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6.2. Compliance and Control Defined

Compliance or quality control is the third universal process in the Juran Trilogy. The others are quality planning in and quality improvement. The Juran Trilogy diagram (Fig. 6.1) shows the interrelation of these processes.

Figure 6.1 *Juran Trilogy diagram. (Juran Institute, Inc., 1986.)*

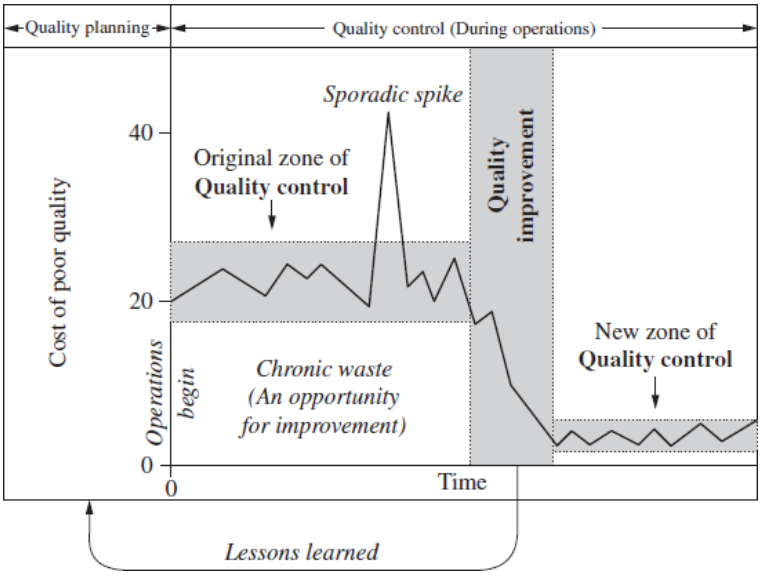


Figure 6.1 is used in several other chapters in this handbook to describe the relationships between planning, improvement, and control—the fundamental managerial processes in quality management. What is important for this chapter is to concentrate on the two "zones of control."

In Fig. 6.1, we can easily see that although the process is in control in the middle of the chart, we are running the process at an unacceptable level of performance and "waste." What is necessary here is not more control, but improvement—actions to change the level of performance.

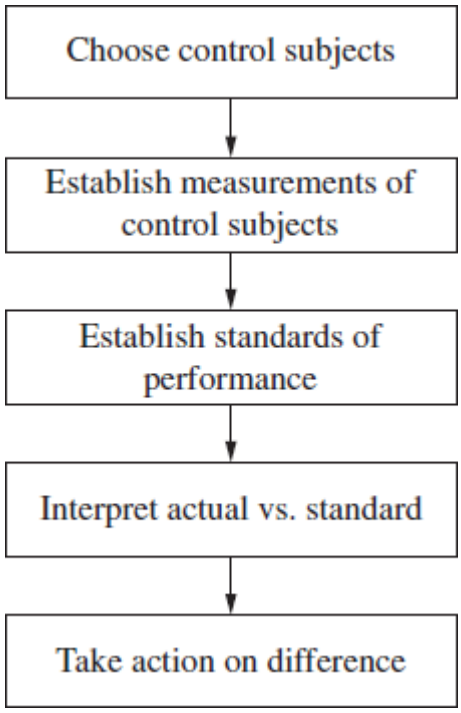
After the improvements have been made, a new level of performance has been achieved. Now it is important to establish new controls at this level to prevent the performance level from deteriorating to the previous level or even worse. This is indicated by the second zone of control.

The term "control of quality" emerged early in the twentieth century (Radford 1917, 1922). The concept was to broaden the approach to achieving quality, from the then-prevailing after-the-fact inspection (detection control) to what we now call "prevention (proactive control)." For a few decades, the word "control" had a broad meaning, which included the concept of quality planning. Then came events that narrowed the meaning of "quality control." The "statistical quality control" movement gave the impression that quality control consisted of using statistical methods. The "reliability" movement claimed that quality control applied only to quality at the time of test but not during service life.

In the United States, the term "quality control" now often has the meaning defined previously. It is a piece of a "performance excellence, operational excellence, business excellence, or total quality program," which are now used interchangeably to comprise the all-embracing term to describe the methods, tools, and techniques to manage the quality of an organization.

In Japan, the term "quality control" retains a broad meaning. Their "total quality control" is equivalent to our term "business excellence." In 1997, the Union of Japanese Scientists and Engineers (JUSE) adopted the term Total Quality Management (TQM) to replace Total Quality Control (TQC) to more closely align themselves with the more common terminology used in the rest of the world. **Figure 6.2** shows the input-output features of this step.

Figure 6.2 *Input-output diagram.*



In **Fig. 6.2**, the input is operating process features, or key control characteristics, developed to produce the product features, or key product characteristics, required to meet customer needs. The output consists of a system of product and process controls, which can provide stability to the operating process.

A key product characteristic is a product characteristic for which reasonably anticipated variation*could significantly affect* a product's safety, compliance to government regulations, performance, or fit.

Key product characteristics (KPCs) are *outputs from a process that are measurable*on, within, or about the product itself. They are the outputs perceived by the customer. Examples of KPCs include

- KPCs "On:" the product: width, thickness, coating adherence, surface cleanliness, etc.
- KPCs "Within:" the product: hardness, density, tensile strength, mass, etc.
- KPCs "About:" the product: performance, weight, etc.

In general, key control characteristics (KCCs) are*inputs that affect the outputs*(KPCs). They are unseen by the customer and are measurable only when they occur. A KCC is

- A process parameter for which variation must be controlled around some target value to ensure that variation in a KPC is maintained around its target values during manufacturing and assembly.
- A process parameter for which reduction in variation will reduce the variation of a KPC.
- Directly traceable to a KPC.
- Particularly significant in ensuring a KPC achieves target value.
- Not specified on a product drawing or product documentation.