

Six Sigma

Introduction

In its broadest sense Six Sigma is a methodology that firms can use to improve the output quality of a process. Six Sigma has its roots in the repetitive processes of manufacturing; however, the same tools can be used in any business process from hiring new people to effective product design and marketing plans.

The foundation of the Six Sigma program is statistics; sigma stands for standard deviations from the mean of a data set in other words a measure of variation, while Six Sigma stands for six standard deviations from the mean. When a process reaches the six sigma level that process will be running close to perfection, producing a mere 3.4 defects per million. By using statistical and analytical tools firms can reduce the amount of variation in a process by removing the causes of variation therefore increasing the output quality of the process.

Six Sigma should not be viewed as a way to achieve one very successful project. Six Sigma should become a company wide mantra and be implemented as a core part of the companies culture and strategy with training from top to bottom in order to see the fullness of its benefits.

Some examples of companies that have successfully implemented a Six Sigma program are:

- GE boasts gains of \$2 billion to the bottom line in 1999 and \$2.4 billion in 2001 because of Six Sigma.
- Motorola saved \$15 billion in the first 10 years of Six Sigma implementation
- Dupont realized more than \$1.6 billion in cost savings the first four years of Six Sigma.
- Many other companies and even municipalities have had similar success by implementing Six Sigma.¹

How to organize a Six Sigma program:

Jim Collins' advice to start with the right people is definitely applicable here. Implementing Six Sigma requires having the "right people in the right seats" to be successful.² Six Sigma is no different. Studying some of the companies listed above will prove that having the right people with the right skills and a shared vision is the foundation for success. The key players of the Six Sigma team are the:

¹ Greg Brue and Rod Howes. "Six Sigma The McGraw-Hill 36-Hour Course," 2006, pg. 2.

² Jim Collins. "Good to Great," 2001, pg. 41.

1. Champion: (Usually upper management/ executive officers) The Champion is the person responsible for instilling the vision of Six Sigma and communicating it across the firm. The Champion should receive Six Sigma training in order to be an effective leader. While most likely not as knowledgeable in the use of specific tools in Six Sigma, a Champion must have an understanding of what the Black and Green Belts are doing in order to relay updates and accomplishments to upper management and throughout the company. The champion also assists the Black Belts by dedicating resources, assists in choosing projects, and is the advocate for the Black and Green Belts.

*Some programs distinguish between Champion and Executive leadership, it's up to you.

2. Master Black Belt: A master Black Belt is a Black Belt that has had extensive experience with the Six Sigma methodology. When a firm first tries to implement a Six Sigma program it may be necessary to hire the services of a master Black Belt to help facilitate correct implementation and initial success. The Master Black Belt can act as a coach to the Black and Green Belts by drawing on extensive experience relating past problems and how they were solved. The Master Black Belt can also evaluate project results and give feedback to Black and Green Belts on performance and implementation.

3. Black Belts: The rank of Black Belt is achieved through a proper accreditation program that teaches the Six Sigma process and tests understanding of the tools to be used. Black Belts have a strong understanding of statistical methods of data collection and analysis and must have experience in past Six Sigma projects. Their full time responsibility is to Six Sigma projects. Black Belts work as project managers and are responsible for all the traditional roles of that assignment, communicating often with the Champion throughout a process. If there are no Black Belts in an organization it might be necessary to train some and secure the services of a Master Black Belt to mentor and develop new Black Belts. Adams, Gupta, and Wilson suggest that a company develop one black per every million in revenue, or in some cases .5-4.0% of employees should be Black Belts.

4. Green Belts: Green Belts are essentially assistants to the Black Belts in their job. Effective Green Belts have an understanding of statistics but don't have the expertise and experience with the Six Sigma tools and projects like Black Belts. Green Belts typically do the leg work under Black Belt direction such as data collection and so on. However, it is important for Green Belts to be involved with the whole process of choosing projects, analyzing processes, using Six Sigma tools, and improving processes so that they can achieve the level of Black Belt and advance into a leadership role. Generally Green Belts work on Six Sigma projects part time while still taking care of their normal responsibilities. (AGW) There should be approximately 10 Green Belts for every Black Belt in a company as a general rule.

The Tools

There are numerous tools and techniques that can be used in Six Sigma the implementation of which is dependant on the current project. These tools include: Control Charts, Pareto Analysis, Histograms, Run Charts, Cycle time, t-test, F ratio,

FMEA, fault tree, and Ishikawa Diagrams. In *Six Sigma Deployment*, Adam, Gupta and Wilson provide an extensive list of possible tools and techniques along with their components and expected outcomes. Successful Black Belts will possess a working knowledge of these tools and when they are appropriately used.

A Case Study

An example of a Six Sigma Project is the process of receiving orders and shipping custom computers. Whenever customers are involved in a process there will be some variation and in all processes there will be defects. In the case of a customized computer company there is a process for receiving orders from the customer including specifications, shipping address, and billing information, etc. Over time there will be customer complaints which are a manifestation of defects and variation. A Six Sigma project will define the process and what is happening. Black Belts will identify and categorize the defects and use tools such as the fishbone diagram or failure mode analysis to trace these defects back to the root cause. The Six Sigma team will then work to eliminate the cause/s. In the computer company case the cause of many of the defects could be untrained customer service personnel who do not receive all the correct information from the customer or it could be a faulty component used in many of the computers such as a bad hard disk. Black Belts and Green Belts will work together to find the root cause/s and eliminate it/them. Six Sigma team members must be creative and possess good problem solving skills because of the divergence of the Six Sigma process as it is applied to a wide variety of projects.

More information about Six Sigma can be attained from the plethora of books written on the subject and web sites that offer instruction on the Six Sigma methodology. There are many proprietary works and programs about Six Sigma, as such the student of Six Sigma should study widely to find the best program from the plethora of choices. Some of the books available are listed in the Literature Review.

Literature Review

Greg Brue and Rod Howes. "Six Sigma The McGraw-Hill 36-Hour Course," 2006.

Cary W. Adams, Praveen Gupta, and Charles E. Wilson, Jr. "Six Sigma Deployment" 2003

Roland R Cavanagh, Robert P. Neuman, and Peter S. Pande. "What is Design for Six Sigma?" 2005

Greg Brue. "Design For Six Sigma," 2003

MaCarty, Daniels, Bremer, and Gupta. "The Six Sigma Black Belt Handbook," 2005

Subir Chowdhury. "Design For Six Sigma," 2002

De Feo and Barnard. "Six Sigma, Breakthrough and Beyond," Juran Institute 2004

Chris Chen and Hadley Roth. "The Big Book of Six Sigma Training Games," 2005.