Study on the Organizational Structured Problem Solving on Total Quality Management

Kairong Liang & Qi Zhang

SAIC GM Wuling Automobile Co., Ltd

Add: 18 Hexi Road, Liuzhou 545007, Guangxi Province, China

E-mail: kairong.liang@sgmw.com.cn

Abstract

The structured problem solving is important methodology in quality improvement. This article discuss the problem solving should be approached in a structured manner using team. Firstly, discuss the concept of problem and structured problem solving. Secondly, descript the base of structured problem solving is the Deming circle: PDCA. And introduce the Bank's 6 steps process of the problem solving. Thirdly, discuss the important of a structured manner using team in problem solving. Fourthly, discuss the argument about the problem solving. Finally, appraise the view of structured problem solving in critical way. And give an example of Toyota how to setup a practical problem solving process and integrate the quality management systems. Through the study, we can learn that when the companies try to meet or exceed customers' needs and expectations, they often need to face different kinds of problems. The structured problem solving is important methodology to fix the problem and improve the quality. And we also need to think about to integrate the problem solving process in the framework of TQM, and understand important of the organization structure in problem solving. And the zero defects are also a good concept and practical way to reduce the quality problem in an organization.

Keywords: Organization structure, Structured problem solving, Total quality management, PDCA, Error& mistake-proofing (Poka-yoke)

1. Introduction

Quality now plays an important role the strategy of organization. Increasing the customers' satisfaction has proved the target of TQM. Most of the organizations are seeking the way to achieve the target. And recent years, the people in TQM have been recognized as the key factor of success to improve the organization performance.

The structure problem solving is most useful way to continuant improving the performance of organization. Through many years practice, the structure problem solving has become a systemic solution for quality improvement. With the TQM technique and idea developing, there are some arguments about the structured problem solving. This article will discuss the structure problem solving in the team in system perspective.

The purpose of this article is to literature review: the concept of structure problem solving, the functions of teams in structured problem solve, the arguments about using structured problem solving, and appraise the way of applying the methodology in the Oakland's (2003) framework of TQM.

2. The theory about the structured problem solving

2.1 The influence of organization structure on TQM

Before the structured problem solving to be study, it is necessary to understand the influence of organization structure on TQM. Dale (2002) described the main issues of sustaining TQM, and the organization structure is the one of main five categories. The influences in the category of organization structure include:

1) Positioning of quality function: The size and role of the quality function will relate to the effect of implement of structure problem solving.

2) Departmental, functional and shift boundaries: The boundaries and barriers between the departments define the form of problem solving teams.

3) Communication: Communication plays an important role in the process of problem solving.

4) Job flexibility and cover: Job flexibility and cover relate to the ability of the team numbers to solve the problem.

5) Supervisory structure: Supervisory structure was the key factor to improve the efficiency of problem solving

process.

2.2 The methodology of structured problem solving

2.2.1 Concepts

It should be important to understand the concept of problem and structured problem solving. Through study some material about TQM, it is known that a problem is defined as a discrepancy between an existing standard or expectation and the actual situation.

GM have define the concept of structured problem solving as a structured process that identifies, analyzes, and eliminates the discrepancy between the current situation and an existing standard or expectation, and prevents recurrence of the root cause.

2.2.2 Structured problem solving methodology

Deming, Julan and Crosby have developed the structured problem solving methodology in the early years of the quality revolution. (Evans and Lindsay, 2005) .Through the structured problem solving, identifying the root cause and implement a solution that prevents recurrence and contributes to quality continuous improvement. Within the quality development, there are the deferent forms of the problem solving methodology, but most of they show many common themes. And the basis of the methodology is the Deming's PDCA. Dale even said the best-know problem solving cycle is PDCA (Dale 2003).

2.2.3 The procedure and the tools of structured problem solving

Base on the Deming cycle, Bank (1992) have developed the common procedure of the structured problem solving, which will give us a snapshot of the structured problem solving. Bank said that there are 6 steps in the problem-solving process. They should normally be taken in sequence (See the Figure 1).

