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CONTENTS

Sr. No.	TITLE & NAME OF THE AUTHOR (S)	Page No.	
1.	OPERATIONAL EFFECTIVENESS OF VIRTUAL PANEL IN POWER PLANT SIMULATOR:	1	
1.	A STUDY	-	
	DR. S. SELVAM, R. VIJAYALAKSHMAN RAO & L. S SENTHIL KUMAR		
2.	A STUDY ON IMPLEMENTATION OF SIX SIGMA	3	
۷.	DR. VINOD N. SAYANKAR		
3.	THE USE OF BUSINESS PROCESS OUTSOURCING (BPO) AND CO-SOURCING BY	6	
9.	INDIAN BANKS	U	
	DR. MUNISH SABHARWAL		
4.	RELIABLE CLOUD STORAGE SERVICES WITH DATA INTEGRITY	11	
	DR. J. THIRUMARAN & DR. K. SIVAKUMAR		
5.	PB FREE SOLDERING INSPECTION OF PCBA	15	
0.	PRATHIBA V KALBURGI	10	
6.	QUERY BASED IMAGE RETRIEVAL USING NEAREST NEIGHBORS	18	
0.	K. SELVAM, G. LAKSHUMANAKUMAR & K. L. SHUNMUGANATHAN	10	
7.	KNOWLEDGE BANK: AN INITIATIVE FOR ACADEMIC EXCELLENCE	22	
7.	DIPALI PRAKASH MEHER & DR. NILESH MAHAJAN		
8.	SOLVING TRAVELING SALESMAN PROBLEM BY DYNAMIC PROGRAMMING	28	
0.	CH. BATTUVSHIN, B.CHIMED-OCHIR & R.ENKHBAT		
9.	EMPIRICAL STUDY ON PARENTAL PERCEPTION TOWARDS THE IMPACT OF	31	
•••	ADVERTISING ON CHILDREN OF PUNJAB		
	PREETI THAKUR		
10.	STUDIES ON WEB BASED MANAGEMENT SYSTEM USING LOAD BALANCING	36	
	SYSTEM		
	S. ARUNKUMAR		
11.	DETERMINING EFFECTIVE FACTORS ON ADJUSTMENT SPEED OF CAPITAL	40	
	STRUCTURE IN TEHRAN STOCK EXCHANGE LISTED COMPANIES		
	MASTANEH ABDOLLAHI DARESTANI & HOSSEIN KARBASI YAZDI		
12.	INVENTORY OF KNOWLEDGE MANAGEMENT AND EFFECTIVE UTILISATION OF	46	
	ORGANISATIONAL RESOURCES		
	DR. ABUBAKAR SAMBO JUNAIDU & SHEHU MALAMI SARKIN TUDU		
13 .	COMBINED EFFECTS OF THE FORMAL FINANCE AND FIRM CHARACTERISTICS ON	51	
	SMES GROWTH IN SOKOTO STATE, NIGERIA		
	MUSTAPHA NAMAKKA TUKUR & BAPPAYO MASU GOMBE		
14 .	IMPACT OF TELEVISION ADVERTISEMENTS ON BUYING BEHAVIOUR OF	56	
	TEENAGERS: AN ANALYSIS		
	DEEPAK KUMAR SHARMA & HARDEEP		
15.	AN EFFICIENT SMART SURVEILLANCE APPLICATION ON ANDROID DEVICE USING	62	
	MESSAGING SERVICE AND EFFICIENT MOTION DETECTION MECHANISM		
	M.R. PRIYADARSHINI		
	REQUEST FOR FEEDBACK & DISCLAIMER	65	

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iv

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HYPOTHESES

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INDINGS

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A STUDY ON IMPLEMENTATION OF SIX SIGMA

DR. VINOD N. SAYANKAR DIRECTOR SANKALP BUSINESS SCHOOL PUNE

ABSTRACT

In today's global era of business and information systems, quality plays an important role. In order to get quality product organization has to implement the system so as to get the quality product. Today's competitive environment leaves no room for occurrences of error. Major enemy of quality is occurrence of variation in product through manufacturing process. More the variation more the generation of defects and hence less will be the profit. Six Sigma seeks to improve the quality of process outputs by identifying and removing the causes of defects 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 employees within the organization. Implementation of six sigma will help the organization in minimizing defects, variation increase in profitability of the organization, customer satisfaction.

