Volume : 2 | Issue : 8 | August 2013 • ISSN No 2277 - 8179

Research Paper

A Study on How Caterpillar Inc. Used 6 Sigma Process to Execute Strategy Enterprise Wide and Emerged Successful in Business

Management

KEYWORDS : 6 Sigma, Values in Action, DMAIC. DMEDI, TQM

Saravanan. G	Research Scholar, Anna University & NPI Program Manager – Caterpillar India Private Limited
Dr. P. Vikkraman	Associate Professor and HOD, Management Studies – Anna University, Regional Centre, Coimbatore

ABSTRACT

Globalization and instant access to information, products and services have changed the way our customers conduct business — old business models no longer work. Today's competitive environment leaves no room for error. We must delight our customers and relentlessly look for new ways to exceed their expectations. This is why Six Sigma Quality has become a part of our culture.

1. INTRODUCTION

Globalization and instant access to information, products and services have changed the way our customers conduct business — old business models no longer work. Today's competitive environment leaves no room for error. We must delight our customers and relentlessly look for new ways to exceed their expectations. This is why Six Sigma (6 Sigma) Quality has become a part of our culture.

Six Sigma at many organizations simply means a measure of quality that strives for near perfection. Six Sigma is a disciplined, data-driven approach and methodology for eliminating defects (driving toward six standard deviations between the mean and the nearest specification limit) in any process – from manufacturing to transactional and from product to service.

The statistical representation of Six Sigma describes quantitatively how a process is performing. To achieve Six Sigma, a process must not produce more than 3.4 defects per million opportunities. A Six Sigma defect is defined as anything outside of customer specifications. A Six Sigma opportunity is then the total quantity of chances for a defect. Process sigma can easily be calculated using a Six Sigma calculator. The fundamental objective of the Six Sigma methodology is the implementation of a measurement-based strategy that focuses on process improvement and variation reduction through the application of Six Sigma improvement projects.

Caterpillar, Inc. USA, is the world largest and leading manufacturer of construction and mining machines, diesel and natural gas engines and industrial gas turbines. Caterpillar products and components are manufactured worldwide.

Caterpillar India Private Limited (CIPL) is a 100% subsidiary of Caterpillar, Inc. USA. CIPL manufactures Off-Highway dump trucks, front end loaders, hydraulic excavators and backhoe loaders. These products are used in open cast mining, quarrying, irrigation, steel plants, cement plants, power plants in the field of construction and material handling.

The quality of Caterpillar's products reflects the power and heritage of the company. As the organization focuses on executing the enterprise strategy and living by its values, one of the top priorities continues to be product quality. The goal to achieve world-class product quality requires each Caterpillar employee to live Our Values in Action—Integrity, Teamwork, Commitment and Excellence—passionately every day to ensure the company delivers on its promises to customers.

To ensure this focus on the customer, Caterpillar Inc. made organizational changes early this year to align its machine product and marketing organizations, which positions the company to achieve its 2010 and Vision 2020 goals and to build deep expertise in product development.

In 2001, Caterpillar launched its 6 Sigma program to drive change to achieve the company's long-term strategic goals (Caterpillar uses 6 Sigma to identify its Six Sigma initiatives). This 6 Sigma process was, and continues to be, extremely successful. Some of the results include first-year benefits that exceeded implementation cost and achievement of the revenue goal two years earlier than planned.

2. WHAT IS 6 SIGMA

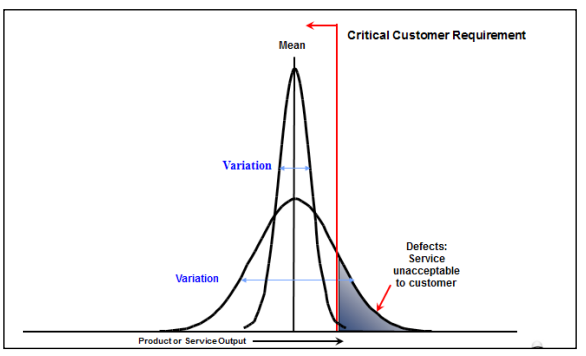
Six Sigma is a total quality management (TQM) technique pioneered by and applied to Motorola processes in the 1980s by Bill Smith, a Motorola engineer who became

known as "the father of Six Sigma." Since then, other companies, such as Bank of America, Honeywell International, Raytheon, and General Electric, have taken these learned processes and expanded them.

