

## ANALYSIS SYSTEM OF CONTINUOUS IMPROVEMENT IN QUALITY AT TOYOTA

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**Abstract:** *The concept of the TQM philosophy is focus on continuous improvement (KAIZEN). Kaizen is a system of continuous improvement in quality, technology, processes, company culture, productivity, safety and leadership. Kaizen is based on making little changes on a regular basis: always improving productivity, safety and effectiveness while reducing waste. Kaizen involves setting standards and then continually improving those standards. To support the higher standards Kaizen also involves providing the training, materials and supervision that is needed for employees to achieve the higher standards and maintain their ability to meet those standards on an on-going basis. In this sense this article present a analyses to determine causes and practical problem solving in seven step at Toyota.*

**Keywords:** continuous improvement, quality, PDCA, processes.

### INTRODUCTION

Traditional systems operated on the assumption that once a company achieved a certain level of quality, it was successful and needed no further improvements. We tend to think of improvement in terms of plateaus that are to be achieved, such as passing a certification test or reducing the number of defects to a certain level.

Traditionally, change for American managers involves large magnitudes, such as major organizational restructuring. The Japanese, on the other hand, believe that the best and most lasting changes come from gradual improvements. To use an analogy, they believe that it is better to take frequent small doses of medicine than to take one large dose. Continuous improvement, called kaizen by the Japanese, requires that the company continually strive to be better through learning and problem solving. Because we can never achieve perfection, we must always evaluate our performance and take measures to improve it. A approaches that can help companies with continuous improvement is the plan –do– check – act (PDCA)

### CONTINUOUS IMPROVEMENT (KAIZEN)

Key features of Kaizen:

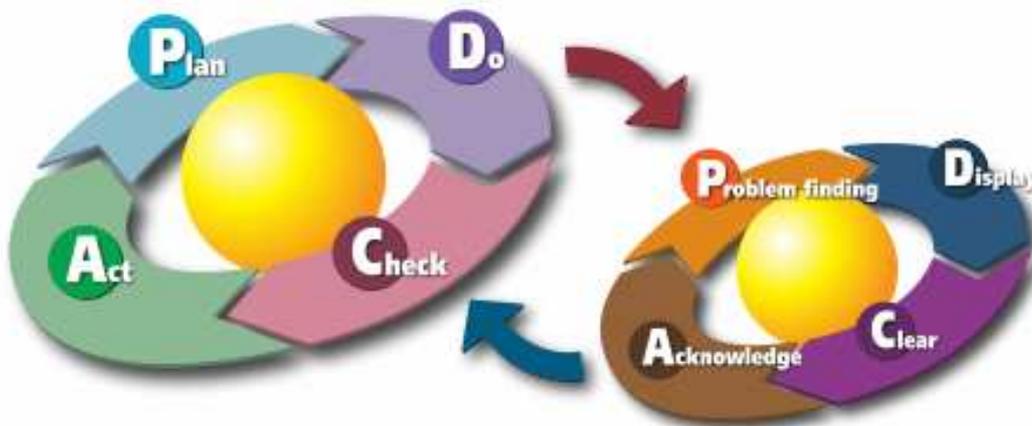
- Improvements are based on many, small changes rather than the radical changes that might arise from Research and Development
- As the ideas come from the workers themselves, they are less likely to be radically different, and therefore easier to implement
- Small improvements are less likely to require major capital investment than major process changes
- The ideas come from the talents of the existing workforce, as opposed to using R&D, consultants or equipment – any of which could be very expensive
- All employees should continually be seeking ways to improve their own performance
- It helps encourage workers to take ownership for their work, and can help reinforce team working, thereby improving worker motivation

**Table 1. Concepts of the TQM**

Concept	MAIN IDEA
<b>Customer focus</b>	Goal is to identify and meet customer needs
<b>Continuous improvement</b>	A philosophy of never-ending improvement
<b>Employee empowerment</b>	Employees are expected to seek out, identify, and correct quality problems
<b>Use of quality tools</b>	Ongoing employee training in the use of quality tools
<b>Product design</b>	Products need too be designed to met customer expectations
<b>Process management</b>	Quality should be built into the process; sources of quality problems should be identified and corrected
<b>Managing supplier quality</b>	Quality concepts must extend to a company's suppliers

The Toyota Production System is known for kaizen, where all line personnel are expected to stop their moving production line in case of any abnormality and, along with their supervisor, suggest an improvement to resolve the abnormality which may initiate a kaizen.

