

Tutorial 6 Lean and Quality

Objectives:

- Describe the Six Sigma Quality concept
 - Define the term “lean” and “quality”
 - Discuss ways of implementing Six sigma quality
 - Describe the quality tools and their role in applying lean concepts
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1. What is Quality?

Quality is the ability of a product or service to meet or exceed the expectations of a customer. The intent of management to create quality goods or services is often operationalized through a commitment to a total quality management (TQM) approach to business. This means a collection of approaches, tools, and techniques are used throughout the firm to foster higher levels of quality. Key components in this approach are recognition of customer needs, employee empowerment, having a vision for quality, and developing a reward system.

2. What is Six Sigma?

- An improvement program aimed at reducing variability and achieving near elimination of defects from every product, process and transaction.
- Objective is to reduce cost and increase revenue: increasing process efficiency and process effectiveness.
- Centered around a disciplined and quantitatively oriented improvement methodology - DMAIC (Define, Measure, Analyze, Improve, Control).
- Six Sigma is a statistical term that means products and services will meet quality standards 99.9997% of the time. In a normal distribution curve used in statistics, six standard deviations (Six Sigma) is 99.9997% of the area under the curve.

3. Describe the key principles of Lean Operation.

Short version:

- Originated from TPS (Toyota Production System),
- Aims to improve/smoothening business process ‘flow’
- JIT (Just in time) philosophy
- Waste elimination – 7 wastes (TIMWOOD)

Long version:

There are five key principles associated with lean operation.

1. The first principle is to define value from the customer’s point of view, and not the traditional producer’s viewpoint.

2. The second is to evaluate the value stream and identify value-added and non-value-added activities for each family of products.
 3. The third principle is to create an effective and uninterrupted flow of necessary activities for each product family.
 4. After the flow has been created, the fourth principle is to have the product flow synchronized based on a pull system of authorized work.
 5. Finally, as these four principles are put into practice, then the fifth principle is to perfect (or continuously improve) this practice.
- The result will be a new way to organize business process (and its activities) to deliver more value to customers while eliminating waste.

4. The local telecommunication company provides service to the cities in Melbourne. The firm's current customers experience an average of 1147 dropped calls per week. The estimated loss time of 30s for each dropped call, which is roughly 9.56 hours per week. What is the company's current quality standard in terms of Six Sigma?

Table 1. Six Sigma Metrics

No. of Std Deviations above the mean	% of output that is defect free	Defects per million opportunities
2	69.15	308,537
2.5	84.13	158,686
3	93.32	66,807
3.5	97.73	22,750
4	99.38	6,210
4.5	99.865	1,350
5	99.977	233
5.5	99.9968	32
6	99.99966	3.4

Solution:

The company operates at 24/7, which equals 168 hours per week.

Computing the defect rate:

$$\frac{9.56}{168} = 0.0569 \text{ or } 5.69\% \text{ defect rate, or}$$

$$1 - 0.0569 = 0.9431 \text{ or } 94.31\% \text{ defect free quality level.}$$

Using the chart in Table 1, it seems that the company is operating at the level between 3 and 3.5 Sigma.

5. You are the lecturer of Business Process Modelling. In recent years, the examination failure rate is around 15% -20% of the total enrolment. You would like to find out major factors that contribute to this failure rate. Use Ishikawa diagram(s) to identify individual causes which may be due to human, process (or method), material, environment, management, etc.



