Latest Trend in Management - Six Sigma

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Abstract

Over the period of time many innovative ideas were applied as management tools keeping in mind the intended goals. These ideas, these innovations resulted in latest management concepts or theories. Six-Sigma, Retail Management, Knowledge Process Outsourcing, World Class Manufacturing, Knowledge Management, Mergers and Acquisitions, Information Life Cycle Management are some of the latest trends in management which have completely changed the management perspective in achieving effective management by reducing cost or maximizing profit. This paper studies six-sigma in detail coupled with some case studies of organizations applying six-sigma. Six-sigma is a business management strategy which was originally developed by Motorola, USA in 1981. A six-sigma process is one in which 99.99966% of the products manufactured are statistically expected to be free of defects (3.4 defects per million). Starting with manufacturing industry it is deep rooted now in every industry seeking almost 100% accuracy in processes or services. The paper covers some industries from entirely different fields and shows how successful those were in achieving Six Sigma. The paper will involve various case studies of "Six Sigma' all over the world. Secondary data will be used to try to find out what are various means and ways through which Six Sigma can be achieved.

1. Introduction

All over the world every management has specific and predefined goals for their organizations, institutes or business. The main concern is to manage the business effectively so that maximum profit may be earned and customers may be satisfied at the same time. Be it manufacturing, retail, service, engineering, software development or any other field; reducing cost, optimizing processes, reducing time and in turn increasing profit are some of the goals which every management seeks to achieve. Over the period of time many innovative ideas were applied as management tools keeping in mind the intended targets. These ideas and innovations resulted in latest management concepts or theories which have changed the way business are being conducted in modern times. Six Sigma, Retail Management, Knowledge Process Outsourcing, World Class Manufacturing, Knowledge Management, Mergers and Acquisitions, Information Life Cycle Management, Technology Management are some of the buzz words which have completely changed the management perspective in harnessing resources and achieving effective management by reducing cost or maximizing profits (Ansari et al., n.d. and Anand et. al., 2007) in a longer sustainable way. Because of globalization and market pressures price levels are always under threat of dropping. This reduces profits unless costs are reduced (asixsigma.com, n.d.). There is always pressure for a business to improve their processes to reduce cost and in turn maximize profits. One simple strategy all over the world is cost cutting exercise without even realizing and understanding what are the areas which needs improvement. This arbitrary and indiscriminate cost cutting produces short term gains resulting in higher long term costs (asixsigma.com, n.d.). Six Sigma, the idea of which is though not latest, but implementation of it is new which boomed early in this century, which every industry seeking

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perfection wants to employ. Six sigma, which is knowledge based, scientific and statistical method, gives long term improvements as all the methods are applied only after ascertaining the areas which require improvement (en.wikipedia.org, n.d.). This paper is an attempt to throw some light on various aspects of Six Sigma, through case studies of the organizations which after applying it completely overhauled their work culture and strategy & achieved unbelievable profits.

2. Research Methodology

Case study method is used in the paper so it is based on the secondary data collected from books, journals and various websites. The three companies whose success stories have been studied are Bechtel, General Electric and Wipro Technologies. The Bechtel was the first major engineering and construction company to adopt Six Sigma (as Six Sigma was originally developed for manufacturing company). General Electric (GE) proved as a catalyst for the growth and propagation of Six Sigma, after GE announced a huge profit due to application of Six Sigma in their organization. Wipro Technology is leading company of India which applied Six Sigma and achieved perfection.

3. Six Sigma

Six Sigma is a set of strategies, techniques and tools for process improvement. It was originally developed by Motorola, USA in 1981. Six Sigma became famous when Jack Welch made it central to his successful business strategy at General Electric in 1995 (en.wikipedia.org, n.d.). Six Sigma seeks to improve the quality of the process outputs by identifying and removing the causes of defects or errors and minimizing variability in manufacturing and business processes. It uses a set of quality management methods, including statistical methods, and creates a special infrastructure of people within the organization named as Champions, Black Belts, Green Belts, Yellow Belts, White Belts etc. who are experts in the methods (en.wikipedia.org, n.d.). Each six sigma project carried out within an organization follows a defined sequence of steps and has quantified values targets, for example, reduce process cycle time, reduce pollution, reduce costs, increase customer satisfaction and increase profits. The term six sigma comes from a field of statistics known as process capability studies (en.wikipedia.org, n.d.). It referred to the ability of manufacturing processes to produce a very high proportion of output within specification. Processes that operate with six sigma quality, over the short term, are assumed to produce long term defect levels below 3.4 defects per million opportunities (DPMO) (en.wikipedia.org, n.d. and isixsigma.com, n.d.). Six Sigma is a registered service mark and trademark of Motorola Inc. The international Organization for Standards (ISO) has published ISO 13053:2011 defining the six sigma process (ISO, ISO Publishes Six Sigma performance Improvement Methodology, 14/09/2011).

