Six Sigma Methodology

Six Sigma means a measure of quality that strives for near perfection. Six Sigma is a disciplined, data-driven approach and methodology for eliminating defects in any process from manufacturing to transactional and from product to service.

The foundations of Six Sigma as an estimation standard can be followed back to Carl Friedrich Gauss (1777-1855) who presented the concept of the normal curve. Six Sigma as an estimation standard in item variety can be followed back to the 1920's when Walter Shewhart showed that three sigma from the mean is the point where a process requires correction. Many estimation principles (Cpk, Zero Imperfections, and so on.) later came on the scene, however, credit for coining the expression "Six Sigma" goes to a Motorola engineer named Bill Smith.

Bill Smith, along with Mikel Harry, had written and codified a research report on the new quality management system that emphasized the interdependence between a product's performance in the market and the adjustments required at the manufacturing point. The report clearly indicated that the lesser the number of non-conformities at each stage of production, the better is the performance. This report was no less than a revolution because it paved the way for the implementation of the 'logical filters' as a key tool to solve problems. Bob Galvin, the then CEO of Motorola became a leader in this system, and with his help later this four-stage logical filter became the skeleton of the present day Six Sigma. The four stages were known as Measure, Analyze, Improve and Control.

The objective of the Six Sigma methodology is the implementation of a measurement-based strategy that focuses on process improvement and variation reduction with the application of Six Sigma improvement projects. This is accomplished with the use of two Six Sigma sub-methodologies:

1. DMAIC: The DMAIC (an acronym for Define, Measure, Analyze, Improve and Control) project methodology has five phases.
    - Define the system, the voice of the customer and their requirements, and the project goals, specifically.
    - Measure key aspects of the current process and collect relevant data.
    - Analyze the data to investigate and verify the cause-and-effect relationships. Determine what relationships are, and attempt to ensure that all factors have been considered.
    - Improve or optimize the current process depends on data analysis using techniques such as the design of experiments, poka yoke or mistake proofing,

and standard work to create a new, future state process.
    - Control the future state process to ensure that any deviations from the target are corrected before they result in defects. Implement control systems such as statistical process control, production boards, visual workplaces, and continuously monitor the process. This process is repeated until the desired quality level is obtained.
2. DMADV: The DMADV project methodology, known as DFSS ("Design For Six Sigma") features five phases:
    - Define design goals that are consistent with customer demands and the enterprise strategy.
    - Measure and identify CTQs (characteristics that are Critical to Quality), measure product capabilities, production process capability, and measure risks.
    - Analyze to develop and design alternatives.
    - Design an improved alternative, best suited per analysis in the previous step.
    - Verify the design, set up pilot runs, implement the production process and hand it over to the process owner(s).

Advantages of Six Sigma

It is customer driven It addresses the entire process behind the production of an item or completion of a service, rather than just the final outcome. It is proactive rather than reactive, as it sets out to determine how improvements can be made even before defects or shortcomings are found. A small company that achieves the coveted Six Sigma quality certification will certainly stand out among its competitors. It is particularly valuable to a specialty manufacturing concern that produces precision goods, such as medical technology, where quality is the utmost customer priority and the customer expects to bear the cost of the Six Sigma process.

Disadvantages of Six Sigma

Because Six Sigma is applied to all aspects of the production and planning process, it may create rigidity and bureaucracy that can create delays and stifle creativity.

Customer focus may be taken to extremes, where internal quality-control measures that make sense for a company are not taken because of the overlying goal of achieving the Six Sigma-stipulated level of consumer satisfaction. For example, an inexpensive measure that carries a risk of a slightly higher defect rate may be rejected in favor of a more expensive measure that helps to achieve Six Sigma, but adversely affects profitability.

Small company six sigma is extremely costly for many small businesses to implement. Employees must obtain training from certified Six Sigma institutes in order for an enterprise to

receive Six Sigma certification. Even if a firm wishes to implement Six Sigma without formal certification, much training is necessary in order to understand the system and how to apply it to particular business processes. Many small businesses cannot possibly afford such training, even for a single employee. In addition, small businesses that need to remain nimble and creative often find the Six Sigma system of process analysis stifling, bureaucratic and overly time-consuming.