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Barriers in Implementing Six Sigma in Small and Medium Manufacturing Enterprises

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Abstract: ***Six sigma is a tool that used by organizations to improve quality, Enhance their operation, Improve efficiency as result it helps to increase overall profit, Six sigma remove defects less than 3.4 defects per million, many large companies implement six sigma due to their financial resources ability, that's why a perception is observed that six sigma is only for large companies, but it can be implemented in small and medium enterprises also with better results.***
Six sigma is not only for quality but it also helps in increasing productivity, profit, improves whole bottom line of company, this study is for small and medium enterprises that helps to guide for implementation process.
Hence Six Sigma is rule which analyzed data and statistics so that industry can focus on primary cause of problem and work accordingly to solve that problem in a simplified manner so that we can get final results improved and better, six Sigma is used in many sectors but gives better result in manufacturing sector also, Small and Medium Enterprises (SMEs) in India operate under typical conditions where a wide variety of products are produced in smaller quantities. For such small batch productions, the production processes including people, machines, materials and methods should be as stable as possible. The quality of the products produced or the services provided must be continuously improved. Whenever possible, inspection should be done at source to avoid quality deviations that would be more costly if found at a later stage.
Keywords: **Six Sigma, SMEs, Barriers, Quality Improvement, Product Defects.**

I. INTRODUCTION

Six Sigma is a set of techniques introduced by an American engineer named Bill Smith who worked for a company called Motorola in 1986, In six Sigma process efficiency can be achieved 99.99966% means we can say that product is defect free that is equivalent to 3.4 defects in every one million products, It is a continuous approach to optimize process and minimize the error in final product it works on set up of methods by which efficiency of work is improved line change

In last decades industries are focusing on quality due to high competition, Tools like SPC, quality management system, TQM, QC quality circle benchmarking etc. And played a very significant role in Indian manufacturing organizations, engineers need a very simple tool to implement or their production so that everyone can follow easily hence overall efficiency is improved, And organization work on several objectives like as maximizing profit, better customer satisfaction, social welfare product, utilizing resources in better way[1] hence 6 Sigma is rule which analyzed data and statistics so that industry can focus on primary cause of problem and work accordingly to solve that problem in a simplified manner so that we can get final results improved and better, six Sigma is used in many sectors but gives better result in manufacturing sector also, Big industries have been implementing Six Sigma efficiently but in small industry due to lack of knowledge unskilled workers don't follow six Sigma methods hence their efficiencies observed lower in comparison to big industries, Small and Medium Enterprises (SMEs) in India operate under typical conditions where a wide variety of products are produced in smaller quantities. For such small batch productions[2], the production processes including people, machines, materials and methods should be as stable as possible. The quality of the products produced or the services provided must be continuously improved. Whenever possible, inspection should be done at source to avoid quality deviations that would be more costly if found at a later stage. In the end, all seven actions must be standardized based on repeatable human action and improvement.

II. DESIGN METHODOLOGY

Six sigma analyzes root cause of problem of work and act accordingly, it focuses on smooth flow of work in processed manner and with minimum cycle time and result in best efficiency with optimal results[3], Six Sigma has goals to improve defects by analyzing data hence acting upon the weak chain so that overall production runs smoothly with high efficiency and as a final result price of final product is reduced and overall profit of industries increased.

DMAIC is set of tools used for solving problems, it was given by Walter shewhart and W. Edward deming

1) *Define:* means identifying needs and wants of customer and also define process mapping, - Determining serious customer requirements It explains basic goals or objectives and define work statistics using tools like Process Map, QFD

a) Maintained scorecard implementation, observing cost of bad quality and renewable revenue.
Formation of a Six Sigma working crew

b) Develop a working strategy and performing plan with clear results
Schedule meetings timely to discuss the improvement of Six Sigma

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2) *Measure:* quantify problem, it measures quantity of problem, also major cost factor problem,
a) Create running graphs and control graphs of important process of variables. Start executing project statistics in a fixed time.
b) Determine the futuristic capacity of the process.
c) Pareto charts and control charts tools most widely tools for this.
d) Develop a flow chart / process defining map
e) Perform system analysis by measuring
f) The reference figures, the findings of the measurement system analysis, the process capacity, a target for improvement, a revised process map, and a refined project book are the strategic results for the measurement stage.
3) *Analyze*: helps to identify the cause of problem by analyzing data, Graphical tools are used to analyze, - Create a cause-and-effect diagram to identify variables that influence the outcome of the process[4].
a) Gather information in order to assess the link between important process input and output factors and Doing related studies.
b) The main causes of errors are the results of the research phase.
4) *Improve:* means implementing and verifying the solution, It's selects operation methods which uses design of experiments, - Brainstorm to identify potential long-term countermeasures and process improvements to root causes. It uses tools for project planning and there management.
Determine optimal operational of key input using whole and response surface methodology.
5) *Control:* is maintaining the solution and following of the control plans and also developing, it also monitor process and creates a feedback plan.

III. RESULT AND DISCUSSION

Study was done to find status of implementation of Six Sigma in small and medium manufacturing enterprises, also to find what problems and barriers small and medium enterprises face for implementing Six Sigma, Also tools and techniques are analyzed that are used by companies, Factors like profit and finance are also analyzed.
Result indicates about the current situation of Six Sigma in SMSE It concludes that maximum companies are aware of six Sigma but very less number of companies are applying at ground level incorrect manner, some companies are practicing but not implementing it wholly ,A big gap is observed during comparison of these companies to global situation.