4. Six Sigma Methodologies

Six Sigma projects follow two project methodologies named DMAIC and DMADV (en.wikipedia.org, n.d. and isixsigma.com, n.d.) composed of five phases each. DMAIC is used for projects aimed at improving an existing process. DMADV is used for projects aimed at creating new product or process designs.

DMAIC

The DMAIC project methodology has five phases:

- ***D**efine* the system, the voice of the customer and their requirements, and the project goals, specifically.
- ***M**easure* key aspects of the current process and collect relevant data.
- ***A**nalyze* the data to investigate and verify cause-and-effect relationships. Determine what the relationships are, and attempt to ensure that all factors have been considered. Seek out root cause of the defect under investigation.
- ***I**mprove* or optimize the current process based upon data analysis using techniques such as design of experiments, mistake proofing, and standard work to create a new, future state process. Set up pilot runs to establish process capability.
- ***C**ontrol* the future state process to ensure that any deviations from 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.

Some organizations add a ***R**ecognize* step at the beginning, which is to recognize the right problem to work on, thus yielding an RDMAIC methodology.

DMADV or DFSS

The DMADV project methodology, known as DFSS ("**D**esign **F**or **S**ix **S**igma"), features five phases:

- ***D**efine* design goals that are consistent with customer demands and the enterprise strategy.
- ***M**easure* and identify CTQs (characteristics that are **C**ritical **T**o **Q**uality), product capabilities, production process capability, and risks.
- ***A**nalyze* to develop and design alternatives
- ***D**esign* an improved alternative, best suited as 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).

Within the individual phases of a DMAIC or DMADV project, Six Sigma utilizes many established quality management tools that are also used outside Six Sigma. Some of the tools are 5 whys, Axiomatic Design, Business Process Mapping, Fishbone or Ishikawa Diagram, Chi-squared test of independence and fits, Control Chart, Correlation, Cost-Benefit analysis, CTQ Tree, Histograms, Pareto Analysis, Pareto Chart, Pick Chart, Stratification etc. Depending upon case to case every company chooses the tools suited to their environment.

Most of the Fortune 500 companies have applied Six Sigma successfully (en.wikipedia.org, n.d.). An attempt is being made to study the various aspects of Six Sigma through detailed study of three companies. It has been observed that it is applicable to manufacturing organizations as well as service organizations. It has universal applicability but scope differs from organization to organization.

5. The Six Sigma Success Stories

The three companies whose success stories have been studied are Bechtel, General Electric and Wipro Technologies.

Bechtel

Though Six sigma was originally developed for manufacturing companies but Bechtel was confident that it would work in their scenario. So Bechtel launched Six Sigma in 2000, when the company was experiencing unprecedented growth and facing corresponding process challenges (Bechtel, Six Sigma Quality and Efficiency- Bechtel Corporation, n.d.). Six Sigma

improved every aspect of their business from construction projects to regional offices, saving time and money for their customers and them. Bechtel implemented Six Sigma in its key offices and business units around the world. About half of their employees have had six sigma training and most of their major projects employ six sigma methods from start to finish. For example, on a big rail modernization project in the UK, a Bechtel team used Six Sigma to minimize costly train delays caused by project work and reduced the break in period for renovated high speed tracks. At a US department of Defence site in Maryland, six sigma helped Bechtel in achieving significant cost savings by streamlining the analysis of neutralized mustard gas at a project to eliminate chemical weapons. To speed up the location of new cellular sites in big cities, Bechtel developed a way to let planners use computers to view video surveys of streets and buildings, making it easier to pick the best spots. In a mountainous region of Chile, Six Sigma led to more efficient use of equipment in a massive mine expansion, with significant cost savings *(*Bechtel, Six Sigma Quality and Efficiency- Bechtel Corporation, n.d.). Since 2000 Bechtel is constantly engaged in improving quality and efficiency with the help of Six Sigma.

GE

In 1998 GE claimed benefits of $1.2 billion and costs of $450 million, for a net benefit of $750 million. In 1999 company further claimed a benefit of more than $2 billion through the elimination of all non value added activities in all business processes within the company (Ansari et al., n.d.). According to GE "Six Sigma 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 GE — it is now the way we work — in everything we do and in every product we design." GE understood that they need to be nearly flawless in executing their key processes to achieve Six Sigma. Six Sigma is a vision GE strive toward and a philosophy that is part of their business culture (GE, What is Six Sigma, A Roadmap to Customer Impact, n.d.).

