

LEAN SIX SIGMA

Six Sigma employs a well-structured continuous methodology to reduce process variation and decrease defects within the business processes using simple to advanced statistical tools and techniques. It improves quality through defect removal and process optimization. The improved quality leads to higher perceived value for the products or services the company offers that help companies achieve increased market share. Companies have reported significant savings by reducing the costs of poor quality.

The other approach to achieving excellence in products and services is based on the removal of waste from service and manufacturing processes is '**Lean**' approach. Many companies have reported significant improvement through the removal of waste or non-value added activities. Companies have also reported that bringing the two concepts — Lean and Six Sigma — together delivers faster results. While the objective of Lean is to create flow and eliminate waste, Six Sigma improves process capability and reduces defects and variation that leads to improved quality and cost savings for the companies. If a company just applies Six Sigma, it cannot maximize the potential of the organization. Lean is really an enabler for Six Sigma ^[7].

The term 'lean' has its root in 'Just-in-time Manufacturing' or 'Lean Manufacturing'; a philosophy of production that emphasizes on the minimization of the amount of all the resources (including time) used in the various activities of the enterprise. It involves:

- identifying and eliminating non-value-adding activities,
- employing teams of multi-skilled workers, and
- using highly flexible, automated machines.

Any process has the following things in common: Variation, Waste, and Delay. The removal of these will make the process much more efficient. Controlling variation makes the process consistent and defect free thereby improving quality. Removing waste and delay from the process will improve flow and reduce the cycle time. Use Six Sigma to reduce defects and variation from the products and processes. Use Lean to reduce or eliminate the waste, improve flow, and reduce the cycle time. A combined approach – *Lean Six Sigma*- is needed to reduce variation, waste, and delay in the processes.

REMOVING WASTE FROM THE PROCESS

The major focus of lean is eliminating or reducing waste from the process. Eliminating waste in a *manufacturing process* involves the following steps:

- Make only what is needed.
- Reduce waiting by coordinating flows and balancing loads.
- Reduce or eliminate material handling.
- Eliminate all unneeded production steps.
- Reduce setup times and increase production rates.
- Eliminate unnecessary human motions.
- Eliminate defects.

The above philosophy can be applied to any process, manufacturing or service because both have waste and variation. Companies have realized significant improvement in quality, cost, productivity, profitability, and cycle time (speed) through the removal of waste or non-value added activities and variation reduction from their process. Thus, lean is for reducing waste, improving flow, and reducing cycle time. Six Sigma is for reducing defects and variation. The combined approach is what is known as **Lean Six Sigma** that is described in quality discipline as a philosophy, a culture, and a journey to excellence.

LEAN AND SIX SIGMA

- Lean is an approach that seeks to improve flow in the value stream and eliminate waste. *It is about doing things quickly.*
- Six Sigma uses a powerful framework (DMAIC) and simple to advanced statistical tools to uncover root causes of the problem to understand and reduce variation. *It is about doing things right (defect free).*
- Lean is an approach based on the removal of waste from service and manufacturing processes. Many companies have reported significant improvement through the removal of waste or non-value added activities.
- Six Sigma improves quality through defect removal and process optimization. The improved quality leads to higher perceived value and increased market share thereby, increasing revenue and achieving higher profitability. Many companies have reported significant savings by reducing the cost of poor quality.

LEAN AND SIX SIGMA APPROACH

Lean	Six Sigma
Specify Value What is important in the eyes of the customer?	Define What is important?
Identify the Value Stream What is the entire Value Stream?	Measure How are we doing?
Flow How will the material and information flow through our process?	Analyze What is wrong?
Pull How can we let the customer pull products, rather than pushing product?	Improve What needs to be done?
Perfect How can we optimize our processes?	Control How do we sustain the improvements?

Source: Lean Six Sigma: some basic concepts, NHS Institute for Innovation and Improvement

DIFFERENCE BETWEEN LEAN AND SIX SIGMA

	Lean	Six Sigma
Theory	Reduce waste	Reduce variation
Application guidelines	Identify value Identify value stream Flow Pull Perfection	Define Measure Analyze Improve Control
Focus	Flow	Problem
Assumptions	Waste removal will improve performance Many small improvements are better than systems analysis	A problem exists Figures and numbers are valued System output improves if variation in all process is reduced

	Lean	Six Sigma
Primary effect	Reduced flow time	Uniform process output
Secondary effects	Less waste Fast throughput Less inventory Improved quality	Less variation Uniform output Less inventory Improved efficiency Improved productivity Improved quality
Criticism	Statistical analysis not valued	System interaction not considered Process improved independently

Source: Lean Six Sigma: some basic concepts, NHS Institute for Innovation and Improvement

INTEGRATING LEAN AND SIX SIGMA

- Companies have reported that bringing the two concepts- Lean and Six Sigma together delivers faster results.
- While the objective of Lean is to create flow and eliminate waste from the process, Six Sigma improves process capability and reduces variation thereby improving quality and reducing cost. If a company just applies Six Sigma, it cannot maximize the potential of the organization. Lean is really an enabler for Six Sigma.
- More and more companies are realizing that it is possible to achieve dramatic improvements in cost, quality, and time by using the above techniques.
- Several companies including Toyota, General Electric, Motorola, and many others have accomplished impressive results using one or the other technique. However, using only one of the above techniques- Lean, Six Sigma, or Design for Six Sigma has limitations.

LIMITATIONS OF LEAN AND SIX SIGMA

Six Sigma does not address the question of how to optimize the process flow, and the Lean principles do not address the use of advanced statistical tools required to achieve the process capabilities needed to be truly 'lean'.

LEAN and SIX-SIGMA TOOLS
How they can achieve enterprise excellence?

