

# A Study on the Application of the Quality Function Deployment in Organizations —a methodical approach for TQC—

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## ABSTRACT

An important problem to be carried into a plan on the occasion for introduction of TQC is to establish the clear-cut policy and workable system on QC.

In connection with escalation the product liability in recent days, especially, a point to be considered in relation the real state of enterprise, it seems likely to be difficult an effective performance without distribution of the definite quality function to each departments in the company, and to define the quality function, it should be educed and coordinated under agreement organization wide participation and conciliation.

In this paper, we have tried to have a more effective graft the European style QC on the oriental enterprise, by means of presenting a model that manages synthetically a way of deployment the fundamental factors affecting quality, and establishing the control subject in each function unit.

## 1. Introduction

To apply Quality Control systematically to management as a useful tool, a synthetic and systematic project is needed for all departments producing quality problems. In this respect, the design of TQC program is the most basic condition of Quality Control and the main task that the Quality Control department must study.

This study, at the stage of introduction and plan which is closely related with human resources, the subject of industrial organization, and organization characteristic, will show the problems and it's solution that the oriental nations using Chinese characters like Korea have.

## 2. Organizational Characteristic of Control

### (1) Characteristic in Organization

The control in organization is insignificant beside "Human", whether the object is quality or cost. Davis explains that "Business performance=Human performance×Physical factor", and March & Simon explain that for organizational equilibrium, the positive motivation that members would stay in that organization work when the inducement which the organization gives to members is more than the contribution from the members or the same, and that otherwise the negative motivation to desert from the organization will be appeared.

McGregor insists in his The Human Side of Enterprise that "many managers would agree that the effectiveness of their organizations would be at least doubled if they could discover how to tap the unrealized potential present in their human resources".

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The problems in constructing TQC program are that the characteristic of individual and group is different from every nations, and that the difference between the East and the West is much. Considering the fact that Quality Control has been introduced and developed from the West, the important key to control task can be found easily.

Generally, Korea is compared with the West in following organizational characteristics.

- 1) Primary human group such as family unit is prior to individual.
- 2) the control pattern is person-oriented rather than task.

The behavior of the role of leader in organization has great effect on not only quality problems but also job satisfaction of members. Stogdill distinguishes behavior pattern between person-oriented leadership and task-oriented leadership. Korean is accustomed to the former pattern traditionally.

- 3) Result is prior to process.

This is the characteristic phenomena after emphasizing industrialization policy. This view sometimes becomes the factors that commit errors in organizational control because the human factor is neglected.

- 4) Characteristic of political and cultural environment.

This means that the resistance to change resulted from the old history and frequent attacks from other nations and the tendency of conservative consciousness.

**(2) control**

Feigenbaum presents four steps of control.

- 1) setting standards
- 2) Appraising conformance
- 3) Acting when the standards are exceeded
- 4) Planning for improvements

But this basic steps of control have to be developed considering the enterprise organizational characteristic of specific nation. Otherwise the effective Quality Control cannot be expected. Furthermore, in the days when the quality demand of the consumer more various, upgraded and nationalized, the more effective organizational control is needed for management of 9M's : Markets, Money, Management, Men, Motivation, Materials, Machines and mechanization, Modern information methods, Mounting product requirements, the basic elements which have great effect on the quality.

The horizontal scope of total quality control of TQC is needed for this organizationwide control. Because the scope of the integration of quality effort extends from initial consumer quality definition to assurance of actual consumer-product satisfaction, it might be thought of as "horizontal", in an organization-chart sense.

The reason of the necessity of controlling organization is proved by the empirical data that the quality problems produced from outside the scope of traditional quality control departments reaches more than eighty percents.(fig. 1)

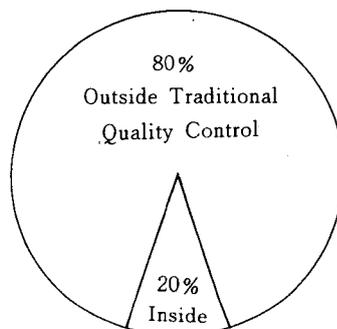


Fig. 1 Quality Problems Requiring Improvement

### 3. Control Responsibilities and Problems of each department.

To establish TQC system in the Enterprise, the quality function of each department has to be clearly allotted and be practiced. This is the premise to clarify the responsibility of each department precisely for TQC and the basic material of controlling method to perform this quality function.(Fig. 2)

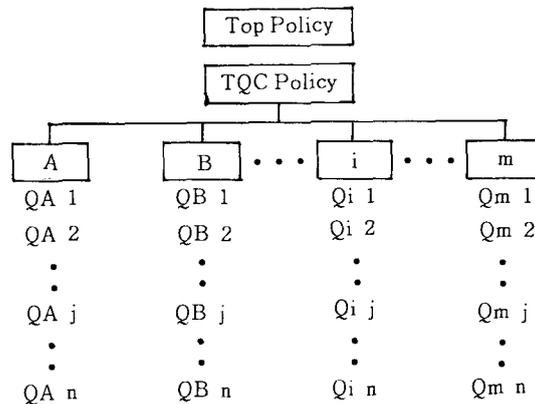


Fig. 2 Horizontal Quality Function

If the quality function of department are n, the organizationwide quality function can be presented as  $\sum \sum Q_{ij}$  (Q: quality function) the division of quality function is easy, but duplications and omissions are many, and though divided, it is often conceptual and abstract. The contents of the division of quality function which can be seen in Tabel 1 investigation of quality function. The subjects of investigation are nineteen staffs in small and medium company.

