Basic Tools of Six Sigma Research to Enhance the Process.

Dr. Vidhyadhar S Athawar

Statistics Department, G S College Khamgaon

Abstract:

In service industry, health industry or production industry Six sigma aims to Service the customer at management level and Service level. It is one of the most leading indicator of management and service sector to provide customer satisfaction level. It is business strategy as well as a crucial procedure having various model, which focuses on preventive control and customer centric, involves continuous improvement. In this research paper we have enhance the basic tools of Six-sigma process and new model is developed.

Key word: Six sigma, DMAIC, new developed model DMAICM, Customer Satisfaction Strategy.

1.1 Introduction

Six Sigma is a business initiative first espoused by Motorola in the early 1990s. Six sigma success stories primarily from the likes of general electric's, Sony allied signal and Motorola have captured the attention of Wall Street and have propagated the use of this business strategy. The six Sigma strategy involves the use of statistical tools and methodology for gaining the knowledge needed to achieve better, faster and less expensive products and services than the competition. The repeated discipline application of master strategy on project after project, where the projects are selected based on key business issues is what derives dollar to the bottom line resulting in increased profit margins and impressive return on investment from the six Sigma training. The six Sigma initiative has specially contributed an average of Six figure per project to the bottom line. A company is designed to change the culture through improvement by focusing on out of the box thinking in order to achieve aggressive stretch goals. Ultimately, Six Sigma if deployed properly will infuse intellectual capital into companies and produce unpredictant knowledge. Gains to translate directly into bottom line results.

1.2 Concept of Six Sigma.

Jiju Antony 2004 stated that Six Sigma process was pioneered by Bill Smith at Motorola in 1986. It is evident that Bill Smith did not really invent [4]. Six Sigma in the year 1980s; rather he applied methodologies that had been available since in 1920s developed by luminaries like Shewhart, Deming, Juran, Ishikawa, Taguchi, and Shainin. All tools used in Six Sigma programs are actually a subset of the Quality Engineering Discipline.

Six Sigma is a powerful system. Basically it is measuring of quality that longs for perfection (3.4 defects on 1.000,000 transactions). The very name of this philosophy is important. Word "sigma" is a Greek letter which represents standard deviation, the term that describes how distant is the data from average or middle.

"Six" parts is involved when one measures the things, the company does right. Three sigma level of quality is the level at which most of companies work nowadays – it is equal to 66.807 defects on million opportunities, while Six Sigma equals 3.4 defects on million opportunities - statistically possible almost perfection. Six Sigma quality requires right people on right positions with the right knowledge.

It is widely recognized as a business strategy that employs statistical and non-statistical tools and techniques, change management tools, project management skills, teamwork skills and a powerful roadmap (DMAIC)

to maximize an organization's return on investment (ROI) through the elimination of defects in processes. According to Statistical view Six Sigma implies 3.4 defects or mistakes or errors or failures per million opportunities. Here, Sigma is a term used to represent the variation about the average of a process. The focus of 'Six Sigma' is not on counting the defects in processes, but the number of opportunitieswithin a process that could result in defects.

The Objective of a Six Sigma strategy is to understand the process, which creates the defects and devises process improvement methods to reduce the occurrence of such defects which improves the overall customer experience. The focus must be on four issues:

- What is the nature of the defects that are occurring in the process?
- Why are such defects occurring and at what frequency?
- What is the impact of a defect on customers?
- How can these defects be measured and what strategies should be implemented to prevent the occurrence of such defects?

1.3 Definition :- Six Sigma

Sunil Desale, S V Deodhar 2013 define that it is the quality system as collective plans, activities, and events designed to ensure that the products, processes, and services satisfy customer needs. In short, Six Sigma is a customer-focused approach to business that provides an overall framework for quality management.

Six Sigma is a statistical term used to measure process variations, i.e., how far a given process deviates from precision, which causes defects. Six Sigma works to systematically and scientifically manage variation and eliminate defects--or to get them as close to zero as possible [9].

Patricia Abreu Sergio Sousa 2012 stated that Six Sigma is an organized systematic methodology used to improve processes or product performance with impact on customers, and is based on scientific and statistical methods [5]. Six Sigma is used to improve Complaints Handling and to reduce the error.

Gandhi 2014 point out that **Six Sigma** refers to "A data-driven method for achieving near perfect quality. Six Sigma analyses can focus on any element of production or service, and has a strong emphasis on statistical analysis in design, manufacturing and customer-oriented activities and in financial services" [2].

