

A Review On Six Sigma And Dmaic Problem Solving Methodology

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Abstract- In today's competitive world, customer wants perfection and there is no room for error. Delighting the customer and new ways to exceed their expectations is requirement of today's business world. Six sigma helps to achieve this goal. Six sigma is a highly disciplined process that helps us focus on developing and delivering near-perfect products and services. Six sigma helps us to reduce deviation in process and keep them within acceptance limit.

Keywords - defects; pipe bending; productivity; quality;

I. INTRODUCTION

Six Sigma is new, emerging, methodology to quality promise and quality management with importance on continuous quality improvements. The main goal of this style is reaching level of quality and consistency that will satisfy and even exceed demands and expectations of today's demanding customer. A term sigma quality Level is used as a gauge of a process goodness. Lower sigma quality level means greater opportunity of defective products, while, higher Sigma quality level means smaller opportunity of defective products within process.

Sigma is a statistical measurement of only 3.4 defects per million and regarded as a management philosophy focused on eliminating mistakes, waste and rework. It establishes a measurable status to achieve and embodies a strategic problem solving method to increase customer. Satisfaction and dramatically reduce cost and increase profits. The real power of Six -Sigma is simple because it trusts people power with process power.

There are countless benefits of having employees trained in the practices of Six-Sigma. Some of the benefits include the following: cost savings, increased productivity, and lower frequency of defects, shorter cycle time, and improved customer satisfaction. Below are just two success stories that had their own particular benefits after implementing Six-Sigma. Many more companies have also had positive results with Six Sigma. One of the earliest success stories begins with Motorola, the founders of Six-Sigma. At the Schaumburg, Illinois facility, ten years after implanting Six-Sigma, great successes were seen. Though Fredrick Taylor, Walter Stewart and Henry Ford played a great role in the evolution of Six-Sigma in the early twentieth century, it is Bill Smith, Vice President of Motorola Corporation, who is considered as the father of six sigma.

II. SIX SIGMA APPROACH

The Six Sigma Approach is customer-driven. For a business or a manufacturing process, the Sigma ability is a metric that indicates how well the process is being performed. The higher the Sigma capability, the better, because it measures the capability of the process to achieve defect-free-work (where a defect is anything that results in customer dissatisfaction) The Six Sigma Approach is also data-driven. It focuses on reducing process variation, centring the process and on optimizing the process. The emphasis is on the improvement of process capability rather than the control of product quality, which includes the improvement of quality and reduction of cost of quality. In short, the Six Sigma approach focuses on customer needs& the inputs of the process. And hence this will results in reducing or eliminating defects, reducing process variation, and increasing process capability.

III. LITERATURE REVIEW

Rajat Ajmera et al. (2017) explore the use of DMAIC methodology of six sigma to minimize the defects rate in a selected textile industry. This is a systematic approach towards defects minimization through five phases of DMAIC methodology named define, measure, analyze, improve and control. Different six sigma tools were used in different phases. Pareto analysis has been done for the identification of major defects. Root causes of those defects were detected by cause and effect analysis. Finally some potential solutions are suggested to overcome those causes. The result found after implementation of the solutions is very significant. Improvements in the quality of processes lead to cost reductions as well as service improvements. The defect percentage has been reduced from 7.4 to 5.08 and consequently the Sigma level has been improved from 2.9 to 3.2.

Nachiket Kulkarni et al. (2017) provide implementation of DMAIC methodology for optimization of production process of splitter shoe. The purpose of this paper is to present the application of the DMAIC methodology which refers to a data-driven quality strategy for improving processes.

Santosh Subhash chandra Dubey & Dr.Arun Kumar (2017) study on the critical factors for successful implementation of TQM and the causes of failure in the SME for adopting TQM. The result will motivate and help them in future research to remove or minimized the barriers of SMEs in implementing TQM to achieve the business excellence.

Patel Chirag et al. (2017) study and understanding the importance about Total Quality Management implementation in foundry shop. Today's competitive environment has lower manufacturing cost, more productivity in less time, high quality product, defect free operation are require to every industry so we are going to implement Total Quality Management through Quality Assurance Plan in foundry shop that will help the industry reduce the various defects. In this review paper we have collect the data though the process mapping & then find major defect and their causes and choose the best solution to improve it by optimize that data using taguchi method using software of Minitab.

Mohd khairulnizamzahari & Norhayatizakuan (2016) analyse the relationship between TQM and employee performance. A total of 350 questionnaires have been distributed to 10 manufacturing companies in Malaysia and effective sample of 294 usable completed surveys (84.0 percent usable response rate). Reliability testing was conducted to test the questionnaire before pilot test was done. Statistical analysis and regression were used to predict and estimate the relationship. The model was assessed using Analysis of Moment Structure (AMOS) based Structural Equation Modelling (SEM). The findings showed that TQM practices have a significant impact on employee performance.