**PLAN-DO-CHECK-ACT (PDCA)**



**Fig. 1. The PDCA cycles**

The cycle of kaizen activity can be defined as:

- Standardize an operation
- Measure the standardized operation (find cycle time and amount of in-process inventory)
- Gauge measurements against requirements
- Innovate to meet requirements and increase productivity
- Standardize the new, improved operations
- Continue cycle *ad infinitum*

**The plan–do–check–act (PDCA) cycle** describes the activities a company needs to perform in order to incorporate continuous improvement in its operation. This cycle, shown in Figure 5-6 is also referred to as the Shewhart cycle or the Deming wheel. The circular nature of this cycle shows that continuous improvement is a never-ending process. Let's look at the specific steps in the cycle.

- **Plan** The first step in the PDCA cycle is to *plan*. Managers must evaluate the current process and make plans based on any problems they find. They need to document all current procedures, collect data, and identify problems. This information should then be studied and used to develop a plan for improvement as well as specific measures to evaluate performance.
- **Do** The next step in the cycle is implementing the plan (*do*). During the implementation process managers should document all changes made and collect data for evaluation.
- **Check** The third step is to *check* the data collected in the previous phase. The data are evaluated to see whether the plan is achieving the goals established in the *plan* phase.
- **Act** The last phase of the cycle is to *act* on the basis of the results of the first three phases. The best way to accomplish this is to communicate the results to other members in the company and then implement the new procedure if it has been successful. Note that this is a cycle; the next step is to plan again. After we have acted, we need to continue evaluating the process, planning, and repeating the cycle again.

#### **IDENTIFY ROOT CAUSES AND PRACTICAL PROBLEM SOLVING IN SEVEN STEP AT TOYOTA USING SYSTEM KAIZEN**

This study (theory and practical) was realized in the department of quality management at Faculty of Economic Science because Toyota is the best learning organization and has judiciously used stability and standardization to transfer individual and team innovation into organization-wide learning. It is one thing for individual employees to come up with innovative ways to do things. But to be transferred to organization learning, the new way must be standardized and practiced across the organization until a better way is discovered.

Toyota evolved out of innovation, originally in making looms and then in automobile design, and ever since, the leadership has worked hard to keep this innovative spirit alive. For example, Toyota used the Prius project to revitalize a maturing product development process. Lexus also pushed the organization to new levels of quality and excellence. However, breakthrough innovation is only one aspect of the Toyota way. Possibly the most important aspect is Toyota's relentless application of the more "mundane" process of continuous improvement. The Toyota Way involves the company learning from its mistakes, determining the root cause of problems, providing effective countermeasures, empowering people to implement those measures, and having a process for transferring the new knowledge to the right people to make it part of the company's repertoire of understanding and behavior.

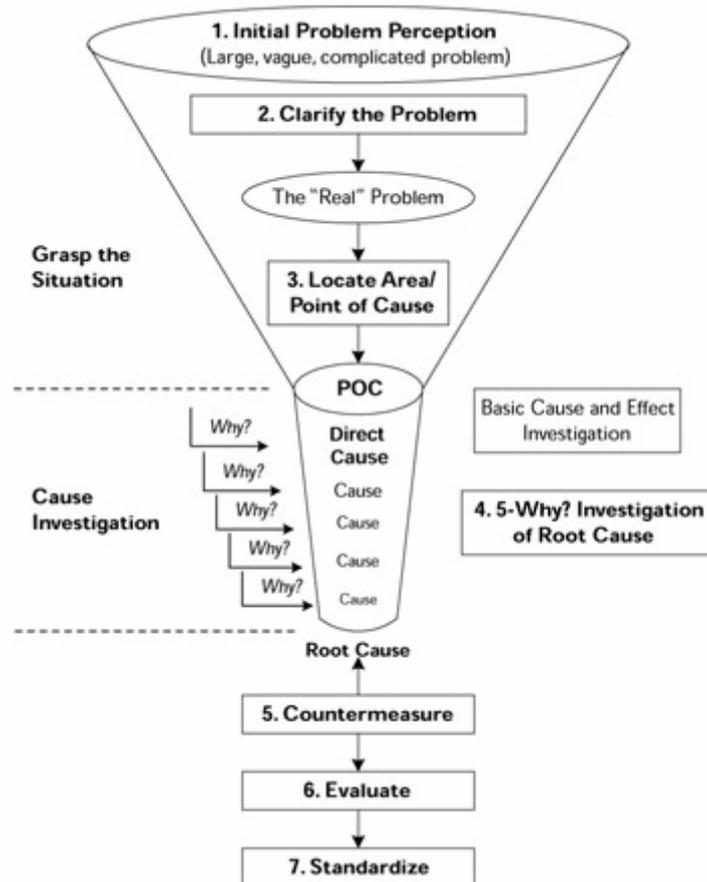
An integral part of kaizen is Toyota's famous five-why analysis. The problem is oil on the shop floor. In this example, each why brings us further upstream in the process and deeper into the organization. For example, cleaning up the oil would simply be a temporary measure until more oil leaked. Fixing the machine would be a little longer term, but the gasket would wear out again, leading to more oil on the floor. Changing the specifications for gaskets could solve the problem for those particular gaskets, but there is a deeper root cause that would still go unresolved. Only by fixing the underlying organizational problem of the reward system for purchasing agents than can be prevent a whole range of similar problems from occurring again in the future.