Step 1: Identifying and selecting problem. Firstly, it is necessary to define a problem as the difference between the target and the actual. A problem report should be written base on measurements.

Step 2: Analyzing the problem cause. In this step, only spend time on finding the cause(s) and not to go to think about the solutions.

Step 3: Generating potential solutions. It is necessary to explore alternatives because only one solution is not good enough.

Step 4: Selecting and planning the best solution. Makes sure the right people do the right things at the right time and planning the best solution results in low cost.

Step 5: Implementing the solution. Seeing the job through to conclusion is necessary, with appropriate contingency planning in case some of the new ideas do not quite work out.

Step 6: Evaluating the solution. Reviewing the results is very important, that will be sure the problem really has been solved.

3. Problem solving in a structured manner using team

3.1 The importance of teamwork in TQM

Most of time, the individual can't to control the quality problems in the organization. The reason is most of the problems are system problems, these problems are generated in the frame of organization. The system often keeps in the way of staffs who are trying to do a good job. It is hard to solve the problem by simply telling the people to do better (Kanji and Asher).

It is easy to understand that the excellent organizations pay a more attention to the value of people working together in teams. Teams can do better through integrated problem solving and efforts. Teams are a useful tool of management, and also are most effective when team activity is match to organizational strategy. So, the strategy should be communicated to team directly, for example, Using of Business Plan Development (BPD) and Scorecards to understand the teams' mission in the organization (Oakland, 2003).

Teamwork is a key factor of any TQM approach. There are a many kinds of teams with different characteristics in TQM quality continue improvement. The teams' superior performing can be used at different phases of development of TQM. Some teams are in one functional business and focus on limited problem solving potential. Others are cross-functional teams and have wide mission (Dale and Bunney, 2003).

3.2 Problem solving base on team

When the companies try to meet or exceed customers' needs and expectations, they often need to face different

kinds of problems. For example, most of auto firms may find that the customers want more functions but low prices. Toyota found that such problems can be solved better by a team than by an individual. Problem solving base on teamwork will be benefit from different viewpoints, divide the work by the team numbers' ability and "brainstorm" possible solutions with one another. The large worldwide electronic company, Motorola is one company that has led the way in team problem solving. Each year, Motorola holds a team competition at which more than two thousand teams from Motorola's worldwide operations and problem solving compete (Vonderembse and White, 1996).

3.3 Types of Teams in the structured problem solving

It is important to understand at this time that although teams come in various forms, they need to enhance the cross-functional, objective, factual implementation of strategy. (Petrick) The quality units or teams usually occur in three forms: Quality circle teams, problem-solving project teams, and Quality improvement teams:

1) Quality circle: A quality circle is a group of employees doing similar work, leaded by one supervisor. Each week, they come together in one or two hours to discuss their quality problems, generate solutions and implement them with the support of management (Caplen, 1988).

2) Problem-solving project teams: When high level leadership identifies the main problems of organization, they setup up a project team to address the issue and solve the problem (Dale, 2003).

3) Quality improvement teams: The team members can be comprised from different departments, customers and suppliers. The goal of such teams has various topics but focus on eliminating waste and non-value-added activity, improving productivity, and improving quality (Dale, 2003).

3.4 Developing effective teams in the structured problem solving

How to make sure that teams work effectively and efficiently need to be discussed, Dale has given the following factors should be considered (Dale, 2003):

1) Such teams should get the support from leadership.

2) The aims and objectives of the teams should be understood by the teams' numbers.

3) The team numbers must be trained the skills and tools of problem solving.

4) The team should be disciplined and should have and utilize a set of method of problems solving based on fact and not opinion.

4. The arguments against using a structured problem solving

The structured problem solving methodology has developed several decades, it is natural that some arguments against using a structured problem solving. The main arguments come from Shingo Shigeo. Shingo is best known for his Error& mistake-proofing (poka-yoke) and resource inspection system. He is the exponential of the zero defect quality control concept. His opinions like the following.