Table 1. Division of Quality Function

| Quality Function                      | Department      |                       |                    |                      |               |           |                    |                 |       |           |          |                 |             |         |
|---------------------------------------|-----------------|-----------------------|--------------------|----------------------|---------------|-----------|--------------------|-----------------|-------|-----------|----------|-----------------|-------------|---------|
|                                       | Quality Control | Technical Development | Design of Products | Production Technique | Manufacturing | Materials | Production Control | Sales Technique | Sales | Institute | Planning | Mechanic Design | Engineering | Control |
| 1. Analysis of Cause of Claim         | 9               | •                     | 1                  | •                    | 3             | •         | •                  | •               | 5     | •         | •        | •               | •           | 1       |
| 2. Development of New Products        | •               | 4                     | 6                  | •                    | 1             | •         | •                  | •               | •     | 6         | 2        | •               | •           | •       |
| 3. Introduction of New Technique      | •               | 6                     | 1                  | •                    | 1             | •         | •                  | •               | •     | 3         | 8        | •               | •           | •       |
| 4. Establishment of Product standards | 3               | •                     | 14                 | •                    | 1             | •         | •                  | •               | 1     | •         | •        | •               | •           | •       |
| 5. Decision of Special Adopting       | 10              | •                     | 2                  | •                    | 1             | 6         | •                  | •               | •     | •         | •        | •               | •           | •       |
| 6. Change of Manufacturing Equipments | •               | •                     | •                  | 10                   | 4             | •         | •                  | •               | •     | •         | 2        | 1               | 2           | •       |

Most of enterprises which I investigated besides the enterprises in Table 1 don't have much differences with the contents of Table 1.

After making the staffs who answered this investigation discuss the results of the division of quality function, I summarized the results like Tabel 2.

Tabel 2.

| Priority | Contents  |
|----------|---|
| 1        | Uncertainty in the responsibility boundary. (imputation)  |
| 2        | Passive attitude in the ordinary job performing.  |
| 3        | Frequent Overlapping and omitting of jobs and the resulting too many conferences and meetings for coordination. |
| 4        | Difficulty in evaluation of job performance and the lack of informations.                                       |
| 5        | Weakening of checking function between organization.  |
| 6        | Etc.  |

The organization, which has "predictable problems" like Table 2, makes hard to make the systematic promotion of organizationwide quality control program, which requires a new type of TQC program to solve such problems.

Feigenbaum also in his six steps to organize QC function, depicts three prior steps as follow.

First : Define the company quality problems for whose solution the organization is being created.

Second : Establish the objectives that the organization must achieve if it is regularly to solve three problems.

Third : Determine the basic work elements that must be accomplished in meeting the organization objectives.

Classify these work elements into an appropriate number of basic functions.

#### 4. Functional Control by Quality Function Deployment

##### (1) Inherent problems in QC organization.

Inherent problems in QC organization pointed out easrlier, are summarized as follow, Without which the effective quality control could hardly expected.

Tabel 3.

| Category                       | Problems   |
|--------------------------------|--|
| Behavioristic Characteristics  | <ul style="list-style-type: none"> <li>- Psychological structure of group over individual.</li> <li>- Person-oriented control pattern rather than task-oriented.</li> <li>- Rashness in expecting results before process.</li> <li>- Other characteristics in political and cultural environment.</li> </ul>                             |
| Organizational Characteristics | <ul style="list-style-type: none"> <li>- More familiarity with group thinking and group performing than individual performance.</li> <li>- Importance of the horizontal connection in the department quality function and the limit of responsibility.</li> <li>- Work contents should be based upon organizational function.</li> </ul> |
| Importance of Quality          | <ul style="list-style-type: none"> <li>- Varification, upgrading, and Internationalization of required quality level.</li> <li>- Importance of non-product quality, affecting quality of products.</li> <li>- Sectional and grade specification of organization</li> <li>- wide quality function.</li> </ul>                             |

## (2) Quality Function Deployment

The first requirement of successful organization control should be paying full considerations to the characteristics of each member, since an organization is first of all an aggregate of individual human beings. consequently, the systematic approach to solve the problems in Table 1 to 3 may be based upon the following QFD(Quality Function Deployment).

Here, the quality function is defined as "a collection of activities through which we achieve fitness for use," and the quality function evolution can be defined as "a function pursuit and analysis system for the top policy by defining the mutual agreeable quality function to be achievement of sectional and grade management aims and it's actual process." It is different from function analysis of VE in that the former deals with organization instead of products.

