

Improving efficiency in the organisation through adoption of Six Sigma methodology

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Abstract

When engineer Bill Smith joined Motorola in 1987 as a senior quality assurance manager, he already had 35 years of experience to his name. He was brought in to help establish a permanent culture change at the company, one with an intense focus on metrics, data collection, and more disciplined statistical approaches to quality control methods. The result was Six Sigma, a set of techniques and tools that improve quality by identifying and removing the causes of defects and minimizing variability.

At the heart of this pursuit lies Continuous Process Improvement (CPI) is essential for achieving ongoing, predictable process results. CPI is derived from the Japanese concept kaizen, a word that means 'improvement' or 'change for better.' Kaizen originated in Japanese businesses after World War II, most notably at the Toyota automotive company, as a quality assurance discipline for eliminating waste and redundancies (lean manufacturing). With the advent of Six Sigma in the 1980s, Kaizen and continuous process improvement became synonymous, and many companies, including Microsoft, General Electric, and Honeywell, have adopted the practice and enhanced their operational efficiency and product quality.

Keywords: Business strategy, quality improvement, robust methodology, six sigma, statistical measure

Introduction

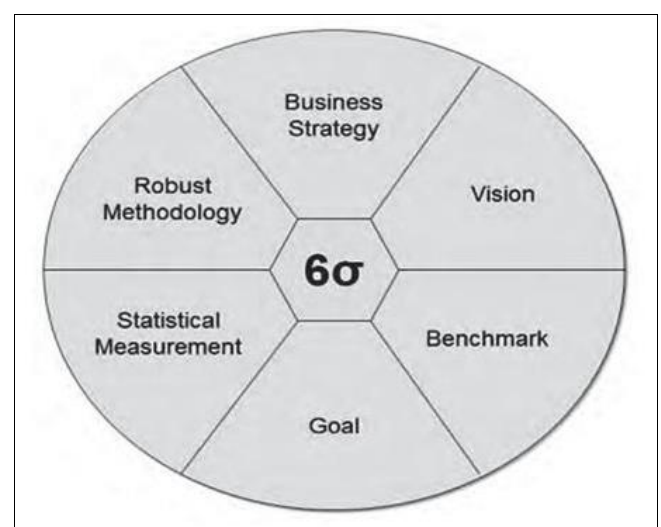
Six Sigma is a disciplined, statistical-based, data-driven quality control program. It is a methodology for continuous cycle time improvement (the reduction of manufacturing defects to a level of no more than 3.4 per million) by eliminating defects in any product, process or service. Developed by Motorola in middle 1980's, Six Sigma is based on quality management fundamentals. Due to its accuracy and merits, the approach became popular at General Electric (GE) in the early 1990's. Today, thousands of organisations across the globe have adopted Six Sigma. Six Sigma is:

- **A Business Strategy:** Using Six Sigma Methodology, a business can strategize its plan of action and drive revenue increase, cost reduction and process improvements in all parts of the organization.
- **A Vision:** Six Sigma Methodology helps the Senior Management create a vision to provide defect free, positive environment to the organization.
- **A Benchmark:** Six Sigma Methodology helps in improving process metrics. Once the improved process metrics achieve stability; we can use Six Sigma methodology again to improve the newly stabilized process metrics. For example: The Cycle Time of Pizza Delivery is improved from 60 minutes to 45 minutes in a Pizza Delivery process by using Six Sigma methodology. Once the Pizza Delivery process stabilizes at 45 minutes, we could carry out another Six Sigma project to improve its cycle time from 45 minutes to 30 minutes. Thus, it is a benchmark.
- **A Goal:** Using Six Sigma methodology, organizations can keep a stringent goal for themselves and work towards achieving them during the course of the year. Right use of the methodology often leads these organizations to achieve these goals.
- **A Statistical Measure:** Six Sigma is a data driven methodology. Statistical Analysis is used to identify

root- causes of the problem. Additionally, Six Sigma methodology calculates the process performance using its own unit known as Sigma unit.

