Quality in an Age Demanding Innovation

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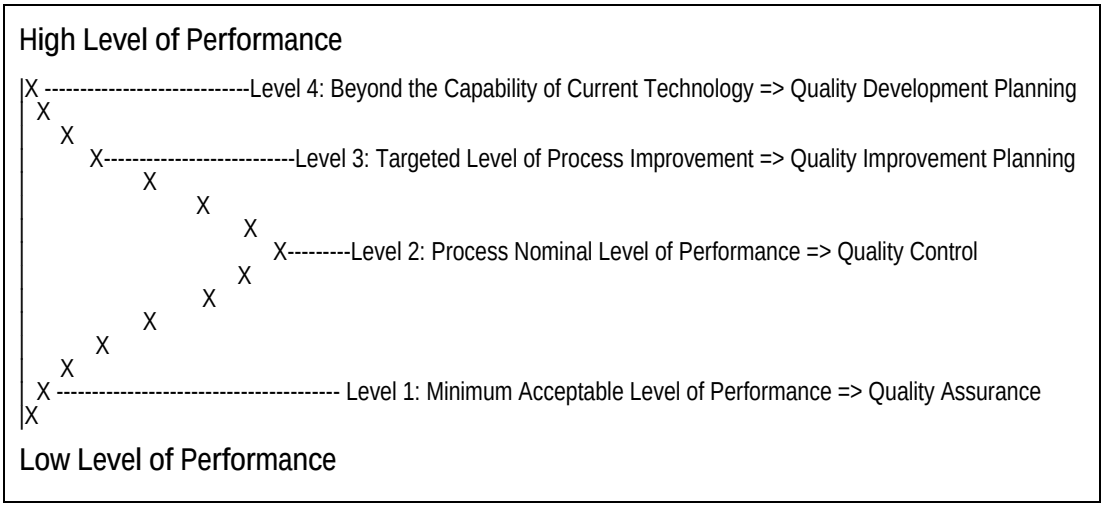
Abstract

In a paper written in Japanese, Kaoru Ishikawa offered a statistical model for relating the basic elements of total quality management to a nominal process using a distribution function of the performance of its characteristic parameter. This paper offers an analytical explanation of the various roles of quality assurance, quality control, problem solving and breakthrough change as related to the challenges of daily management for business control and innovation stimulating change for the future. The three questions that I intend to address using this model are:

1) When methodologies in the daily management system seek to achieve stability and regularity through process control, how can workers integrate innovative ideas and seek change?
2) What is the relationship between quality assurance and quality control in seeking to achieve control? How does quality planning and quality improvement relate? How are these four items related to each other and how do they address the needs for evolutionary and revolutionary change?
3) How does the Japanese TQM system of nichijo kanri system for routine management integrate with the hoshin kanri system for breakthrough? What are their interrelationships and dependencies?

Once you decide if you are doing structured problem solving to control special cause of variation in the daily management system or are taking a scientific approach to create new capabilities and extend the level of performance beyond the current boundaries (an inquiry demanding innovation and a journey to create quality and stability in a world that is currently unknown), then you can determine how to proceed. The

management approach to control and improvement must consider two different types of concern: (1) How to obtain the best possible performance out of the resources that have already been invested in the process? (2) How to design a new process (product) to reliably deliver a specified new capability at a performance level beyond the current level? Consider this problem using the Ishikawa illustration that he presented. If you depict a normal distribution on its side, then you can get a rough idea how these different approaches relate to a specific measurement:



Would you structure improvement projects to attack each of these levels of performance in the same way? The answer is clearly no. You would attack Level 1 as a problem in standardized work management and the discipline of process control to assure that the process never descends below this lowest acceptable limit. You would attack improvement of Level 2 as a process control system (e.g., statistical process control with feedback loops with appropriated adjustment) to maintain the state of control for desired performance. At Level 3 you would challenge workers to eliminate waste and reduce variation from unwanted sources by applying DMAIC and lean management principles. You would use DFSS/Customized Waterfall approach to design new capabilities that exceed the current known range of performance.