First, what it is not. It is not a secret society, a slogan or a cliché. Six Sigma is a highly

disciplined process that helps us focus on developing and delivering near-perfect products and services. Why "Sigma"? The word is a statistical term that measures how far a given process deviates from perfection.

The central idea behind Six Sigma is that if you can measure how many "defects" you have in a process, you can systematically figure out how to eliminate them and get as close to "zero defects" as possible. Six Sigma has changed the DNA of Caterpillar — it is now the way Caterpillar work — in everything it does and in every product the company designs



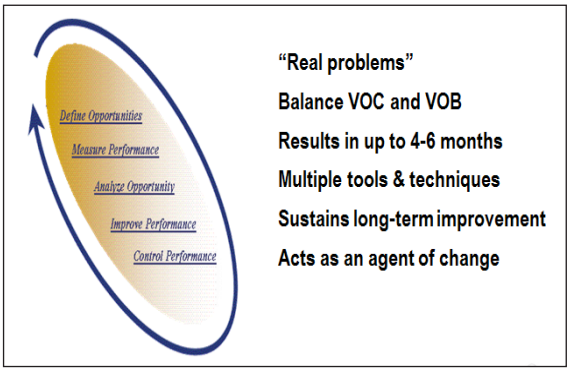
Reducing Process Output Variation

To combat the defects referenced in the Six Sigma goal, companies have adopted methodologies to make a linear map of the process. Two common methodologies are

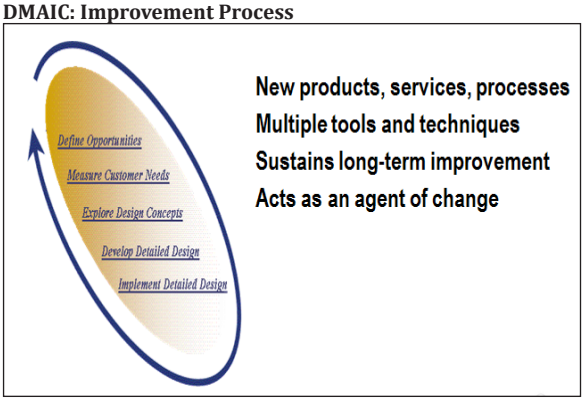
DMAIC (Define, Measure, Analyze, Improve, Control) and DME-

Volume : 2 | Issue : 8 | August 2013 • ISSN No 2277 - 8179

DI (Define, Measure, Explore, Develop, Implement). DMAIC is "a data-driven quality strategy for improving processes, and is an integral part of the company's 6 Sigma Quality Initiative." DMEDI is defined as "a creative approach to designing new robust processes, products and services." Thus the difference between DMAIC and DMEDI is that DMAIC examines processes already in place, and DMEDI helps put a new process in place. A Six Sigma project is designed to improve a process. Each step of the process that needs improving is mapped to analyze where problems exist. The problems are analysed with many different tools, such as Pareto diagrams, tree diagrams, root cause analysis, and process mapping. Then a Six Sigma team takes on the improvement project.



DMAIC: Improvement Process



DMEDI: Creation Process

3. 6 SIGMA AT CATERPILLAR

Caterpillar CEO Glen Barton started the 6 Sigma culture change in 2001 when he challenged every officer for his or her personal commitment to the program. And he got it.

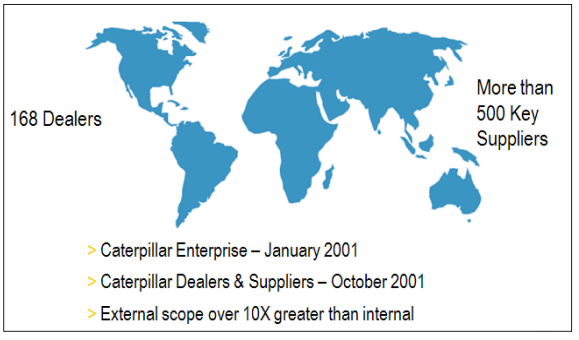
The Black Belts, Master Black Belts, and anyone else associated with 6 Sigma projects were relieved as they realized that the methodology and their roles in the company would continue. Many individuals throughout Caterpillar participate in 6 Sigma projects each year, from the factory workers to the group presidents who support the strategies. According to the company, there are approximately 2,000 active Black Belts at Cat. Each employee knows and understands that major initiatives and changes will take place using the 6 Sigma strategy. If a problem exists, 6 Sigma is the tool that will help solve it. On a side note, employees even take the lessons they learn from work to other organizations in which they volunteer their time.