KEYWORDS

Information system, manufacturing process, six sigma, quality management.

INTRODUCTION

ix Sigma is a set of techniques and tools for process improvement. It was developed by Motorola in 1986. The world sigma is statistical term that measures how far a given process deviates from standard. Six Sigma seeks to improve the quality of process outputs by identifying and removing the causes of defects 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 employees within the organization. These employees may be six sigma certificate holders of Champions, Black Belts, Green Belts, and Yellow Belts etc. who are experts in the methods. Each Six Sigma project carried out within an organization follows a defined sequence of steps and has quantified value targets. This is for example, reduction of process cycle time, reduction of pollution, reduction of costs, increase of customer satisfaction and increase in profits.

The term Six Sigma originated from terminology associated with manufacturing specifically terms associated with statistical modeling of manufacturing processes. The maturity of a manufacturing process can be described by a sigma rating indicating its yield or the percentage of defect-free products it creates. A six sigma process is one in which 99.99966% of the products manufactured are statistically expected to be free of defects (3.4 defective parts/million).

Motorola set a goal of "six sigma" for all of its manufacturing operations and this goal became a by word for the management and engineering practices used to achieve it. The term six sigma process comes from the notion that if one has six standard deviations between the process mean and the nearest specification limit.

 $\mathbf{6\sigma}$ The often-used Six Sigma symbol

Sigma Level		Yield %	Defects per Million Opportunities
1		30.9	6,90,000
2		69.2	3,08,537
3		93.3	66,807
4		99.4	6,210
5		99.98	233
6		99.9997	3.4

IMPLEMENTATION ROLES

One of the key innovations of Six Sigma involves the absolute professionalizing of quality management functions which is major factor of any organization. Six Sigma programs adopt a kind of elite ranking terminology to define a hierarchy that kicks across all business functions and levels. Six Sigma identifies several key roles for its successful implementation.

Executive Leadership includes the CEO / Director and other members of top management. They are responsible for setting up a vision for Six Sigma implementation. They also empower the other role holders with the freedom and resources to explore new ideas for breakthrough improvements. They also makes the team for implementation of six sigma including experts.

METHODOLOGY OF SIX SIGMA

Six sigma methodologies are considering the following parameters.

1. Customer: Customer is king of any business process however the goal of six sigma is customer satisfaction. Delighting customers is a necessity.

2. Metrics: Understanding customer requirements and design of specific metrics are main concern to the six sigma. An incorrect metric would lead to wastage of efforts.

3. **Processes:** With customer requirements and metrics in view the processes leading customer satisfaction have to be improved. Identifying the areas where process needs improvement.

4. **Employees**: The employees in the organization have to trained about the processes and final goal aligned with the organization's objectives. Employees creates results and involving them is essential to organization's quality approach.

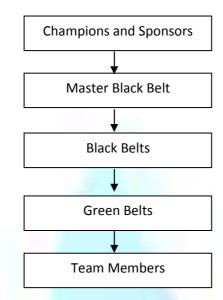
KEY CONCEPTS OF SIX SIGMA

Some of key concepts of six sigma are as per following:

Critical to Quality	Attributes most important to the customer
Defect	Failing to deliver what the customer wants. Defects are randomly distributed throughout the process.
Process Capability	What the organizational process can deliver
Variation	What the customer sees and feels. Variability is necessarily inherent in any type of process.
Stable Operations	Ensuring consistent, predictable processes to improve
Design for Six Sigma	Designing to meet customer needs and process capability

SIX SIGMA ORGANIZATIONS

The deployment of employees in the organization to implement six sigma is critical. The six sigma has five level of hierarchy. At the top are the champions and sponsors the management support and requisite leadership. The ground level is divided into teams led by Green Belts. In the hierarchy Black Belts assists Green Belts and Master Black Belts come to the help of the Black belt.



