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Common Process Management based on the TQM Matrix and Three Dimensional Unification Value Model

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Abstract

Generally, TQM (Total Quality Management) is used worldwide and recognized. However, contents of activity are various, and it is very difficult for organization to define the whole assessment scope of TQM. On the other hand, we have participated in the development of international standard for supporting the quality requirements and evaluation of system in ISO/IECJTC1/SC7. In the previous study, we suggested the concept of TQM matrix and the view point of Three Dimensional Unification Value Models for evaluating system. Based on the previous study, in this paper, we would like to propose the common process management based on the consideration of TQM matrix and view point of three dimensional integrated value models.

Keywords: Common process, TQM matrix, New TQM, TDUVM, PDC.

Contribution/ Originality

This study originated the new formula of "common process" for total quality management. The characteristic of this paper is that the suggestion of "common process" that can manage the quality of organization management system based on the concept of new TQM matrix. Furthermore, the "common process" to suggest certified it and inspected that it was applicable to quality improvement, risk management, project management.

1. Introduction

Generally, for quality improvement of an organization management, TQM (Total Quality Management) is used worldwide and recognized. The TQM has spread in U.S.A. in the 1990s, and to provide a high quality and suitable price of product and service at appropriate good timing for a customer satisfaction.

The biggest aim is covering all processes from a plan, the design stage of the product to production, sale, maintenance, service and manages the quality of the product generally, and it is to aim at the effective and high quality management. The TQM clarifies requirements for the management quality of the organization by the examination standard for ex, American Malcolm Baldrige Prize (American Malcolm Baldrige Prize Criteria for Performance Excellence, 2014) and Japanese management quality prize etc. now. However, contents of activity are various, and it is difficult for organization to define the whole scope of TQM. It is very important that the activity theme about the TQM is based on the consideration of the needs and priority from the objective requirement, which should correspond to the basic consideration of quality management. If we have defined the wrong theme, and miss understanding about importance and priority of target for TQM, as a result, it may cause a significant risk in the organization management.

For example, the company which got a high evaluation about the quality of management causes poor management and disgraceful affair after several years, and there is the case reaching the bankruptcy.

Such a situation has the risk to give many stakeholders concerned including the stockholder who misjudged a vast loss. We worked on a study for improvement of quality requirement and evaluation of system for many years, and have participated in the development of international standard for supporting the quality requirements and evaluation of system in ISO/IECJTC1/SC7. In recent years, we have worked on developing the ISO/IEC25000 (SQuaRE) series (Esaki, 2013) of standards for quality requirements and evaluation for system and software product for a long time in ISO/IEC JTC1 (Joint Technical Committee 1 of the International Organization for Standardization and the International Electro technical Commission) SC7WG 6 (software and systems engineering under ISO technical committee, working group six). On the other hand, definition of system is "a combination of interacting elements organized to achieve one or more stated purposes" defined in ISO/IEC15288: 2008 Systems and software engineering - System life cycle processes. Based on the definition of system, organization having a specific purpose is a kind of system, too. Therefore, it is thought that evaluation technique of the system quality is adaptive for a quality evaluation of the organization management. Above considerations, in the previous study, we

suggested the concept of the TQM matrix (Esaki, 2013; Esaki, 2015) and TDUVM (Three Dimensional Unification Value Models) (Esaki, 2013; Esaki, 2013) based on the concept of system quality.

In this paper, we would like to propose the Common Process Management for TQM based on the consideration of both TQM matrix and TDUVM. Furthermore, this paper proposes the result of verification about Common Process from the viewpoints of TDUVM process for domain of TQM matrix.

2. General Concept of Quality

2.1. Target Entity of Quality Control

Figure 1 show the basic concept of quality control that shows the relationships between process and product, and concept of the PDC cycle. From figure 1, every activity includes a product and a process. In addition, an input and outcomes of process are included in the activity of organizations. Also, the quality control activity makes the repetition of product and process, which include a "product - process - product - process and product" during a PDC cycle as shown in figure 1. Output product of a process before becomes an input product for the later process.