1.4 A Study of Six Sigma And Its Importance

Ayon Chakrabarty and Kay Chauan Tan 2007 described that Six Sigma is an operating philosophy and customer focused methodology that remove waste, improve the level of quality as well as improve the financial performance of the organization and customer satisfaction [1].

1.5 Six Sigma has two major methodologies.

Paul Purnendu et al. June 2011 illustrated two methods that are DMAIC and DMADV. DMAIC is used to improve an existing business process and DMADV is used to create new product designs or process designs in such a way that it results in a more predictable, nature defect free performance [6].

   i) DMAIC

   D- Define, M- Measure, A- Analyze, I- Improve, C- Control

   ii) DMADV, Define, Measure, Analyze, Design and Verify

DMAIC :- DMAIC is based on original PDCA Plan Do Check Act cycle. However, DMIAC is used for application of both efforts - improvement of processes and design/redesign of processes.

"DMAIC projects

1.6 Research and development sector:-

The objectives of implementing Six Sigma in R&D organizations are to reduce cost, increase speed to market, and improve R&D processes. To measure the effectiveness of Six Sigma, organizations need to focus on data driven reviews, improved project success rate, and integration of R&D into regular work processes.

1.7 DMAIC Methodology consists of the following five steps

Here the quality level that is needed is goodness level. A Sigma level is used as a measurement within a Sigma program include + - 1.5 Sigma value to account for typical shift and drift of the mean. The Sigma quality level relationship is not linear. In other word a percentage unit improvement in parts per million defect rate does not equate to some percentage improvement in the Sigma quality level.

Pictorial representation of implementation of business strategy [3].

Executives Visions

Assessment Phase			
Six Sigma Assess Select exemplary projects	Conduct six sigma executive assessment workshop	Select Six-sigma Champions	Develop implementation plan

Deployment Phase			
Conduct executive training	conduct champion training	Define projects	create intra-support structure

Project implementation

Measurement Phase						
Floe chat Total process	Create C & E diagram	Control charts project metrics	Estimate capability performance	Create Pereto chats	Conduct MSA	Identify potential

Analysis Phase						
Create Multivariate Charts	Determine confidence intervals for key metrics	Conduct Hypothesis test	Determine variance components	Assess correlation of variables	Conduct regression analysis	Conduct ANOVA

Improvement Phase				
Select DOE factors levels	Plan DOE execution	Conduct DOE	Implement variability reduction design Assessment	Consider response surface methods

Control Phase					
Determine Control plan	Implement Plan control charts	Consider short runs and three way control chart	Consider CUSUM, EWMA &EPC	Consider pre-control charts	Mistake proof process

1.8 Tools of Six-Sigma Process

1.8.1 Knowledge center activity (KCA)

The basic theme of this text is to always strive for improvement and not to play games with the numbers. With this approach management needs to ask the right questions that lead to the voice use of statistical techniques for the purpose of obtaining knowledge from facts and data. Management needs to

encourage the voice application of statistical techniques for Six sigma programs to be successful. This suggests periodic process review and project based on assessment that lead to a knowledge centre activity KCA focus in all aspects of business. This text uses the term KCA to describe efforts for wisely obtaining knowledge or wisely utilizing the knowledge oforganization and process. The strategies and techniques described within these text are consistent with the philosophies of such quality authorities.

1.8.2 Problem solving and decision making:

The steps to effective decision makings are Become aware of a problem or needed action Define the problem or needed action Consider Alternatives and their consequences Select an approach Implement the approach Provide feedback. Here basic and varieties of tools are briefly described for the purpose of aiding with the efficient building of strategies for collecting and compiling information that leads to knowledge. With this knowledge we can make better decisions. The mechanism of implementing many of the topics is described as a basic tool.

1.8.3 Run chart:

A run chart or times series plot permits the study of the observed data for trend or patterns , where the x-axis is time and the y- axis is measured variable. Team can use a run chart to compare a performance measurement before and after a solution implementation to major its impact. Often a problem exist with the interpretation of run chart there is a tendency to see all variation as important.

1.8.4 Control chart:

Control chart offers the study of variation and its sources. Control charts can give process monitoring and control and can give direction for improvements. Control charts can separate special from common causes issues of a process. This is very important because the resolution approach is very different for these two types of situations. Control chat can give any identification of special causes so the there can be timely resolution. Here the monitoring should be of key process input variable where the process flow is stopped for resolution when this variable goes out of control. Control charts of a simple test that identify special causes occurrences from common causes variability through the comparison of individual points and trend to an upper control limit UCL and lower control limit LCL.

