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A STUDY ON SIX SIGMA

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Abstract – This study is intended to investigate six sigma- its principles, business transformations, techniques, tools and certification.

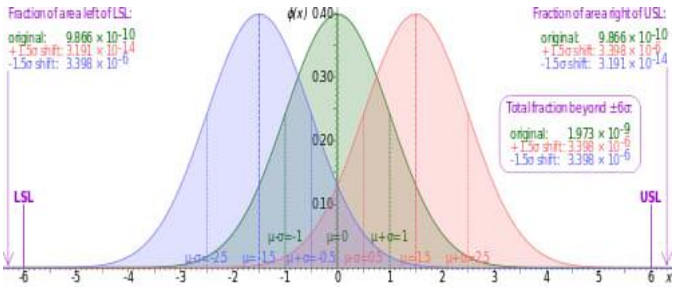
***Key Words*: six sigma**

1.INTRODUCTION

Six Sigma is a set of management tools and techniques designed to improve business by reducing method that provides organizations tools to improve the capability of their business processes. This increase in performance and decrease in process variation helps lead to defect reduction and improvement in profits, employee morale, and quality of products or services.

It is a data-driven approach that uses a statistical methodology for eliminating defects. "Six Sigma" comes from the bell curve used in statistics, where one Sigma symbolizes a single standard deviation from the mean. If the process has six Sigmas, three above and three below the mean, the defect rate is classified as "extremely low."

The name Six Sigma is derived from the bell curve used in statistics where one Sigma represents one standard deviation away from the mean. The defect rate is said to be extremely low when the process exhibits Six Sigma's, where three are above the mean and three below.



2.The 5 Key Principles of Six Sigma

The concept of Six Sigma aims at– delivering near-perfect goods and services for better customer satisfaction.

Goals are achieved through a two-pronged approach

Problem identification- need based activity-what are the aspects to be upgraded

Solution to need based problems- changing current process / product design towards customer satisfaction

3.Key principles of six sigma:

1. Customer centric approach – customer is the king

   The ultimate aim is to bring maximum benefit and satisfaction to the customer. In order to achieve this, customer need has to be satisfied and hence creating loyalty among customers. Customer loyalty can be established only by maintaining benchmarked quality standards.

2. Minimize waste

   To achieve this, vast data collection is required followed by honest investigation of problems , identification of actual needs of the customer, corrections and improvements needed in present processes and finally tabulation of data for further improvement. Maintain the things that gives or adds value to the customer.

3. Get Rid of unwanted process/activities

   Once the problem is identified, make changes to the process to eliminate variation, hence errors are avoided.. Streamline process and functions to achieve quality control in products and efficiency inn process.

4. Involve all stake holders

It is essential that, all the stakeholders are involved in this process as a team and collaboratively work together to improve quality of the product and efficiency of the process. Do problem-solving approach to improvise product and process and remove bottle-necks in the whole process.

A detailed knowledge, training and skill are required to reduce unforeseen errors and failures thereby optimal performance of process is ensured.

5. Ensure a Flexible and Responsive Ecosystem

A cultural transformation among all stakeholders has to be inculcated for flexibility and response to market with an organized procedure in implementation stage.

When this is achieved, the company gets a competitive advantage, hence customer satisfaction is improved.

This cultural transformation can be termed as business transformation.

3. The Six Sigma Methodology

DMAIC	This is a data driven methodology, which contains five stages – this aims for product delivery and service. Define -measure-analyze-improve and control
DMADV	Has own set of procedures and protocols that are to be implemented for improving customer satisfaction and quality. This is a part of design for six sigma aims for design or re-designing of product or process D – Define, M – Measure, A – Analyze, D – Design, V – Validate.

4. Business Transformation in line with six sigma

Six Sigma uses a data-driven management process used for optimizing and improving business processes with the framework of customer focus and clever use of data and statistics to.

The Six Sigma Process of the DMAIC method has five phases:

STEP 1 - - Define

STEP 2—Measure

STEP 3—Analyze

STEP 4—Improve

STEP 5 -- Control

Each of the above phases of business transformation has several steps:

1. DEFINE

The Six Sigma process begins with a customer-centric approach.

Step 1: The business problem is defined from the customer perspective.
Step 2: Goals are -What do you want to achieve? What are the resources you will use to achieve the goals?
Step 3: Check the involvement of the stakeholders.

2. MEASURE

The second phase is focused on the metrics of the project and the tools used in the measurement. How can you improve? How can you quantify this?

Step 1: Measure your problem in numbers or with supporting data.
Step 2: Define performance yardstick. Fix the limits.

Step 3: Evaluate the measurement system to be used. Can it help you achieve your outcome?

3. ANALYZE

The third phase analyzes the process to discover the influencing variables.

Step 1: Determine process efficiency and effectiveness. Does the process help achieve what you need?
Step 2: Quantify your goals in numbers. For instance, reduce defective products
Step 3: Identify variations using historical data.

4. IMPROVE

This process investigates the effects of changes in various parameters. This phase the process implementation is carried out

Step 1: Identify possible reasons. Variables identified in Process and its influence is studied
Step 2: find relationships between the variables.
Step 3: fix process tolerance, Process tolerances can be maintained by using tools like optimization and validation set.