According to GE customers don't judge us on averages they feel the variance in each transaction. Six Sigma focuses first on reducing process variation and then on improving the process capability. Customers value consistent, predictable business processes that deliver world class levels of quality. This is what Six Sigma strives to produce. Across the company, GE associates embrace Six Sigma's customer focused, data driven philosophy and apply it to everything they do. GE has categorized three elements of quality namely customer, process and employee (GE, What is Six Sigma, A Roadmap to Customer Impact, n.d.). Customers are the center of GE's universe: they define quality. They expect performance, reliability, competitive prices, on time delivery, service, clear and correct transaction processing and more. They have modified or redesigned their processes according to customers' perspective. All GE employees are trained in the strategy, statistical tools and techniques of Six Sigma quality. Quality is the responsibility of every employee. Training courses are offered at various levels:

- Quality Overview Seminars: basic Six Sigma awareness
- Team Training: basic tool introduction to equip employees to participate on Six Sigma teams
- Master Black Belt, Black Belt and Green Belt Training: in-depth quality training that includes high-level statistical tools, basic quality control tools, Change Acceleration Process and Flow Technology tools
- Design for Six Sigma (DFSS) Training: prepares teams for the use of statistical tools to design it right the first time.

Associates are exposed to various tools related to quality. Some of the tools used are as under (GE, What is Six Sigma, A Roadmap to Customer Impact, n.d.):

Control Chart- Monitors variance in a process over time and alerts the business to unexpected variance which may cause defects.
Defect Measurement- Accounting for the number of frequency of defects that cause lapses in product or service quality.
Pareto Diagram- Focuses on efforts or the problems that have the greatest potential for improvement by showing relative frequency and/or size in a descending bar graph. Based on the proven Pareto principle 20% of the sources cause 80% of given problem.
Process Mapping- Illustrated description of how things get done, which enables participants to visualize an entire process and identify areas of strength and weaknesses. It helps reduce cycle time and defects while recognizing the value of individual contributions.
Root Cause Analysis- Study of original reason for non conformance with a process. When the root cause is removed or corrected, the non conformance will be eliminated.
Statistical Process Control- The application of statistical method to analyze data, study and monitor process capability and performance.
Tree Diagram- Graphically shows any broad goal broken into different levels of detailed actions. It encourages team members to expand their thinking when creating solutions.
Thus GE focuses on customers' perspective, processes and employees to match the best quality they are known for.

Wipro Technologies

Wipro started in 1946 as a vegetable oil company (Wipro, Abont Wipro, n.d.) today boasts of being an Information Technology giant. Wipro is the first Indian company to adopt Six Sigma (Sharma et al., 2008). Today, Wipro has one of the most mature Six Sigma programs in the industry ensuring that 91% of the projects are completed on schedule which is much above the industry average of 55%. The demand in the industry led Wipro to implement Six Sigma though it was not a well thought out plan. A leading communication networks provider in the US required improvement in the product performance of a telecom application using Six Sigma methodologies. Thus with the growing importance on aligning business operations with customer needs and driving continuous improvement, Wipro began moving towards focusing on Quality, thereby, creating a learning environment that led to implementation of Six Sigma. Six Sigma methodologies were designed to overcome the following challenges (Sharma et al., 2008):

- Reduce the data transfer time
- Reduce the risk
- Avoid interruption due to LAN/WAN downtime
- Parallel availability of the switch for the other administrative tasks concurrently

The Six Sigma process resulted in an achievement of close to 250%, 6 minutes for 1MB transfer and 18 minutes for average data transfer. The set target was 200%.Six Sigma at Wipro simply means a measure of quality that strives for near perfection. It is an umbrella initiative covering all business units and divisions so that it could transform itself in a world class organization. At Wipro, it means (Sharma et al., 2008):

1. Have products and services meet global benchmarks
2. Ensure robust processes within the organization
3. Consistently meet and exceed customer expectations
4. Make quality a culture within the organization.

Wipro offers following Six Sigma consulting services

- Six Sigma institutionalization
- Problem solving using Six Sigma
- Six Sigma Training

The objective of Six Sigma implementation at Wipro has continuously been on integrating and implementing approaches through a simultaneous focus on defect reduction, timeliness and productivity. This has translated at lower maintenance costs, schedule-overrun costs and development costs for customers. Measurements and progress indicators have been oriented towards what the customer finds important and what the customer pays for. Analysts remarked that Six Sigma was an indisputable success at Wipro technologies whether in terms of customer satisfaction, improvement in internal performance, or in the improvement of shareowner value.

6. Conclusion

It can be summarized that to achieve long term sustainability six sigma is a powerful tool in the hands of management. To reap the benefits of Six Sigma initial investment is high but long term benefits are numerous including cost saving, increased profit, consistent improved quality of processes, employee performance and ultimately better products & services which leads to high level of customer satisfaction which is the ultimate goal of every organization. But being a costly tool it can be used only in big organizations. Challenge is to make it a tool suited for every organization whether big or small. Moreover with today's ever changing and challenging business environment changes are to be brought into the scope of Six Sigma.

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