1.8.5 Probability plot:

Probability plots are most often associated with tests to assess the validity of normality assumptions. When data are a straight line on a normal probability plot, the data are pre-assumed to be from a normal distribution. Probability plots similarly apply to other distributions such as the viable distribution. Probability plots can also be used to make a percentage of population statements. This can be very useful in describing the performance of business and other processes.

1.8.6 Pareto chart:

Pareto chats are a tool that can be helpful for example to identify the source of chronic problem or common causes in a manufacturing process. The pareto principle basically states that a vital few of the manufacturing process, characteristics cause, most of the quality problems on the line, while travel many of the manufacturing process characterize cause only a small portion of quality problem.

1.8.7 Brainstorming:

Brainstorming is a very valuable means to generate new ideas and get group involvement. There are many ways to conduct a brainstorming session. There are all so many ways to compile the information from a brainstorming session. The generation of ideas can be generated formally or informally within a session.

Flexibility exist when choosing an approach because each team and group seems to take a personality of its own. To begin this process of gathering information by brainstorming, a group of people is assemble in a room where it is preferable that tables are position in a manner to encourage discussion. The people who are assembled should have different perspectives on the topic that is to be address. The problem of question is written down so that everyone can see it, and the following basic rules of the exercise are followed by meeting leaders who have experience in conducting a brainstorming.

1.8.8 DAMICM: A new developed phase is Maintain:

This improved method (DMICM) plays an important role that reflects the financial benefits to the banking sector. In this method all the six phases play a vital role collectively. So, it is necessary to maintain the standard of level of each and every phase so that it will be executed at an increasing rate. So, to keep in control it is necessary to maintain all the phases under control by taking feedback from customers every month, and the views of employees whatever is required to change are considered to make it possible to meet the customer requirement. Only feedback from customers will maintain the process. This suggestion, opinion and feedback appear helpful to upgrade the Service Sector.

Conclusion:

Six Sigma is the commercial process, which can be applicable to all Service sector and Industrial Sector. By applying all the given basic tools, we can improve the existing process or we can enhance the process which will be helpful to financial growth. All these basic tools depend upon the top management level for implementation. The way they implement will be served. Ultimately, Six sigma if deployed properly will infuse intellectual capital to companies and produce unpredictant knowledge.The new developed phase maintained is useful to improve the process continuously forever.

Reference:

1. Ayon Chakrabarty and Kay Chuan Tan "The current state of six sigma application in services", Managing Service Quality, Emerald Group Publishing Limited,2007, Vol. 17, N0.2, 194- 208 .
2. Gandhi Shraddha R " A study of six sigma and its importance", International Journal of Business Quantitative Economics and Applied Management Research,Oct 2014, Vol 1, Issue 5.
3. Implementing Six Sigma " Forrest W Breyfogle III, John Willy & Sons.
4. Jiju Antony Caledonian Business School, Glasgow Caledonian University Glasgow, UK "Six Sigma in the UK service organizations: results from a pilot survey by jiju Antoney", Managerial Auditing Journal, 2004, Vol. 19 No.8.
5. Patricia Abreu Sergio Sousa, " Using Six Sigma to improve   Complaints Handling", Proceeding of the world Congress on Engineering, Londan, U.K,July 2012, Vol. III.
6. Paul Purnendu, Bose K Swapan, and Dhalla S Rizwan, "Progress in TQM & Indian Banking Performances", International Journal of Innovation, Management and Technology, June 2011,Vol. 2, No. 3.
7. R Radhakrishnan and P Balamurugan, " Construction of control chart based on six sigma initiatives for range", Global Journal of Mechanical Engineering and Computational science,2011, Vol 1(3), 1-4
8. R S Naagarazam & Arivalagar Text Book on TQM , Irwin Mcgraw –Hill, New Delhi.
9. Sunil V Desale, S V Deodhar, "An Application of Lean and Six sigma Principle for Constructional Process Improvement in Indian Organizations", Indian Journal of Applied Research,2013, Vol. 3, Issue 4
10. Young Hoon Kwak and Frank T. Anbari, " Benefits, obstacles, and future of six sigma approach", 26,Technovatio, 2006.