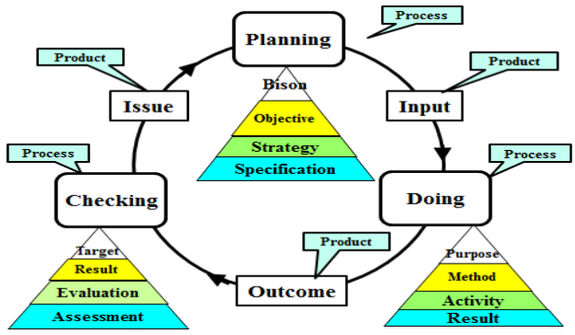

Figure-1. Concept of quality control

-PDC Cycle

It is necessary to turn the PDC cycle called the inspection to improve the quality of product and process to show in figure 1. It should visualize a quality state of a product and process for turn a PDC cycle, and it is necessary to confirm the existence of problems. For the purpose of improvement of a process, it is necessary to evaluate that quality of input resources and outcomes are essentially. Therefore, it is necessary to evaluate both quality of a product of the company activity and the process in the TQM.

2.2. Concept of New TQM

In the previus study (Esaki, 2013) we have proposed the new framework of TQM, that is necessary to lead an organization for success of improvement from such a viewpoint and considerations. Figure 2 is the overall framework of the new TQM which is proposed previous study (Esaki, 2013). From figure 2, five target domains of process management such as "Quality assurance, Quality improvement, Static risk management, Investment management (ex. Dynamic risk management of Project) and Top management" and four target domains of product such as "Input, Outcomes, Constrain and Resources" of organization activity has systematized. In the framework of new TQM, the leadership of top management in the center of figure 2 and locate four process as quality assurance, quality improvement, risk management, investment management in the circumference.

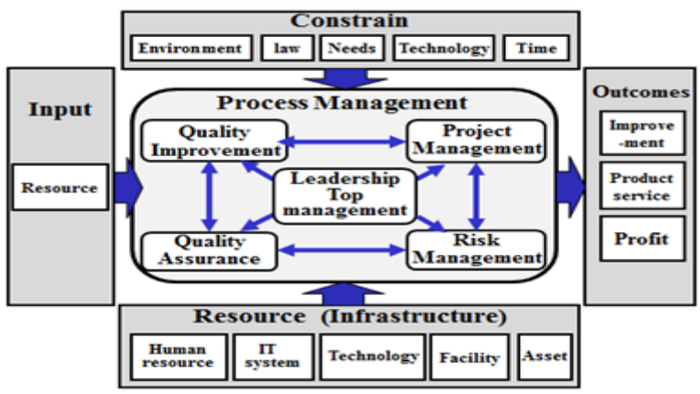

Figure-2. Total Framework of TQM

From figure 2, "input resources, outcomes and each domain of management process" has systematized. Furthermore, figure 2 show the framework of whole TQM, which include such as the organization activity and conversion process from input into the outcomes. The risk management of project and investment management has been handled as the specific management theme and out of scope of TQM.

Based on the framework of new TQM. Following process management should be performed.

-Quality of top management process: The quality of top management.

-Quality assurance process: Activities of assurance of the primary quality of product and process that are specified and promised according to the contract of customers at past and present.

-Quality improvement process: It is a target domain of the quality improvement for product and process such as the QC (Quality Control) circles which have been performed conventionally.

-Risk management process: It is the target domain called static risk management conventionally. It may cause future problem by the influenced from problems or issues of product or process (the deficiency of the requirement procedure) of the present organization and is generally called risk management.

-Investment(Project) Management process: The domain of the quality of the investment, it is a domain called the investment management (or project management) conventionally. The management of the investment risk is generally handled dynamic risk management of projects included in the scope of Project Management.

3. General Concept of Process Management

3.1. Concept of Problem and Issue

Figure 3 shows the concept of "structure of problem and issue" by suggested previous study (Esaki, 2013; Esaki, 2015).

The cross axle shows the present and the future in time axes, and the vertical axis shows a volume of positive effect or negative effect (a loss) by the influence of occurred problem. As shown in figure 4, the problem may cause a negative effect at present, and a more serious negative effect (a loss) will be at risk of the minus number to be connected in it. On the other hand, issue may cause big problem in future even if the issue does not have a negative effect (a loss) at present. An issue is actualized as a positive effect in the future when we make the improvement plan for expected positive effect and perform it.