International Academy for Quality

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In a paper written in Japanese, Kaoru Ishikawa offered a statistical model to relate the basic elements of total quality management to a nominal process using a distribution function of the performance of its characteristic parameter. This paper offers an analytical explanation of the various roles of quality assurance, quality control, problem solving and breakthrough change as related to the challenges of daily management for business control and innovation stimulating change for the future. The three questions that I intend to address using this model are:

1) When methodologies in the daily management system seek to achieve stability and regularity through process control, how can workers integrate innovative ideas and seek change?

2) What is the relationship between quality assurance and quality control in a daily pursuit to achieve control? How does quality planning and quality improvement relate? How are these items interrelated and how do they address the needs of evolutionary and revolutionary change?

3) How does the Japanese TQM control system of ***nichijo kanri*** system for routine management integrate with the ***hoshin kanri*** system for breakthrough? What are their interrelationships and dependencies?

What is the situation that you are currently facing?

The first choice management must make is to decide if it needs structured problem solving for control of special cause of variation in its daily management system or does it need to take a scientific approach to create new capabilities and extend the level of performance beyond its current boundaries? The second inquiry demands innovation and is a journey to create quality and stability in a world that is mostly unknown.

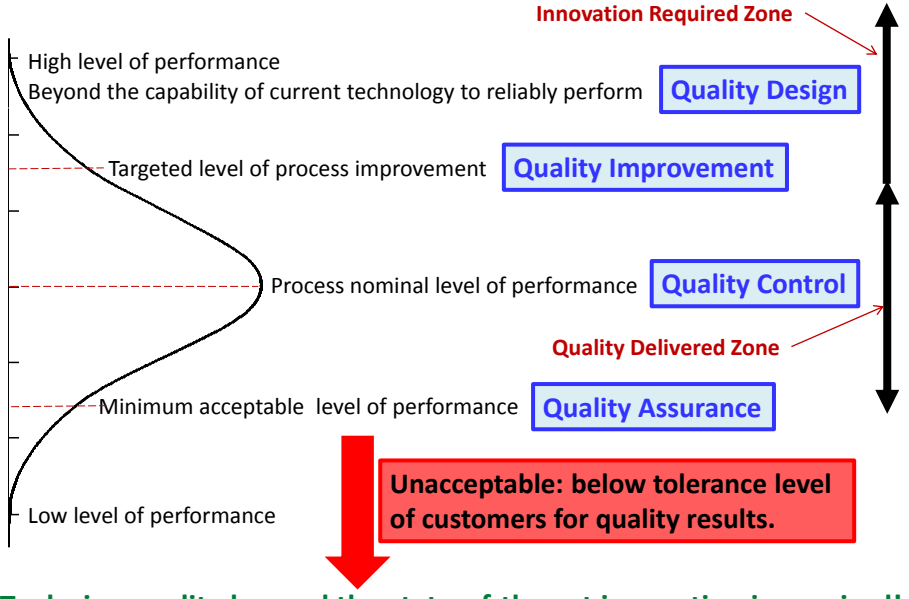
The management approach to control and improvement must consider two different types of concern:

(1) How to obtain the best possible performance out of the resources that have already been invested in a process (product)?

(2) How to design a new process (product) to reliably deliver a specified new capability at a performance level beyond the current level?

We shall illustrate this problem using a normal distribution to provide a rough idea about how these different approaches relate to a specific performance measurement.

What level of performance is required by customers?



To design quality beyond the state-of-the-art innovation is required!

How to approach this problem once it is diagnosed?

So how would you react? Would you structure improvement projects to attack each of these performance levels the same way? The answer is no:

- You would attack a quality assurance issues as a problem in managing standardized work by applying the discipline of process control and statistical thinking methods to assure that the process never descends below this lowest acceptable limit.
- You would attack improvement of quality control as a process control system (e.g., using statistical process control with feedback loops with appropriate adjustments) to maintain the state of control for desired performance.
- You would attach quality improvement issues by challenging workers to eliminate waste and reduce variation from unwanted sources by applying structured problem solving and lean management methods.
- You would use project management and analysis methods of the quality by design approach to create new capabilities that exceed the current known range of performance to address stretch performance goals.