- **A Robust Methodology:** Six Sigma is the only methodology available in the market today which is a documented methodology for problem solving. If used in the right manner, Six Sigma improvements are bullet-proof and they give high yielding returns.

Six Sigma can also be thought of as a measure of process performance. once the current performance of the process is measured, the goal is to continually improve the sigma level striving towards 6 sigmas. Even if the improvements do not reach 6 sigmas, the improvements made from one sigma level to other will still diminish costs and augment customer satisfaction.



Why Six Sigma?

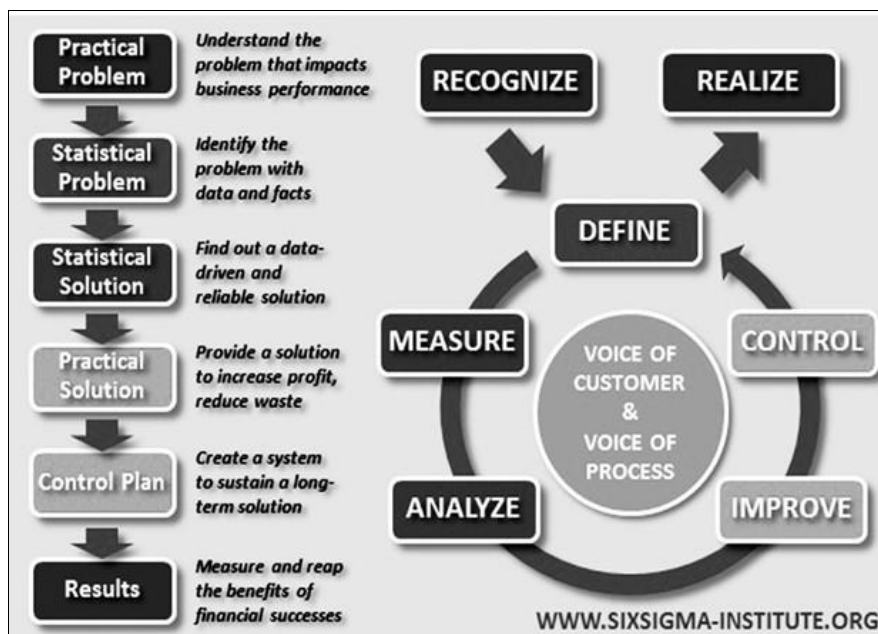
With the budding costs cost of resources and rise in other factors such as competition, the organizations are forced to

look around for alternative methods which add to efficiency. Adoption of Six Sigma methodology helps in improving efficiency in any organization as it meticulously identifies defects and minimizes the variations within a process. This is because, each Six Sigma project is supposed to follow a defined sequence of steps and includes specific improvement targets. Some examples could include:

- Decrease in process cycle time.
- Decrease of scrap generated by a process.
- Growing customer satisfaction.
- Decline in the number of factory defects.
- Decrease or elimination of costly reworks.
- Cost Reduction
- Quality Improvement
- Improved Customer Satisfaction
- Take steps to lower the environmental impact due to in-house production

The scope of Six Sigma is not curtailed to the manufacturing industry rather the tools and techniques of Six Sigma are presently being used to improve processes in all type of business organizations, routine office operations, business processes and customer service processes.

How does 6 Sigma work?



Situation 2: This is the situation when there is no process in existence at all and it has to be designed using Design for Six Sigma (DFSS) approach. DFSS approach typically requires IDOV:

1. Identify process goals in terms of critical parameters, industry & competitor benchmarks, Voice of Customer (VOC).
2. Design involves enumeration of potential solutions and selection of the best.
3. Optimize performance by using advanced statistical modeling and simulation techniques and design refinements.
4. Validate that design works in accordance to the process goals.

A typical Six Sigma project determines the existing state and enhances the performance of the business process to a new and statistically significant improved state with the use of statistical tools. There can be two situations: First, the process already existing but it is not working “reasonably” well; second, there is no process in existence at all.