4.1 The argument about the problem solving process

The structured problem solving process has long lead time. Firstly need to use the statistical tools need to inspect the samples,   identify the problem and analysis the root cause of problem, generate the potential solutions, then make out the action plan, to fix the problem. In the modern automotive product line, two minutes will product one unit. There have produced large volumes product with defects before the error has been fix.

4.2 The argument about the Deming circle

The Deming Circle is the base of structure problem solving. The argument either that the Deming Circle does not recognize the control function, like that a similar control function is inherent in the Deming Circle's "Do" phase, but many people tend to take "Do" function at face value. Accord to this opinion, at the stage of control and execution, the approach would permit us to expect quality maintenance, but not quality improvement. So the problem solving is hard to contribute to improve quality, then we would have to prevent the problem occur in the phase of product design (Shingo, 1986).

4.3 The technique of poka-yoke

Base on the above discuss, it is easier to understand the significance of installing poka-yoke devices before production launch. There is no doubt that poka-yoke techniques constitute an effective means of regulating wide variations in quality. That, however, is a quality maintenance function. Anyone wishing to improve quality will have to give consideration to poka-yoke at the planning stage (Shingo, 1986). It is known that the important of the quality tools (Shingo, 1989).

1) Prevention is also keys to an effective Problem Solving Process.

2) To be successful in preventing recurrence the Root Cause-or root of the problem must be identified and eliminated.

5. Critical appraisal of the structured problem solving

5.1 Systemic perspective on the structured problem solving

What is the good attitude of implementation the structured problem solving? It is necessary to understand the framework of TQM. We should have systemic perspective to structured problem solving implementation in the influence of organisational structure on TQM. Firstly, it is necessary to understand the purposes of organized problem solving in a TQM framework (Bank 1992). Secondly, the benefit of structured problem solving in teams (Source for the GM training documents) .Finally, Integrate structured problem solving into TQM. It is necessary to understand the TQM framework and the model in implementation of the Dealing with the problem. Set out clearly the required quality standard in variables and standards. Table1. As follows

5.2 Setup structured problem solving process

The problem-solving process is a natural and logical sequence for overcoming quality problems and improving the standard of decision making. It is also a guide for identifying which total quality management methods to be applied. Problems, no matter what their size or complexity, can best be solved by proceeding through a sequence of steps (Kanji and Asher).

In the Fig 2, there are 7 steps of structured problem solving process in Toyota. That will be the benchmark for us to understand the structure problem solving process (Liker 2004).

1) Initial Problem Perception: Before the five-why analysis can begin, practical problem solving requires you to clarify the problem or, in Toyota terminology, grasp the situation.

2) Clarify the problem (problem breakdown): This may include prioritizing a number of different problems in a Pareto analysis. The Pareto diagram uses bar graphs to sort problems according to severity, frequency, nature, or source and displays them in order of size to show which problems are the most important. It is probably the most often used statistical analysis tool within Toyota simple, but powerful.

3) Locate the Point of Cause (PoC): At this point you also want to set targets for improvement. Then you make a first attempt at identifying the point of cause (POC).

4) The 5 why tool: At Toyota, a five-why analysis is often used as part of a seven-step process they call problem solving.

5) Countermeasure: implement a countermeasure

6) Evaluating: evaluate the results

7) Standardizing: does it become part of a new standardized approach, the seventh step standardizing the new process is very important at Toyota.

5.3 Education and training in the organization

Education and training are key factors in total quality management, if teams start to look at quality management problems without proper training they will lose their way and become disheartened. If the quality problem is not identified accurately and the TQM method selected for solution based only on data analysis, then the problem will not be eliminated forever (Kanji and Asher) .

6. Conclusion

By study, we found that the structured problem solving play important role in TQM, we should setup the common structured problem solving process for the organization. And the teams also are the key fact to success implying the structured problem solving methodology. We need to choose the manner teams to solve the problem in the organization.

References

Bicheno, J. (2002). *The Quality 75: Towards Six Sigma Performance in Service and Manufacturing.* PICSIE Book.