The 6 Sigma culture has permeated Caterpillar in all aspects of the business. 6 Sigma didn't exist only in the manufacturing or the engineering side of the business—it also entered the financial world and the human resources side. When the company faced the challenge of the general population of its workforce retiring, it turned to 6 Sigma, using a 6 Sigma team to identify whether its benefits package was competitive with ones at other top companies.

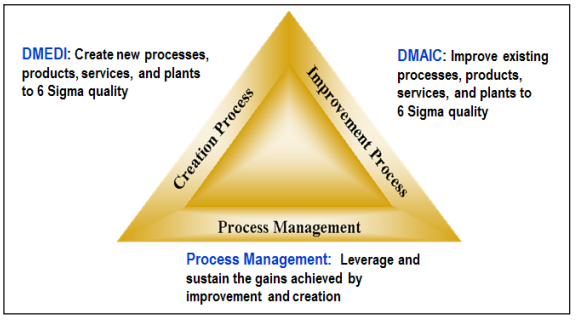
In 1990, Caterpillar reorganized to a business unit structure, which sometimes makes the transfer of knowledge between business units more difficult. But 6 Sigma provided an effective change mechanism and a means of integrating the knowledge learned through 6 Sigma projects across the various business units. In addition to its own use of 6 Sigma, the company has taught its suppliers and dealers about the benefits of using the technique to refine the entire sales model. Caterpillar has introduced 850 suppliers worldwide to 6 Sigma, which has created more than 1,000 supplier Black Belts to help run the projects. One supplier that said it was interested in the Caterpillar 6 Sigma methodology allowed Cat to consult and transform the business. When implementing 6 Sigma, Caterpillar used facts and data to show the results the supplier could expect, so it didn't take long for the supplier to totally buy in to the methodology.

Dealers have also taken on the 6 Sigma commitment. More than 165 dealerships have produced more than 1,000 Black Belts to help with projects. Dealers find it amazing that they can share their projects with one another on a Caterpillar website that depicts best practices among the dealers. Even though each dealership is run as a separate business, 6 Sigma has helped give all of them a common feel across the world. Not only are dealerships learning about projects that need to be done in their business, but they're following the steps of the process and learning which projects to do first.

Just as Caterpillar embraced the methodology, dealers have also accepted the idea of making 6 Sigma a top-down methodology that pushes the training and concept down to the workers at the lowest level.



Global Deployment with Different Cultures



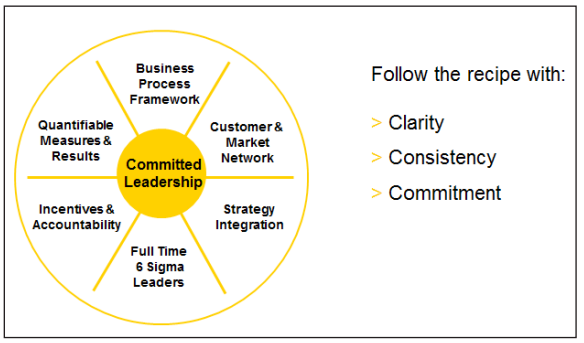
6 Sigma at Caterpillar

Attaining Strategic Goals

When Glen Barton introduced 6 Sigma to Caterpillar, he envisioned using it to help the company achieve the $30 billion mark in revenue by 2006. Instead, it achieved this goal in 2004—two years ahead of plan. Current Chairman and CEO Jim Owens continues to execute strategy using the 6 Sigma methodology. New strategic goals include People; Performance Product & Process; and Profitable Growth. Metrics have been developed for each of the strategic goals for the years 2010, 2015, and 2020.

For simplicity, the following metrics will be used in Caterpillar's 2010 strategic goals: People's metrics include a highly engaged workforce and achieving world-class safety. Performance Prod-

uct & Process's metrics include being No. 1 in quality, market leadership, and market leading availability.