What distinguishes quality control from innovation?

- **Quality control** emphasizes developing a performance standard and then consistently maintaining that standard of performance by understanding those factors that create sources of variation that induce future change.
- Key quality control characteristics include: consistency, reliability, rigidity, and durability which combine to deliver discipline in work processes that provides the desired state of conformance to standards. Emphasis in the area of control is on prevention and elimination of problems – the gap between the desired state of results and the current outcome state.
- **Innovation** is necessary to achieve prolonged excellence in performance of operations (process) and delivery of results (content). It requires the elimination of factors causing ambiguity in understanding the inherent nature of implicit customer desires. Innovation entails creating customer intimacy which is necessary to achieve sustained, distinctive competitive differentiation in the delivered values that are perceived as desirable or attractive to customers. Innovation is necessary to achieve a reputation for excellence.
- Key innovative characteristics include: breakthrough, insight, flexibility, esteem, and speediness to deliver features in the right market rhythm.

Innovation requires 'creative destruction' of the past!

- Austrian economist Joseph A. Schumpeter (1883-1950) defined innovation as "the creative destruction of the past" or the "planned abandonment" of legacy ways and products.
- Schumpeter's definition recognizes that reality is constantly changing and in this transition there is a struggle between the need to assure mutual prosperity by the pursuit of a common good for society and political pressure to maximize benefit for the few who have control over capital.
- In order to achieve mutual prosperity in social benefits (which Taylor cited as the objective of scientific management), it is essential that efficient construction of the working environment define the relationships among workers and process by which plant and equipment support their work.
- Thus, **control** (elimination of waste in work and pursuit of effectiveness in operations through delivery of defect-free, productive and efficient working systems) **must be married with innovation** in the content of the deliverable and through a refreshing of the systems of production.
- Innovation occurs by design with an objective for pursuing the creation of an increased degree of 'attractive quality' that maintains the pace with the advances in society's perception of attractiveness!

What must we "do" to "be" quality?

Work is coordinated motion that consumes resources:

- Physics identifies work as a force acting to move an object over time. This is true for physical objects and for human beings.
- When work activities are able to sense their environment and adjust or reconfigure their tasks to adapt to these changing circumstances or opportunities in order to achieve a desired output, then a dynamic control system is created.
- Dynamic control means that systems are self-regulating and have the capability to achieve a desired outcome through the collaborative work of their many parts.
- Achieving dynamic capability on a project involves coordination by the program manager who allocates resources and controls the scope of work to achieve the required performance and schedule.

Waste is a Lack of Efficiency in Resource Management:

"Insufficient standardization and rationalization create waste (muda), inconsistency (mura), and unreasonableness (muri) in work procedures and work hours that will eventually lead to the production of defective products." (Taiichi Ohno, 1988, 41)

- Waste is any activity that adds cost or time but does not add value as judged from the customer's perspective; it may also be an activity that increases risk to employees by imposition of hazardous working conditions.
- Thus, waste occurs when society's resources are not used in an appropriate manner.
- According to the Toyota theory of management, there are three words that classify sources of waste and inefficiency: 'muri,' 'mura,' and 'muda.'

Three Classifications of Waste:

- **Muri: No waste from bad thinking – irrational waste.** Muri is a type of waste that arises from poor decision making in the design process itself (e.g., through an unfortunate strategic choice which results in overburdening the working system). This type of waste occurs when making bad executive decisions in the technology of the design process or in negotiating the terms for contracts or specifications which are impossible to achieve.
- **Mura: No waste from unbalanced working – flow waste.** Mura is a type of waste that arises from poor integration of work activities (e.g., which results in a work load that is unbalanced across the supply chain). This type of waste occurs when coordination of the work activities of all participants is not streamlined and interruptions occur that disturb scheduled activities and cause delays or slippage in schedules.
- **Muda: No waste from poor working discipline – process waste.** Muda is a type of waste that arises from poorly implemented operations (e.g., waiting time, bad quality parts, etc.). This type of waste occurs when quality problems arise or tasks are not performed effectively thereby creating extra cost or delaying schedule performance.