**Table 2. Analysis of problems**

<b>Level of problem</b>	<b>Corresponding level of countermeasure</b>
<b>There is a puddle of oil on the shop floor</b>	Clean up the oil
<b>Because the machine is leaking oil</b>	Fix the machine
<b>Because the gasket has deteriorated</b>	Replace the gasket
<b>Because we bought gaskets made of inferior material</b>	Change gasket specification
<b>Because we got a good deal (price) on those gaskets</b>	Change purchasing policies
<b>Because the purchasing agent gets evaluate don short-term cost savings</b>	Change the evaluation policy for purchasing agents

**Source: Toyota Technical Center, Ann Arbor, Michigan**

The real learning point of these case is to keep asking why until the root cause(s) are determined. Take countermeasures at the deepest level of cause that is feasible and at the level that will prevent reoccurrence of the problem.



**Fig. 2: Toyota’s practical problem-solving process**

At Toyota, a five-why analysis is often used as part of a seven-step process they call “practical problem solving.” (See Fig. 2) Before the five-why analysis can begin, “practical problem solving” requires to clarify the problem or, in Toyota terminology, “grasp the situation.” Trainers who teach this methodology within Toyota have found the most difficult part to learn is grasping the situation thoroughly *before* proceeding with five-why analysis. Grasping the situation starts with observing the situation with an open mind and comparing the actual situation to the standard. To clarify the problem, we must start by going to where the problem is (*genchi genbutsu*). 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.

The seventh step (standardizing the new process) is very important at Toyota. Toyota’s standards have a much broader role than making shop floor workers’ tasks repeatable and efficient. The Toyota Way results in standardized tasks throughout the company’s white-collar work processes, such as engineering. Everyone in the company is aware of and practices standardization. For example, an engineer can walk into any Toyota factory in the world and see almost identical processes. Toyota also applies standards to the design of products and manufacturing equipment. Managers have a misconception that standardization is all about finding the scientifically one best way to do a task and freezing it. As Imai (1986) explained so well in *Kaizen*, his famous book on continuous improvement, it is impossible to improve any process until it is standardized. If the process is shifting from here to there, then any improvement will just be one more variation that is occasionally used and mostly ignored. One must standardize, and thus stabilize the process, before continuous improvements can be made. In fact, at Toyota the standard work is posted outward, away from the operator. The operator is trained using the standardized work, but then must do the job and not look up at the standardized work sheet. The standard work sheet is posted outward for the team leaders and group leaders to audit to see if it is being followed by the operator. Any good quality manager at any company knows that you

cannot guarantee quality without standard procedures for ensuring consistency in the process. Many quality departments make a good living turning out volumes of such procedures. Unfortunately, the role of the quality department is often to assign blame for failing to “follow the procedures” when there is a quality problem. The Toyota is to enable those doing the work to design and build in quality by writing the standardized task procedures themselves. Any quality procedures have to be simple and practical enough to be used every day by the people doing the work.

## **CONCLUSIONS**

Standardization and learning go hand in hand and are the basis for continuous improvement. If we don't standardize the improved process, the learning up to that point falls into a black hole, lost, forgotten, and unavailable for further improvements.

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