Situation 1: The process already existing but it is not working “reasonably” well. This scenario focuses on use of DMAIC (which stands for Define, Measure, Analyze, Improve and Control):

1. Define problem statement process goals in terms of key critical parameters on the basis of customer requirements or Voice of Customer (VOC) and setting project boundaries.
2. Measure a complete picture of the current state of the process and establishes a baseline through measurement of the existing system in context of goals and collecting the data regarding possible causal factors.
3. Analyze the current scenario in terms of causes of variations and defects and determining the root cause.
4. Improve the process by systematically reducing variation and eliminating defects and root causes.
4. Control future performance of the process and support and maintain the gains realized.

Note, sometimes a DMAIC project may turn into a DFSS project because the existing process may require complete re-design making room for a new process due to lack of effectiveness of existing system. Such a development may be discovered during ‘improvement phase’ of DMAIC.

It is extremely important to remember that Six Sigma is not just about quality of the product but has also to take in account the customers and the market. For instance, in the year 1988, Polaroid had a sale of over US\$ 2 billion, and was an excellent player in stock exchange. In the year 1997, it became a Six Sigma company. However, in late 2001, it had to file bankruptcy because it just kept on focussing on improvement of quality of their products and completely failed to assess the customer needs.

Illustration

Consider a pizza delivery shop that guarantees the order delivery within 30 minutes from the time of accepting an order. In the event of a delivery time miss, the customer is refunded 100% money. It implies that such pizza shop will have to make 99.9997% deliveries within 30 minutes to be called a six-sigma shop. There are certain parameters called a Critical to Quality (CTQ) and its example with reference to pizza shop will be:

- **CTQ Name:** Timely Pizza delivery.
- **CTQ Measure:** Time in Minutes.
- **CTQ Specification:** Delivery within 30 minutes from the order acceptance time.

Defect: Delivery that takes longer than 30 minutes.

The Six Sigma Training and Certification Levels

The Six Sigma training and certification levels are emulated from the martial arts. “Six Sigma” management has several levels of certification i.e. Champion, Yellow Belt, Green Belt, Black Belt, and Master Black Belt. Each level of certification is described below:

Champion

A Six Sigma Champion is the most basic form of Six Sigma certification. A Champion understands the theory of Six Sigma management, but does not yet have the quantitative skills to function as an active Six Sigma project team member.

A Yellow Belt

A Six Sigma Yellow Belt is an individual who has passed the Green Belt certification examination but has not yet completed a Six Sigma project. A Yellow Belt should have a basic understanding of Six Sigma, statistical tools and DMAIC methodology. However, executives in Six Sigma organizations function as champions of Six Sigma projects.

Green Belt

A Six Sigma Green Belt is an individual who works on projects part-time either as a team member for complex projects, or as a project leader for simpler projects. Green belts are the “work horses” of Six Sigma projects. Green Belts receive training on DMAIC methodology, statistical tools, proper data collection and analysis of the data collected. Most managers in a mature Six Sigma organization are green belts.

Master Black Belt

A Master Black Belt is classically trained in statistical tools, Six Sigma methodology and management processes. Master Black Belts mentor and direct groups of Black Belts and Six Sigma teams through various problems that need to be reviewed.

Conclusion

Six Sigma is a set of practice originally developed by Motorola to systematically improve processes by eliminating defects. A defect is defined as non-conformity of a product or service to its specifications.

While the particulars of the methodology were originally formulated by Bill Smith at Motorola in 1986, Six Sigma was heavily inspired by Six preceding decades of quality

improvement methodologies such as Quality Control, TQM, and Zero Defects. Like its predecessors, Six Sigma asserts the following:

- Continuous efforts to reduce variation in process outputs is key to business success;
- Manufacturing and business processes can be measured; analysed, improved and controlled;
- Succeeding at achieving sustainable quality improvement requires commitment from the entire organisation, particularly from top-level management.

So, we may finally opine that Six Sigma is the ability of highly capable processes to produce output within specification. In particular, processes that operate with six sigma quality produce at defect level below 3.4 Defects Per (one) Million Opportunities (DPMO). Six Sigma’s implicit goal is to improve all processes to that level of quality or better.

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