Caterpillar Recipe for Success – Guiding Principles

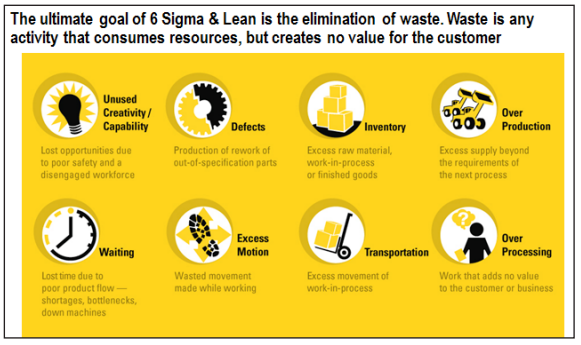
Finally, Profitable Growth's metrics include $50 billion in revenue and earnings per share growth in the top half of the S&P 500 companies.

Over the last eight years, Caterpillar has demonstrated the usefulness of 6 Sigma in achieving its strategic goals. This was accomplished by fully integrating the methodology and its principles into all aspects of the business, including suppliers and dealers. It also allowed the integration of knowledge from Black Belt projects across business units. Further, Caterpillar believes that, by using 6 Sigma to drive change, its new goals are obtainable.

One example that exemplifies Caterpillar's continuing integration of 6 Sigma into all aspects of the business is a project that will improve threaded joint design in the assembly process. This project focuses on continuous improvement in Caterpillar's quality culture and provides an opportunity to leverage best practices and replicate solutions across the enterprise.

The company is also working on a 6 Sigma project that focuses on ergonomic improvement. This project is helping Caterpillar put processes in place that allow a proactive and, ultimately, preventive approach to ergonomic injuries—providing a better work environment for employees.

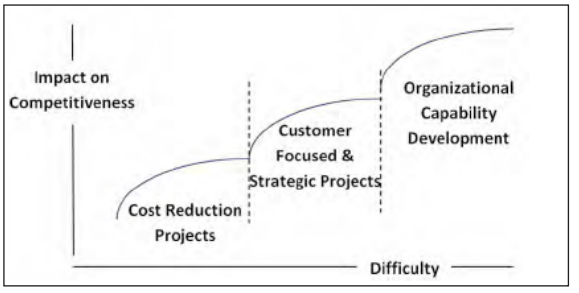
As you can see, Caterpillar is continuing to embrace the 6 Sigma methodology, not only in manufacturing and engineering, but across the organization. This way of working and thinking continues to be successful in driving the company's strategy for change.



8 Wastes

4. SUMMARY

Six Sigma has the potential to contribute to an organization in a range of ways; the common approach of focussing on financial measures alone misses some of the more important but less early measurable aspects.



Impact on competitiveness versus difficulty for various Six Sigma approaches

5. CONCLUSION

Six Sigma is constantly evolving. New combinations spring up in seemingly endless numbers. Some are superficial in the extreme and appear to be more about giving consultants something new to sell than about improving the Six Sigma Paradigm. Despite the real benefits Six Sigma can, and does bring, to organizations Kwak and Anbari (2006) point out that it is not the solution to all business problems. Used appropriately as part of the way organizations tackle business transformation and in conjunction with broader principles, it has much merit. Unfortunately it has often been hijacked by reductive thinkers who see short term problem solving and cost reduction as the way to drive organizational success. This makes Six Sigma just another way of squeezing more out of our creaking processes and, worse, our people.

Abbreviations and Acronyms

TQM	: Total Quality Management
DMAIC	: Define, Measure, Analyze, Improve, Control
DMEDI	: Define, Measure, Explore, Develop, Implement
CIPL	: Caterpillar India Private Limited
WW	: World Wide

REFERENCE

a. 6 Sigma and Lean Tools – Caterpillar University | b. 6 Sigma – The Road Map to Customer Impact – General Electric Co. | c. Six Sigma – Book of Knowledge – Graeme Knowles | d. How Caterpillar Uses 6 Sigma – John Gillet, Ross Fink, Nick Bevington | e. Six Sigma Tools and Techniques – Six Sigma Academy | f. Caterpillar Production System – Caterpillar University |