A. *Six Sigma myths*

1) It requires a numerous training
2) Large team is required
3) It is simple quality program
4) Requires complicated statistics
5) Costly in implementing
6) Changes responsibility for workers

B. *Six Sigma facts*

1) Provides better work culture
2) Simplifies problem and gives better solution
3) Importance is given to process for regular returns
4) It improves quality with efficiency 99.99966%
5) it utilizes tools and techniques

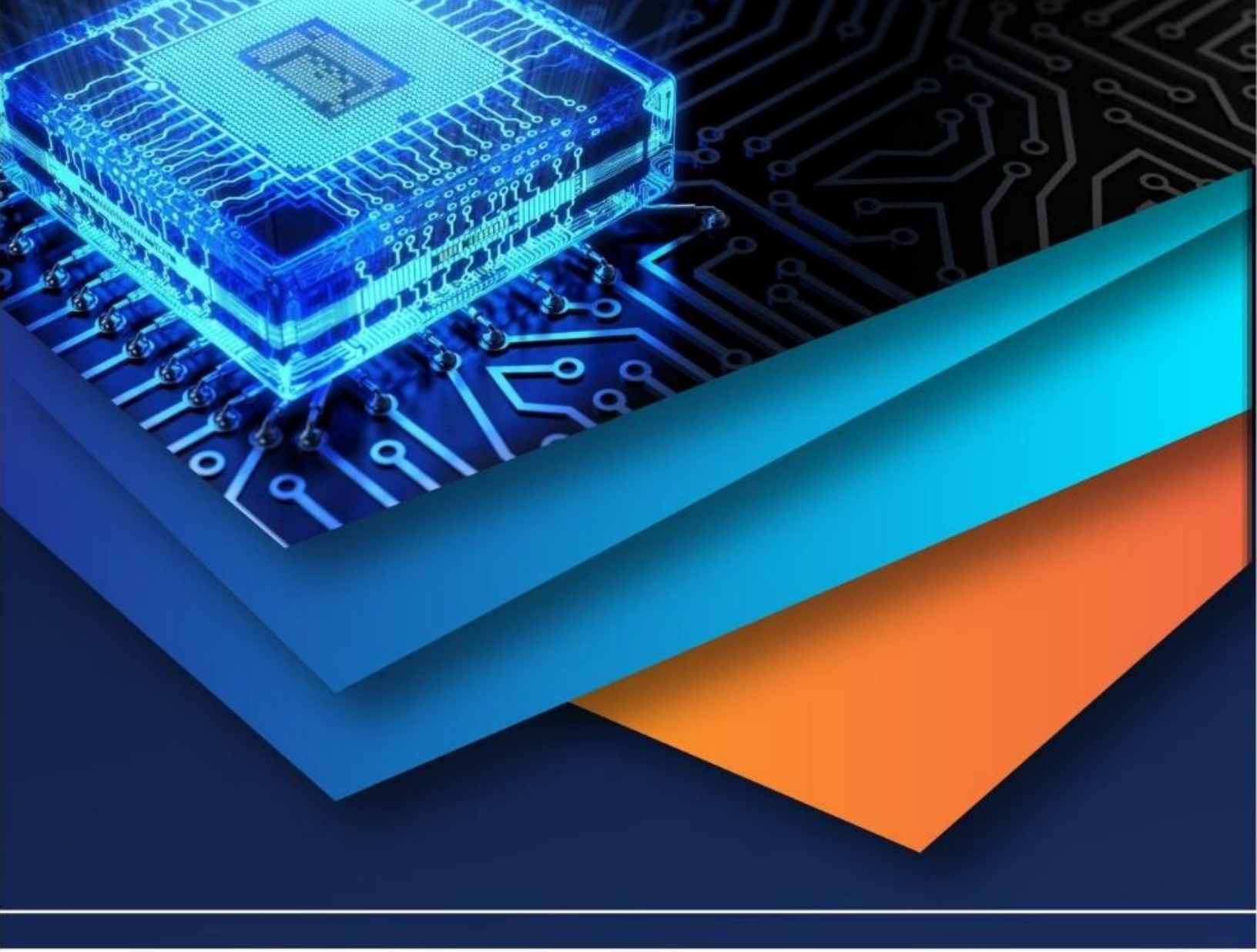
IV. CONCLUSION

Tools and techniques are suggested to improve quality and solving problems successfully, the main misconception about Six Sigma is that it is not about statics but it is all about dealing statistically, Six Sigma not only help in quality improvement but also helps in financial activities like as return on capital investment.
A strong conclusion comes out from this study is about leadership, it is very important to create environment for supporting Six Sigma by top management because leadership plays an important role for success or failure of any initiative, top management should endorse Six Sigma by giving knowledge and proper guide, they can create a well environment easily and results for this will be long lasting, in this way organization can achieve desired goals and vision in minimum time.
In this research paper, and initiative has taken to implement Six Sigma in some manufacturing industries. The results of the study clearly and effectively demonstrate that Six Sigma is a versatile strategy for improving productivity levels. The literature reveals that the application of Six-Sigma has generally been limited to large production companies. The research also shows a low presence of Six Sigma in a manufacturing industry, such as small industries in northern India. In the present study of some small manufacturing industries, an effort has been made to reduce the predominantly high levels of waste and, ultimately, to improve capacity utilization levels. The results show that the Six-Sigma implementation has an impressive range after the successful implementation of the Six-Sigma project-based approach.

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