Jyoti Prakas Majumdar (2016) studied on the Critical Factors for successful implementation of TQM and the causes responsible for reluctance of the SME in adopting TQM. The result will encourage and guide the future research to remove or reduce the difficulties of SMEs in implementing TQM to achieve the business excellence.

C. Manohar & A. Balakrishna (2015) discusses the quality and productivity improvement in a manufacturing enterprise through Defect Analysis and deals with an application of Six Sigma DMAIC (Define- Measure-Analyze- Improve- Control) methodology in wheel production plant which provides a framework to identify, quantify and eliminate sources of variation in an operational process in question, to optimize the operation

variables, improve and sustain performance viz. process yield with well executed control plans to reduce defects happening in Cast wheel production.

Naisargik Patel & Sanjay Shah (2015) studies the implementation of Six Sigma methodology in manufacturing Industries. The DMAIC (define- measure-analyze- improve- control) approach has been used in implementing Six Sigma in manufacturing industries for improving quality level. This will improve Sigma level by implementing DMAIC methodology, without any huge capital investment. Implementation of Six Sigma methodology has resulted in large financial savings for different manufacturing industries reducing defects.

S. Suresh, A. L. Moe and A. B. Abu (2015) have used Six Sigma DMAIC methodology for Defects Reduction in Manufacturing of Automobile Piston Ring. Using the Six Sigma method, the rejection percentage is reduced by 13.2% from the existing 38.1% of rejection. Further improvement in the rejection is expected in the long run after the continuous implementation of all the solutions.

Jitendra A Panchiwalaet (2015) carried out the research work made by several researchers and an attempt to get technical solution for minimizing various casting defects and to improve the entire process of casting manufacturing.

VivekPatil et al. (2015) studied quality control and Statistical techniques used to improve productivity and to reduce rejections due to casting defects.

B. Naveen et. al (2015) presents the current performance of outputs and capacity of the plant calculated using continuous data collected in shop floor. In each workstation the processing time is different and the longest time consumption workstation will be identified as a bottleneck workstation. The identified workstation will be analysed to reduce the processing time which increases production rate.

Julian paulsidin et al. (2014) explored the relationship between the extent of quality management implementation and quality of production in Malaysia's manufacturing companies. A questionnaire survey was prepared and distributed to manufacturing companies in Malaysia. Analysis of the data in this study supports a strong positive relationship between the implementation of quality management and quality of production which was consistent as claimed in the previous studies.

Shashank Soni et al. (2013) identified the root causes of failure for a welding process at a manufacturing plant and propose to use Operational Six Sigma technique to eliminate the problem. In contrast to other method which measure and identify the non-conformance through destructive testing, a technique is proposed to use a

mathematical model, which is later charted using SPC technique. The control chart for the mathematical model identifies the failure of the process in real time and will reduce/eliminate the testing process.

Rai (2013) defined satisfaction as “a buyer’s emotional or cognitive response post-subjective assessment and comparison of pre-purchase expectations and actual performance subsequent to the consumption of the product or service, meanwhile evaluating the costs incurred and benefits reaped in a specific purchase even or over time in course of transacting with an organization”.

Deepak Mittal et al. (2013) study the Analysis of Critical Factors for Successful Implementation of Total Quality Management in Manufacturing Industries. The identified parameters include customer focus, continuous improvement, team work and involvement, top management commitment and recognition, training and development, communication in company, measurement and feedback. A total of 40 questionnaires are sent to the different manufacturing industries. Then questionnaires were collected back from various industries and the data was managed in a usable format.

IV. PROBLEM STATEMENT

Now days, many companies want to expand their output and productivity to achieve their yearly target by eliminating some causes and production time that affect profit for company. Bend Joints Pvt Ltd, Bhopal is facing 14-15% of rejections of bend pipes every month from their production. This study deals with the reduction of bending defects in Bend Joints Pvt Ltd, Bhopal.

V. OBJECTIVE OF STUDY

Main objectives of this study are as follows-

- To implement industrial engineering tools in selected manufacturing company.
- To identify the highest frequency of defects occurs at the workstations.
- To reduce the percentage of defect.
- To propose new methods to the selected manufacturing company.
- To improve the productivity of the company.

VI. PRESENT WORK

In the present work, an attempt has been made to reduce the percentage of defects (Flattening and Crinkling) occurred in the pipe bending by controlling the parameters with Taguchi technique. This work discusses the quality and productivity improvement in a manufacturing enterprise through defect analysis and deals with an application of Six Sigma DMAIC (Define–Measure–Analyse–Improve–Control) methodology in pipe bending plant which provides a framework to identify, quantify and eliminate

sources of variation in an operational process in question, to optimize the operation variables, improve and sustain performance viz. process yield with well executed control plans to reduce defects happening in pipe bending plant. Key performances indicators of this study were the defect quantity. Taguchi’s experimental design is used for process validation and improvement. Then the analysis of data is carried out on MINITAB software to find the effect of these parameters.

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