Dale, Barrie G. (2003). *Managing quality - 4th Ed.* Oxford: Blackwell Publishers

Juran, J.M., & A. B. Godfrey. (1998). *Juran's quality handbook.* 5th Ed.New York: McGraw-Hill.

Liker, J. K. (2004). *The Toyota Way: 14 Management Principles from the World's Greatest Manufacturer.* New

York: McGraw-Hill.

Monden Yasuhiro. (1998). *Toyota production systems.* 3rd Ed.. London: Chapman & Hall

Oakland, J. S., & L. J. Porter. (1995). *Total Quality Management, text with cases.* Oxford: Butterworth-Heinemann.

Ross and Perry. (1999). *Quality management text cases and readings.* London: St. Lucie Press.

Shingo, Shigeo. (1986). *Zero Quality Control: Source Inspection and the Poka-yoke System.* Cambridge: Productivity Press.

Shingo, Shigeo. (1989). *.A study of the Toyota production system from an industrial engineering viewpoint.* Portland: Productivity Press.

Slack, N., et.al. (2004). *Operations management. 4th Ed.* Edinburgh: Pearson Education Limited.

Taiichi Ohno. (1988). *Toyota Production System: beyond large-scale production. Cambridge:* Productivity Press.

Womack J., et.al. (1990). *The Machine That Changed the World.* New York: Rawson Associates.

Table 1. Systemic perspective on the structured problem solving

The purposes of organized problem solving in a TQM framework	1. To improve a company's performance by successfully solving problems that is causing dissatisfaction for internal or external customers.
	2. To ensure that problem solvers do not jump to solutions before they have analyzed the cause(s) of the problems.
	3. To provide a process that can be used by project teams to maximize the contribution from each individual.
	4. To implement solutions to problems that really does eliminate the problems through prevention processes.
	5.To reduce the cost of quality
The benefit of structured problem solving in teams	1.Appropriate People Involved in Solution
	2.Focus on Elimination of Root Cause vs. Implementation of Temporary Fixes
	3.Applies to All Types of Problems
	4.Creates a Culture of Strong Problem Solving
	5.Creates a Culture Where All Are Involved in Continuous Improvement
	6.Provides a Formal Communications and Follow-up Tool
The understand of TQM framework and the model in implementation of the Dealing with the problem	1. Often it will be necessary to collect data, which will then be analysis.
	2.When all or most of the facts are known, possible solutions can be considered;
	3. Next the ideas must be sorted out.
	4. Now the proposals must be sold to management.
	5. Once approval has been given, the proposals can be implemented.

- Define deviation between 'actual' and 'target'
- Write statement of the problems
- Prioritize

- Monitor results
- Restart process if necessary

Identifying and selecting problem
1

- Sort symptoms and causes
- Collect data
- Fishbone-cause and effect analysis
- Brainstorm
- Prioritize