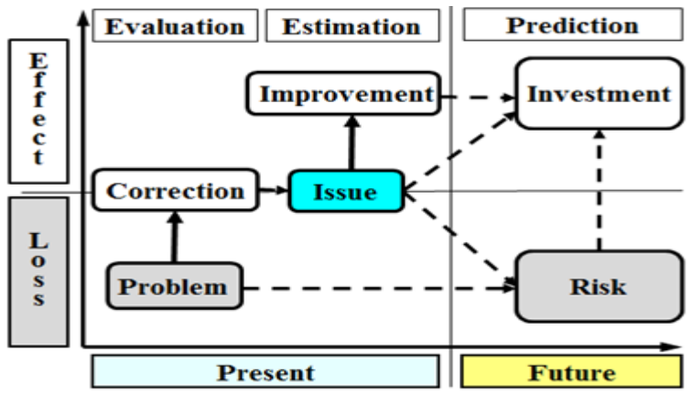

Figure-3. Concepts of Problem, Issue and Risk

3.2. Concept of Target Domain of Process Management

3.2.1. Concept of TQM Matrix

Figure 4 show the more detail and devised domain of new TQM matrix (Esaki, 2013; Esaki, 2015) which has introduced based on the structure of quality management as explained in figure 3.

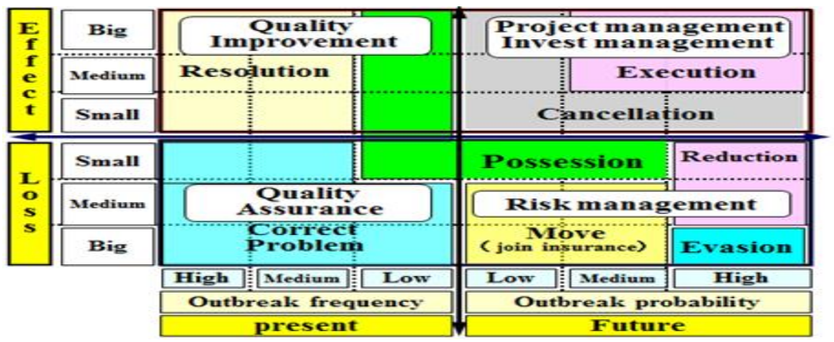

Figure-4. Total Quality Management Matrixes

The time of the cross axle of figure 4 can sort with the outbreak probability of the phenomenon more finely. On the other hand, an effect and loss can be defining more detail in the vertical axis on a scale from the view point of influence of problem. Based on the consideration of figure 4, matrix of the whole target domain of the TQM can be defined. The management domain of process for TQM has covered both quality assurance and quality improvement conventionally that has been intended. Also, additional management domain of process such as investment (ex. project management) and the static risk management should be covered in figure 4. Risk is defined as the scale of the damage and probability that a problem will produce in future when occurred.

3.2.2. Concept of Target Domain of Process Management

Based on the consideration of TQM matrix shown in figure 4, the whole target domain for process management of new TQM can be defined. The management domain of process for new TQM has covered both quality assurance and quality improvement conventionally that has been intended. Also, additional management domain of process such as investment (ex. project management) and the static risk management should be covered in figure 4.

Target Domain of Quality Assurance

An activity of guarantee of quality corrects a problem shown in figure 4, and should secure quality of normal state. The activity to guarantee the quality of the products such as intermediate or final product and process such as the deficiency of the procedure of the specified plan, and aim of contract of customer should be achieved. Quality of output product and process should be achieved with the promised cost and the appointed date of delivery. It is usually necessary to correct problem promptly because the guarantee of quality responsibility (defect responsibility) based on the contract may cause a problem or has produces the negative effect (a loss). A quality assurance is the required activities that perform surely in the organization.

Target Domain of Quality Improvement

It is a domain of the quality improvement such as the QC (Quality Control) circles which have been performed conventionally. This activity solves the issue that an organization holds, and to raise it in attractive quality of product of the organization and the second quality of the process, and to meet an expected requirement. The issue does not produce the negative effect at that point, but may cause positive effect, if we can improve it. We perform the improvement of the issues which actualized in the past or at present that an attractive quality of product or the more effective procedures. And, it is necessary to consider the priority of the aim because defect responsibility does not necessarily occur. We can perform a priority in consideration of the importance, emergency degree and can go ahead through the improvement. The remaining problems are limited as far as there is a contract with customers, but issue may not always disappear.

Target Domain of Static Risk Management

It is a domain called risk management conventionally. It may cause future problem by the influenced from a product (the intermediate, final) or the process (the deficiency of the requirement procedure) of the present organization and is generally called as risk management. Risk is defined as the scale of the damage and probability that a problem will produce in future when occurred. When we do not hit any measures and improve the present conditions, it is a problem or negative effect (a loss) that will occur in future by the turn of inside situation or change of outside environment of organization. It is called "static risk" in this study.