Generating waste during the innovation process:

Lessons learned from stimulation of innovation:

- Innovation waste means that we have consumed scarce resources in the development of features or functions that are not highly desirable to the targeted customers – investing more than is required or extending levels in performance characteristics beyond what is necessary for commercial success – investing more than is required to generate quality outcomes.

How can preventive action increase the quality of innovation?

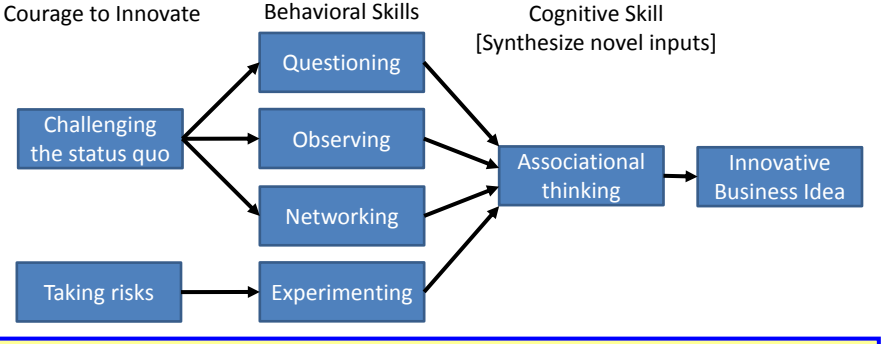
- **Prevent "muri"** (irrational waste) – the loss of quality that comes from poorly managed rational and emotive decision making processes.
- **Prevent "mura"** (flow waste) – a loss that occurs from lack of integration and cooperation in cross-functional process flows that deliver results.
- **Prevent "muda"** (discipline or control waste) – eliminate both the over and under control conditions and manage expectations to deliver within the performance tolerance that is defined by the market expectations.

Don't develop quality control myopia or defect-induced hyperopia!

Seeing differently to generate opportunities to attract:

Structured Innovation Process

Innovator's DNA Model for Generating Innovative Business Ideas *



Innovation can be developed and is capable of being converted into a process. Curious people who are willing to take (or are encouraged) to take risks can systematically develop processes that encourage questioning, observing, networking and experimenting as means to stimulate or act as catalysts for associational thinking: connecting ideas that previously had been unrelated to formulate a new concept.

* Jeffrey H. Dryer, Hal B. Gregersen and Clayton M. Christensen (2011), ***The Innovator's DNA: Mastering the Five Skills of Disruptive Innovation*** (Boston: Harvard University Press). More on these innovation skills in the next section on competence development.

Imperative: Broaden your understanding of quality!

Innovation: a process that is 'right-sighted' based on customer insight!

Don't get caught in a "quality control trap" – learn flexibility!

Standards, problem-solving and control comprise a necessary set of conditions for sustained quality; but collectively they are not sufficient to assure enduring quality or sustained performance excellence.

- Quality must be designed for long-term performance and must be capable of being "refreshed" to maintain its alignment by learning how to make sense of rapidly shifting markets and customer perceptions. This sensitivity requires a transformation in thinking: increasing the degree of our curiously and using probing questions in order to see differently, increase situational awareness, create focus on poorly perceived abstractions to increase our mindfulness of poorly defined customer issues. These are concepts that must be embraced to achieve innovative breakthrough! We must increase our curiosity and learn to make sense out of ambiguous circumstances and become rapidly adaptive to shifting external situations.
- We must abandon steadfast adherence to dogmatic principles, rigidity, over-control, and reliance on old legacy standards. Such dependence weakens the ability of management systems to respond to opportunities for innovation.