Evaluating solution
6

Analyzing Problem Causes
2

Implementing solution
5

Generating potential solutions
3

- Project control
- Maintain commitment
- Plan contingencies

Selecting and planning solution
4

- Brainstorm
- Analyze potential helps and hinders
- Build on each other's ideas

- Prioritize solutions
- Resources/costs
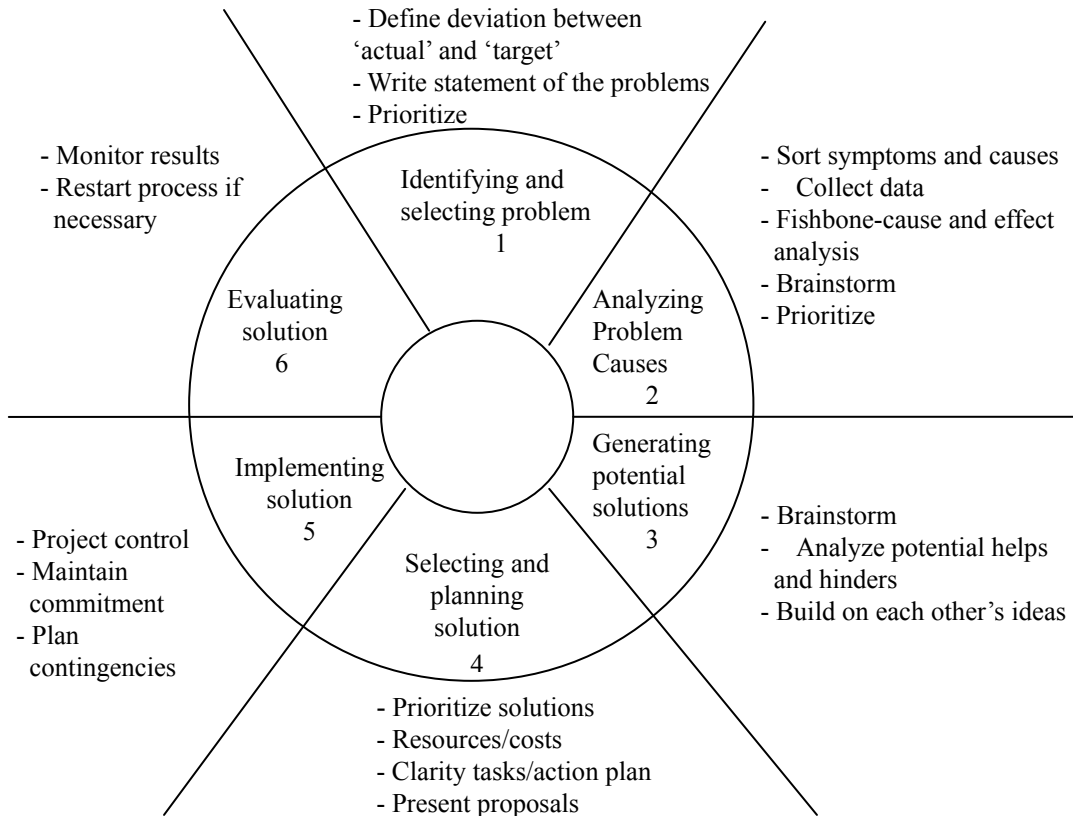- Clarity tasks/action plan
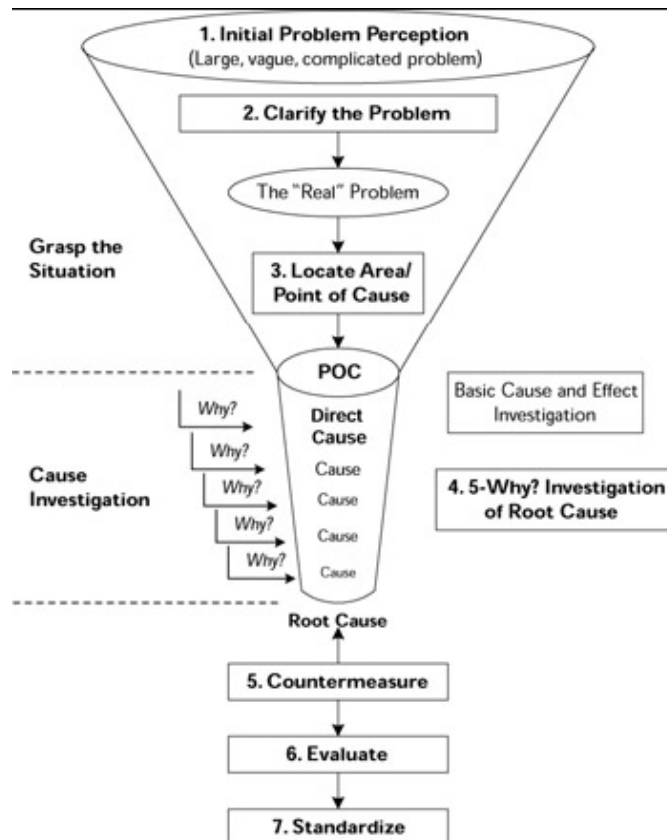- Present proposals

Figure 1. The Problem-Solving Process (Bank, 1992)

Fig 2. The structured problem solving process in Toyota