Step 1. To find out primary function.

Primary function is the basic function of each department, the loss of which will bring about the nullification of the *raison d'être* of each department. It is the most uperfunction of all other necessary ones and the first requisite in the realization of management aims. The form of total participation with brain storming method is highly recommendable, where it's possible, and both the function already performed and the function to be performed should be considered together.

The persons responsible for the performance of primary function will be director in case of large enter prises or department chiefs in case of small and medium enterprises.

Step 2. To spcify the primary function.

Specify not the job contents, but its functions. Use predicate + objective form. Function means the aim or role of a work.

Step 3. To evolution the ways and means of primary function into the secondary functions.

The secondary function is the lower function the perform the upper one and its aim should be the primary function. In the same level, there exist several ways of connection, but the order of P—D—C—A cycle is most recommendable.

Step 4. To repeat like Step 3, 3rd level, 4th level, ..., nth levels.

nth function is the ultimate one which cannot be evolutioned any further. In this process, the functions which are not performed in the respective departments are turning up and they should be arranged and classified into the subject of company standarization. Because the company standarization has as its objects the functions which are not performed currently, although they should be performed.

Step 5. To examine the relationship between ends and means, and the interrelationships in the primary function, management aims, and work division.

It should be checked out that the performance of nth function can bring about the achievement of n-1th function.

Step 6. To synthesize and control the function evolution of each department and gain the approval of person in charge.

Functions of each department may be overlapped or omitted, which should be corrected through meetings between departments. For example, the functions of production control department can be performed by quality control department.

## (3) Decision the control points of functions and the means of controlling.

The arrangement of department quality functions is followed by the choice of concrete and objective ways of performing them. Control points should be decided as the means of performing each respective function, and the performance are the indices of function performances.

Each control point consists of aims, control materials, checking point time, importance and control method which are summarized into the form of Table 4.

**Table. 4**

| (1)<br>Control<br>Subject | (2)<br>Aims | (3)<br>Control Material |                        | (4)<br>Checking<br>Timing | (5)<br>Importance | (6)<br>Control<br>Method |
|---------------------------|-------------|-------------------------|------------------------|---------------------------|-------------------|--------------------------|
|                           |             | Material                | Person<br>in<br>Charge |                           |                   |                          |
|                           |             |                         |                        |                           |                   |                          |

(1) One control subject for one function is a general rule, and if it's necessary, one subject for more than two functions are still possible.

(2) According to the rule of management by objectives, express the possible aims concreteness and correct measurement, which are relevant to management aims and reflect the opinions of the person in charge.

(3) Record the material which will be the data of control subject.

(4) Checking should be done once a day or once a week etc.,

(5) Each control subject should be marked with A, B, C, or 0, 00, 000, according to the degree of importance. These weighted points function as the basic of performance evaluation.

(6) Prefer the concrete and statistical ways of explaining, avoiding the abstract and conceptual ones. Recording and judgement should be clear without any vagueness. SQC method is highly recommendable where it's possible.

**(4) Characteristics and Merits of QFD**

The effective use of QFD method relies on understanding of its own peculiar characteristics and merits. Characteristics of QFD are; designing approach from functional point of view; analysis and control system connecting ends and means together, participation of total members behavioral scientific method of endowing motivation and group consciousness. Its merits which were proved through actual practice are as follow.

- 1) Company's policy, department function and the method of execution become made clear.
- 2) Overlapping and omission of department functions can be excluded.
- 3) Duty, responsibility and authority in each step become specified.
- 4) The object and range of company standardization may possibly be decided.
- 5) Troubles between relevant department are decreased.
- 6) Decreasing the time for meeting and conference.
- 7) The establishment of organizationwide control system become possible upon the basic of traditional psychological structure.

**5. Conclusion**

In the phase of TQC introduction, special care should be taken to the specification of the policy of total quality control and the establishment it's promoting system. With the recent increase of product liability and the necessity of performing organizationwide quality control, specification of quality functions among various department is the first premise of effective quality control program. It must be decided through the open discussion of whole members, not depending upon the indication of QC staffs or experts. QFD is a TQC promoting model, which applies VE method to the analysis of organization. This method shall be developed further, being an appropriate approach model for other oriental countries as well as Korea.

### Reference

- (1) Stogdill, R., *Handbook of leadership*, N. Y. : Free Press, 1974.
- (2) Feigendbaum, A. V., *Total Quality Control*, 3rd ed., McGraw-Hill, New York, 1983.
- (3) Juran, J. M., and F. M. Gryna, *Quality Planning and Analysis*, 2nd ed., McGraw-Hill, 1980.
- (4) McGregor, D., *The human side of enterprise*, McGraw-Hill, 1960.
- (5) Lee, H. S., "A study on the method of applying the way of VE for TQC," *Journal of the KSQC*, 11(1), 1983.
- (6) Sullivan, L. P., *A System to Assure that Customer Needs Drive the Product Design and Production Process*, Quality Progress, June, 1986.