Black Belt – These are leaders of team responsible for measuring, analyzing, improving and controlling key processes that influence customer satisfaction and/or productivity growth. Black Belts are full-time positions.

Green Belt - These are similar to Black Belt but not a full-time position.

Master Black Belt – These are first and foremost teachers. They also review and mentor Black Belts. Selection criteria for Master Black Belts are quantitative skills and the ability to teach and mentor. Master Black Belts are full-time positions.

QUALITY TOOLS

Cause and Effect Diagram: Cause and effect diagrams are created by Kaoru Ishikawa (1968) that shows the causes of a specific event. This diagram also called Ishikawa diagram. Common uses of the Ishikawa diagram are product design and quality defect prevention to identify potential factors causing an overall effect. Each cause or reason for imperfection is a source of variation. Causes are usually grouped into major categories to identify these sources of variation.

Control Charts: Control charts monitors variance in a process over time and alert the process to unexpected variance which may cause defects. Control charts also known as Shewhart charts in statistical process control are tools used to determine in a state of statistical control.

Check Sheet: The check sheet is a form used to collect data in real time at the place where the data is generated. The data it captures can be quantitative or qualitative. Its purpose is to to provide a structured way to collect data about quality as a rough means for assessing a process or as input to other analysis.

Histogram: In statistics a histogram is a graphical representation of the distribution of data. It is an estimate of the probability distribution of a continuous variable and was first introduced by Karl Pearson. A histogram may also be normalized displaying relative frequencies. The intervals must be adjacent and often are chosen to be of the same size. The rectangles of a histogram are drawn so that they touch each other to indicate that the original variable is continuous.

Pareto Chart: A Pareto chart was named after Vilfredo Pareto is a type of chart that contains both bars and a line graph where individual values are represented in descending order by bars, and the cumulative total is represented by the line. The purpose of the Pareto chart is to highlight the most important among a set of factors. A Pareto chart focuses on efforts or the problems that have the greatest potential for improvement by showing relative frequency and size in a descending bar graph. In quality control it often represents the most common sources of defects the highest occurring type of defect or the most frequent reasons for customer complaints.

Scatter Diagram: A scatter diagram is a type of mathematical diagram using Cartesian coordinates to display values for two variables for a set of data. A scatter plot is used when a variable exists that is below the control of the experimenter. If a parameter exists that is systematically incremented and decremented by the other, it is called the independent variable and is plotted along the horizontal axis. The dependent variable is plotted along the vertical axis.

Defect Measurement: Accounting for the number or frequency of defects that cause lapses in product or service quality.

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.

STATISTICAL PROCESS CONTROL

The application of statistical methods to analyze data, study and monitor process capability and performance.

BENEFITS OF SIX SIGMA

Organizations which implement Six Sigma have significant benefits that contribute to competitive advantage and to changing the culture in an organisation. BENEFITS FOR THE ORGANIZATION

- Six Sigma is driven by the customer its prime aim to achieve maximum customer satisfaction and minimizing the defects.
- Focuses on prevention on defects rather than fixing it
- Improvement in quality of product or service as perceived by the internal and external customer
- Focuses on the process improvement. Process cycle time reduction
- Leads to rise of profitability and reduction in costs
- Increase in employees skills development
- Use of common language throughout the organization
- Achievement in world class standard

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- Improvement in knowledge and skills
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DISCUSSION

Six sigma is a powerful tool that can help an organization to design, operate and control every process in a manner that fetches the several benefits of implementation. The goal of six sigma is to improve internal as well as external customer satisfaction and continuously improve processes throughout the organization. Champions take responsibility for Six Sigma implementation across the organization in an integrated manner. Champions also act as mentors to Black Belts. Six sigma concepts reduce sources of variation and improving quality and productivity. It also reduces and eliminates defects in occurring during the process. By implementing six sigma in industries, it receives several benefits and increases the profitability. Six sigma is a powerful tool that can transform organization for perfection.

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