5. CONTROL

In this final phase, you determine that the performance objective identified in the previous phase is well implemented and that the designed improvements are sustainable.

Step 1: Validate the measurement system to be used.
Step2: Establish process capability.
Step 3: if satisfied, implement the process

6. Six Sigma Techniques

The Six Sigma methodology also uses a mix of statistical and data analysis tools such as process mapping and design and proven qualitative and quantitative techniques, to achieve the desired outcome.

Step 1- Brainstorming

Step 2 – Cause-effect diagram

Step 3 – Customer centric

Step 4- 5S

Step 5- Kaizen

Step 6 – Benchmarking

Step 7- Mistake proofing

Step 8- Value stream mapping

1) Brainstorming

Brainstorming is the key process of any problem-solving method and is often utilized in the "improve" phase of the DMAIC methodology. It is a necessary process before anyone starts using any tools. Brainstorming involves bouncing ideas and generating creative ways to approach a problem through intensive freewheeling group discussions. A facilitator, who is typically the lead Black Belt or Green Belt, moderates the open session among a group of participants.

2) Cause-effect diagrams

This technique helps to get to the root cause of the problems under consideration and is used in the "analyze" phase of the DMAIC cycle.

In the 5 Whys technique, the question "why" is asked, again and again, finally leading up to the core issue. Although "five" is a rule of thumb, the actual number of questions can be greater or fewer, whatever it takes to gain clarity.

3) Customer centric

This is the process used to capture the "voice of the customer" or customer feedback by either internal or external means. The technique is aimed at giving the customer the best products and services. It captures the changing needs of the customer through direct and indirect methods. The voice of the customer technique is used in the "define' phase of the DMAIC method, usually to further define the problem to be addressed.

4) The 5S System

This technique has its roots in the Japanese principle of workplace energies. The 5S System is aimed at removing waste and eliminating bottlenecks from inefficient tools, equipment, or resources in the workplace. The five steps used are Seiri (Sort), Seiton (Set In Order), Seiso (Shine), Seiketsu (Standardize), and Shitsuke (Sustain).

5) Kaizen (Continuous Improvement)

The Kaizen technique is a powerful strategy that powers a continuous engine for business improvement. It is the practice continuously monitoring, identifying, and executing improvements. This is a particularly useful practice for the manufacturing sector. Collective and ongoing improvements ensure a reduction in waste, as well as immediate change whenever the smallest inefficiency is observed.

6) Benchmarking

Benchmarking is the technique that employs a set standard of measurement. It involves making comparisons with other businesses to gain an independent appraisal of the given situation. Benchmarking may involve comparing important processes or departments within a business (internal benchmarking), comparing similar work areas or functions with industry leaders (functional benchmarking), or comparing similar products and services with that of competitors (competitive benchmarking).

7) Mistake Proofing

This technique's name comes from the Japanese phrase meaning "to avoid errors," and entails preventing the chance of mistakes from occurring. In the poka-yoke technique, employees spot and remove inefficiencies and human errors during the manufacturing process.

8) Value Stream Mapping

The value stream mapping technique charts the current flow of materials and information to design a future project. The objective is to remove waste and inefficiencies in the value stream and create leaner operations. It identifies seven different types of waste and three types of waste removal operations.

6. The Six Sigma Tools

1. Cause and Effect Analysis
2. Flow Chart
3. Pareto Chart
4. Histogram
5. Check Sheet
6. Scatter Plot
7. Control Chart

7. Six Sigma Levels

The Six Sigma training levels conform to specified training requirements, education criteria, job standards, and eligibility.

1]White Belt

This is the simplest stage, where:

- Any newcomer can join.
- People work with teams on problem-solving projects.

- The participant is required to understand the basic Six Sigma concepts.

2]Yellow Belt

The participant:

- Takes part as a project team member.
- Reviews process improvements.
- Gains understanding of the various methodologies, and DMAIC.

4]Green level

This level of expertise requires the following criteria:

- Minimum of three years of full-time employment.
- Understand the tools and methodologies used for problem-solving.
- Hands-on experience on projects involving some level of business transformation.
- Guidance for Black Belt projects in data collection and analysis.
- Lead Green Belt projects or teams.

5]Black Level

This level includes the following:

- Minimum of three years of full-time employment
- Work experience in a core knowledge area
- Proof of completion of a minimum of two Six Sigma projects
- Demonstration of expertise at applying multivariate metrics to diverse business change settings
- Leading diverse teams in problem-solving projects.
- Training and coaching project teams.

6]Master Black Belt

To reach this level, a candidate must:

- Be in possession of a Black Belt certification
- Have a minimum of five years of full-time employment, or Proof of completion of a minimum of 10 Six Sigma projects
- A proven work portfolio, with individual specific requirements, as given here, for instance.
- Have coached and trained Green Belts and Black Belts.
- Develop key metrics and strategies.
- Have worked as an organization's Six Sigma technologist and internal business transformation advisor.

8] **CONCLUSION:**

In this study principles of six sigma – its principles, business transformations levels , techniques , certification levels and their criteria are studied.

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