LEARN ABOUT QUALITY

SIX SIGMA

Overview

The Six Sigma method provides organizations with the tools they need to improve their business process capabilities. The goal of Six Sigma is to improve customer satisfaction by reducing and eliminating process variation that may lead to defects and/or errors/mistakes.

Six Sigma Process Capability

Sigma	Defects per million	Cost of poor quality	
6 sigma	3.4 defects per million	<10% of sales	World-class
5 sigma	230 defects per million	10 to 15% of sales	
4 sigma	6,200 defects per million	15 to 20% of sales	Industry average
3 sigma	67,000 defects per million	20 to 30% of sales	
2 sigma	310,000 defects per million	30 to 40% of sales	Noncompetitive
1 sigma	700,000 defects per million		

(https://asq.org/quality-progress/articles/the-essential-six-sigma?id=fd0426020b1e48a6bbef09044477412e)

QUALITY GLOSSARY DEFINITION (HTTPS://ASQ.ORG/QUALITY-RESOURCES/QUALITY-GLOSSARY/S)

(https://asq.org/training/lean-six-sigma-green-belt-e-learning-splssgb2022asq)

WHAT IS SIX SIGMA?

WHAT IS SIX SIGMA?

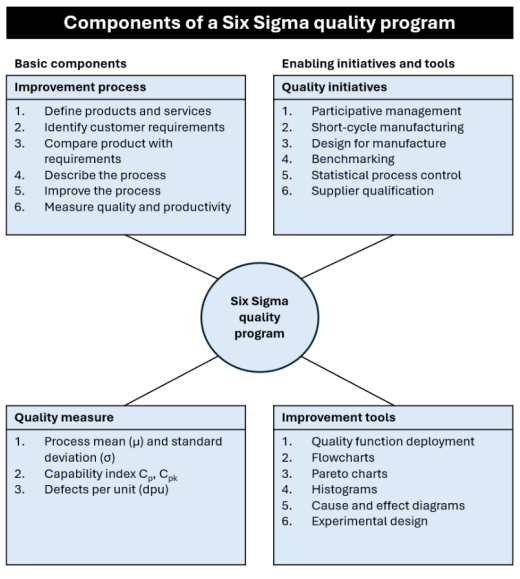
Six Sigma is a method for disciplined quality improvement that provides the tools organizations need to improve the capability of their business processes.

The goal of a Six Sigma program is to improve customer satisfaction through reducing and eliminating variation in processes, products, and services that may lead to defects and/or errors/mistakes. The numerical goal of a process operating at a 6-sigma level is 3.4 defects per million opportunities, while higher levels of defects are associated with lower sigma levels.

This increase in performance and decrease in process variation leads to defect/error reduction and improvement in profits, employee morale, customer satisfaction, and product and service quality.

Six Sigma views all work as processes that can be defined, measured, analyzed, improved, and controlled. Processes are a series of steps that take various inputs and produce outputs such as a product or a service. Understanding the relationship between the inputs and outputs is a key concept in Six Sigma. By controlling the inputs, you can control the outputs.

For the history of where Six Sigma originated, read "Six Sigma: A Breakthrough Strategy for Profitability (https://asq.org/quality-progress/articles/six-sigma-a-breakthrough-strategy-for-profitability?id=bd6baa689df842a3905d068dd52d2120&status=SUCCESS&numberOfItemsInCart=0)" (Quality Progress, May 1998, pp. 60-64.)



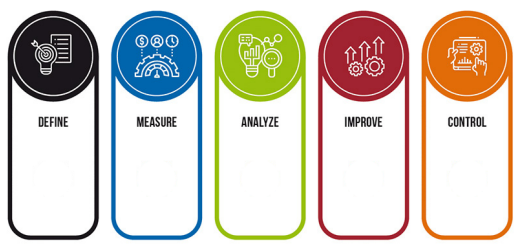
(https://asq.org/quality-progress/articles/six-sigma-quality-programs?id=f84a5024b2d24bdba36858c647d82d44)

DEFINITION OF SIX SIGMA

DEFINITION OF SIX SIGMA

Six Sigma has been defined several ways including:

- A fact-based, data-driven philosophy of improvement that values defect/error prevention over defect/error detection. It drives customer satisfaction and bottom-line results by reducing variation and waste, thereby promoting a competitive advantage. It applies anywhere variation and waste exist, and every employee should be involved.
- An organized and systematic method for process improvement that relies on statistical methods and the scientific method to make dramatic reductions in customer-defined defect/error rates.
- An approach that allows organizations to drastically improve their bottom line by monitoring and improving everyday business activities in ways that minimize waste and resources while increasing customer satisfaction.



(https://asq.org/training/lean-six-sigma-green-belt-e-learning-splssgb2022asq)

Regardless of the exact definition, these various definitions all include a few common threads, including:

- The use of teams that are assigned well-defined projects that directly affect the organization's bottom line.
- Training in statistical thinking at all levels.
- Emphasis on the define, measure, analyze, improve, and control (DMAIC) approach to problem solving.
- A management environment that supports these initiatives as a business strategy.

What Tools Are Used in Six Sigma?

Six Sigma experts use qualitative and quantitative techniques and tools to drive process improvement. Such tools include statistical process control (https://asq.org/quality-resources/statistical-process-control), control charts (https://asq.org/quality-resources/control-chart), failure mode and effects analysis (https://asq.org/quality-resources/fmea), and process mapping (https://asq.org/quality-progress/articles/a-simple-process-map?id=33d4fa09a400477786d208ca4a6a3069).