We investigate a risk of product and process of the present based on result of risk analysis to a static risk and risk assessment by calculating the outbreak probability and scale of the damage at the time of the outbreak quantitatively and estimates it. In addition, as for the risk measures, it is necessary performing based on the consideration of the priority from the effectiveness and limited input resources. And to perform "reception, imputation, reduction and evasion" of four risk measures correspond to the result of risk analysis as shown in TQM Matrix.

Target Domain of Investment Management (or Project Management)

The domain of the quality of the investment activity, it is a domain called the project management or investment management conventionally. The management of the investment risk is generally handled as risk management of the projects. The project can be called the investment activity to get a positive effect to expect in the future. The degree of the "positive or negative effect" is caused by the influence of project when we perform the measures expecting positive effect. Therefore, investment management risk can be called dynamic risk. From figure 4, the dynamic risk is defined on the "probability and scale of an effect" when it occurred by the project which produce an expectation or negative effect by taking new action for improvement.

3.3. View Point of Common Process Management Based on the TDUVM

Figure 5 shows the concept of TDUVM (Esaki, 2013; Esaki, 2013) for specifying and evaluating a quality of process based on the consideration of three axis of figure6. In this model, the three kinds of axis such as "Planning", "Doing (Execution)", and "Checking (Evaluation)" have defined for quality assessment of process.

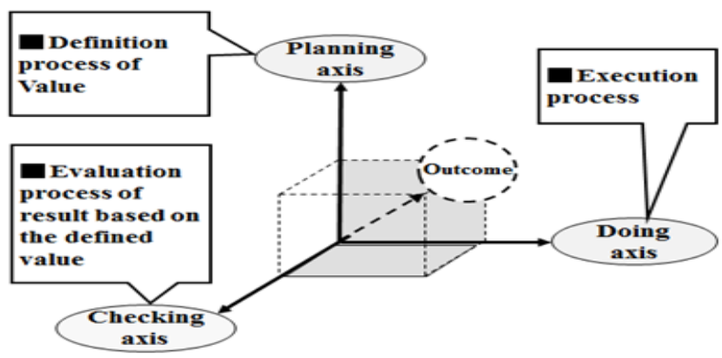

Figure-5. Concept of Three Dimensional Unification Value Model for process

-Planning axis: Performance of planning process for defining suitable targeted value (purpose) of Figure 6.

-Doing axis (Execution): Performance of execution process for achieve defined plan.

-Checking axis (Evaluation): Performance of evaluation process for taking suitable result based on the plan.

"Planning axis" indicate the quality of planning process, which the process to achieve the ultimate plan, such as purpose, objective, schedule and budget. The "Doing axis" represents the quality of execution process to achieve objectives of defined plan. The "Checking axis" represents the quality of evaluation process to take suitable result of evaluation based on the defined plan. From figure 6, total quality of process for company could be indicated by volume of the cuboids or the vector, by using the "Planning axis", "Doing axis" and "Checking axis"

4. Common Process Model Based on the TQM Matrix and TDUVM

Figure 6 shows the concept of common process based on the concept of TQM Matrix.

