.

With consideration of main job, the correlation appeared only for the participants whose main job was design as shown in <Table 8>.

<Table 8> Correlation between total personal consciousness for total quality and total quality system evaluation of participants whose main job is design

Correlation coefficient = 0.356
P < 0.05, n = 49

3. Conclusion

This research, based on the analysis of a questionnaire concerning the personal consciousness for total quality and quality system evaluation, found several problms and suggests some remedial actions for the quality system of K company located in Daeduk Science Town.

First, the overall quality system evaluation shows some deficiencies. This appears to be due to a lack of continuous improvement in the quality system and a lack of an aggressive understanding and participation of employees, including management, in quality activities. Secondly, among the quality system elements, the evaluation of the management leadership and utilization of human resources and their training was the worst of all aspects evaluated by the junior and senior employees. Thirdly, the quality activity is usually performed by the QA, QC, and design departments personnel. This means that the personnel in the technology and project control departments who are the direct contact points with the customer are not positively involved in quality activity. Fourth, effective management of human resources to help the employee's self-development and practical indoctrination and training to help the employee well understand the quality system are not carried out satisfactorily.

In response to the noted problems, some remedial actions are suggested : First, personnel in the management and technology and project control departments should be more positively involved in the quality activity. Secondly, the quality system of K company needs to be reviewed and supplemented in many aspects, especially with regard to management leadership and resource utilization systems. Thirdly, the quality activities in the technology and project control departments need to be activated. Fourth, based on the comparatively worst evaluation on the human resource utilization, it is judged that employees desire effective management of human resources and practical indoctrination and training. If the recommended indoctrination and training are performed, more attention should be given to personnel in the technology and project control departments and junior employees.

Finally, this research has two limitations. One is the small sample size. Since the scope of this research was limited to the K company, the number of the population, and accordingly the sample size were not sufficient. The other limitation was the quality system standard of K company. In this research the ISO 9000 standards were recommended as the reference standard in establishing the TQM system of the organization. However, the K company referenced the ASME NQA-1 standard, which was reviewed and reported as similar to the ISO 9000 standards, instead of the ISO 9000 standards.

References

[1] Craig Nathanson, "Are You a Total Quality Person ?," *Quality Progress*, pp.117-119. 1993.

[2] Factory Mutual Engineering Association, "TG Report ISO9000/NQA-1 Comparison," 1991.

[3] Mark, G. B, "How to Determine Your Quality Quotient," *The Journal for Quality and Participation,* pp. 76-80. 1990.

[4] ASME NQA-1, Quality Assurance Program Requirements for Nuclear Facilities ,ASME. 1989.

[5] ISO 9001, Quality Systems-Model for Quality Assurance in design/development, production, installation and servicing, ISO. 1987.

[6] Richard, S. J, "TQM : Management Processes for Quality Operations," ASQC Quality Press, pp. 9-10. 1993.