For more on Six Sigma tools, visit the Six Sigma tools (https://asq.org/quality-resources/six-sigma/tools) Learn About Quality page

WHAT IS LEAN SIX SIGMA?

WHAT IS LEAN SIX SIGMA?

While Six Sigma focuses on reducing process variation and enhancing process control, lean drives out waste (nonvalue-added processes and procedures) and promotes work standardization and flow. The distinction between Six Sigma and lean has blurred, with the term lean Six Sigma (LSS) being used more often because process improvement often requires aspects of both approaches to attain positive results.

Lean and Six Sigma both provide customers with the best possible quality, cost, and delivery. There is a great deal of overlap between the two disciplines, but they approach their common purpose from slightly different angles:

- Lean focuses on waste reduction, whereas Six Sigma emphasizes variation reduction.
- Lean achieves its goals using less-technical tools such as kaizen, workplace organization, and visual controls, whereas Six Sigma tends to use statistical data analysis, design of experiments, and statistical process control.

Successful implementation often begins with the lean approach, making the workplace as efficient and effective as possible by reducing waste and using value stream maps to improve understanding and throughput. If process problems remain, more technical Six Sigma statistical tools may be applied.

IMPLEMENTING SIX SIGMA

IMPLEMENTING SIX SIGMA

Six Sigma is a business system with many statistical aspects, and it naturally fits the business systems of most organizations. It is an operational system that speeds up improvement by getting the right projects conducted in the right way. It drives out fear by making employees agents of change.

Six Sigma implementation often is top down. Usually, the CEO is the driving force, and an executive management team provides the Champion for each project. The Champion is responsible for the project's success, providing necessary resources and breaking down organizational barriers. Getting upper management Champions involved in the project selection process helps guarantee the projects will have a large impact on the business.

The project leader is called a Black Belt (BB), and all their time typically is dedicated to completing process improvement projects. The projects likely will come from different business areas, thereby giving the BB a broader view of the business.

The project team members are called Green Belts (GBs), and they do not typically spend all their time on process improvement projects.

It is important to note Six Sigma project participants such as BBs and GBs tend to be agents of change who thrive in the new business climate of constant change. They are open to new ideas and are used to rigorously evaluating new ideas.

Master Black Belts (MBBs) are resources for the project teams. MBBs often are experienced BBs who have worked on many projects. They generally have knowledge of advanced tools, business and leadership training, and teaching experience. A primary MBB responsibility is training and mentoring new BBs in the organization.

For more information on different Six Sigma Belts, visit the Six Sigma Belts (https://asq.org/quality-resources/six-sigma/belts-executives-champions) Learn About Quality page.

Six Sigma Projects

A Six Sigma project is completed using five clearly defined steps: define, measure, analyze, improve, and control. These steps constitute the cycle Six Sigma practitioners use to manage problem-solving projects. The steps help practitioners ensure that data-driven decisions are made, root causes are identified, improvements are vetted, and controls are implemented within the process.

The improvement projects must be integrated with the overall goals of the organization. Top-level support for and overview of project planning, implementation, and evaluation are important aspects of this integration.

The major components of a typical Six Sigma program are shown in the image "Components of a Six Sigma quality program." Improvement process and quality measurement are fundamental to Six Sigma. Although the distinction between quality initiatives and improvement tools is somewhat arbitrary, initiatives are viewed as ongoing management processes, while tools are analytical techniques used to support the improvement process.

At the managerial level, Six Sigma relies on an improvement process that is used by all employees to improve product, service, and process quality. The following is a brief description of each step in the Six Sigma improvement process:

1. **Define products and services**. Describe the products and support services, including information, consulting, and follow up, that are provided to external and internal customers.
2. **Identify customer requirements**. Identify internal and external customers, and determine their requirements for each product or service. These requirements should be stated in measurable terms.
3. **Compare the product with customer requirements**. Identify gaps between what the customer expects and what he or she is receiving. This step also should provide some basis for prioritizing needed improvements.
4. **Describe the process.** Provide a detailed description of each process. Flowcharts and other improvement tools often are used in this step.
5. **Improve the process.** Evaluate each process in terms of its value and relationship to other processes. Changing how the process flows can involve simplification, mistake proofing and/or eliminating or combining process steps.
6. **Measure quality and productivity.** Establish baseline values for quality and productivity, and track improvement. This can include benchmarking best-in-class organizations to provide targets for quality and productivity improvement.

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Changing World, Adapting Improvement Models

Jay Patel, Founder, CEO, and President, QPS, discusses the fundamentals of both lean and Six Sigma methodologies and how to determine which tool your organization or project can benefit most from.

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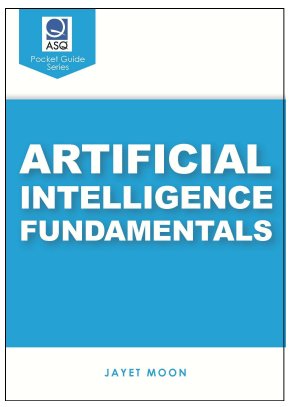

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Jamison V. Kovach (https://asq.org/search#q=kovach&t=articles&numberOfResults=40&srt=relevancy) is a professor at the University of Houston. She holds a doctorate in industrial engineering from Clemson University in South Carolina. Kovach was awarded ASQ's Feigenbaum Medal in 2010 and is an academician in the International Academy for Quality. Kovach received her lean Six Sigma Black Belt certification from North Carolina State University in Raleigh. She is an ASQ fellow, the past chair of ASQ's Houston Section, past editor of Lean & Six Sigma Review (https://asq.org/quality-resources/pub/lean-six-sigma-review) and a Fulbright Scholar.

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