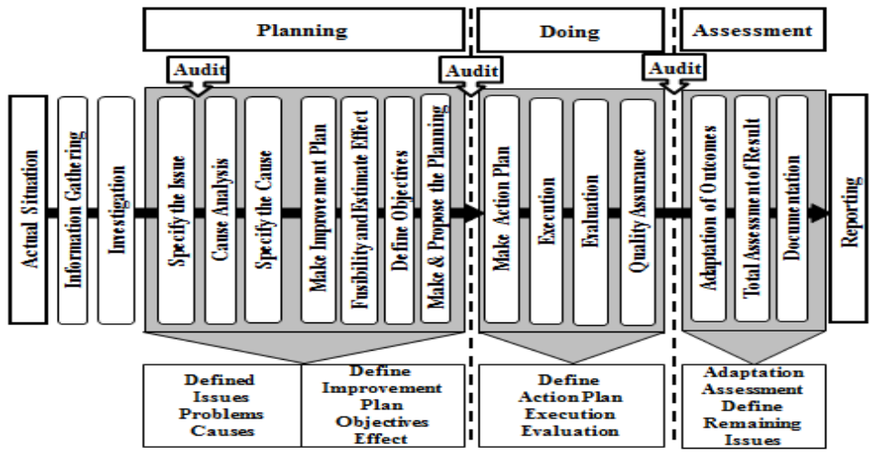

Figure-6. Concept of Common Process

Based on the consideration of TQM Matrix, following common management process can be defined commonly to the four target domain of process management. Because, deference between four target domain of process are only effect or loss of vertical axis on a scale and only outbreak probability of the phenomenon of the time of the cross axle. Also, based on the consideration of TDUVM, common process can be defined correspond to the three process such as Planning, Doing and Evaluation of Three dimensional unification value models. Figure6 is the common and universal process that you should carry out when you would like to correct or improve a problem. At first, in order to solve an issue, what you should gather an information and perform a confirmation of situation. And should identify a problem, a risk, identification of the investment theme. In order to identify a problem, we should confirm a realization of "primary quality of a product and a process". On the other hand, in order to identify an issue, we investigate the needs of interested stakeholders and we identify the issue that we should improve to realize second quality from it. Static risk is the outbreak of the big loss in the future when we ignore the problem without hitting any solutions. On the other hand, the investment theme is the issue that the big result can be expected in future if we solve the issues.

An important thing is that the later solutions and measures are different among a problem, issue, risk and investment theme. Therefore, it is very important to identify a problem, an issue, a risk and an investment theme accurately without mistake. If we take the wrong identification of the issue, we have the risk of postponing a problem of the primary quality that should correct promptly. On the other hand, if we mistake an issue and risk, the theme of low priority may cause the wasting a business opportunity with precious financial resources. Next, if we can identify an issue, it is necessary to identify a true cause causing the problem.

Solution is the activity to remove the disincentive of the cause of a problem, an issue, a risk and an investment theme. The solution to remove a cause when we take the wrong identification of the true cause is not a correct solution in question without it being the effective solution. If we could identify a cause, we should identify a main cause from that. We should clarify the solution to remove a main cause causing a problem next. If solution plan to remove a cause become cleared, we should predict the effect when we carried out it. Solution plan should be made with priority by the consideration about urgent degree and cost-effectiveness. Generally, the solution to problem has to correct it promptly without postponing it.

If we carry out the solution and solve the causes, problem can be finally zero because the problems are limited. On the other hand, issues cannot be zero forever because the needs of the interested stakeholder about an issue, a risk and the investment theme exist. Therefore, it is necessary to carry out the solution assigned priority for an issue, a risk and an investment theme by considering emergency, the need, cost-effectiveness from the limitation of limited financial resources.

5. Verification of Common Process

Table 1 shows the result of comparison between proposed common processes of each four target domain of TQM Matrix. From table 1, differences between processes of each domain of TQM matrix are only view point of product.

Table-1. Comparison of Assessment Method of TQM for Process

Three Dimension	Common Process	Target Domain of Process Management based on the TQM Matrix			
		Problem	**Issue**	**Risk**	**Investment (Project)**
	Define the Target Entity	Environment or Situation or needs or history			
Plan	Information Gathering	Collect to necessary information for the purpose of target entity			
	Investigation & Analysis	Estimation & Prediction & Analysis			
	Identified the Requirement	Problem	Issue	Risk	Investment
	Cause Analysis	Cause Analysis and Assessment			
	Identified the Cause	Identify the most important Cause			
	Making Measures and Planning	Planning for solving problem	Planning for improvement of issue	Planning for Risk management	Planning for investment or Project
	Estimate and Predict Effect	Fusibility study & Effort Analysis and Assessment			
	Requirement specification	Define Purpose & Objectives			
	Making Summary Plan	Define Organization & Schedule & Budget			
Do	Making Execution Plan	Resolution plan	Improvement Plan	Risk measures plan	Project execution plan
	Execution	Perform action based on the plan			
	Evaluation	Assessment & Evaluation the Outcomes of activity based on the plan			
	Quality Assurance	Verify & Confirm the result			
Check	Adaptation of Outcomes	Adapt the outcomes to specific context use			
	Total Assessment of Result	Assessment the result of activity			
	Documentation	Make a report of result of activity			
	Reporting	Reporting & Presentation			

Concerning Requirement specification process, differences are only limited to the content of objectives.

Also, Making plan and action plan, differences are only limited to the content of planning.

On the other hand, other processes without requirement specification and planning, differences cannot be recognized. Therefore, proposed standardized common process can be used to each target domain of new TQM commonly.

6. Concluding Remarks

In this study, we suggested the standardized common process that it was necessary to really perform from the viewpoint of TQM Matrix for different activity theme of the process management which has been pushed forward conventionally. From the result of the comparison as shown in table 1, proposed standardized common process can be used to each target domain of TQM Matrix. And it is very important to identify the real cause and defining the suitable purpose and making the plan for each target domain of TQM Matrix. In the future study, we would like to try making the example of adaptation of new TQM for corporations.

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