

# Six Sigma In Project Management

Shubham Iranna Goudar<sup>1</sup>, Prof M.M.G. Math<sup>2</sup>, Dr. G.B. Rudrakshi<sup>3</sup>

<sup>1,2,3</sup>Dept of Mechanical Engineering

<sup>1,2,3</sup>Basaveshwar Engineering College (A), Bagalkot.

**Abstract-** *Competition is increasing rapidly and it is not good enough to complete the projects within time and budget, but the aim is to understand the Voice of Customers. In the last few decades, the project management concept and its techniques have established proven practices and demonstrated their worth within several organizations. But the continuing dramatic failures in projects have highlighted the disadvantages in traditional methods of project management and in particular, the ways in which projects are formulated and executed through them, leaves many opportunities for further development in the project management process.*

*As organizations have started paying more attention towards improving their operational management practices, Six Sigma methodologies has revolutionized the world of business and evolved with growing momentum in customer satisfaction and quality.*

## I. INTRODUCTION

Six-Sigma ( $6\sigma$ ) is a set of techniques and tools for process improvement. It was introduced by engineer Bill Smith while working at Motorola in 1986. It seeks to improve the quality of the output of a process by identifying and removing the causes of defects and minimizing variability in manufacturing and business processes. It uses a set of quality management methods, mainly empirical, statistical methods, and creates a special infrastructure of people within the organization who are experts in these methods.

Subsequently, application of Six Sigma methodologies in project management would provide an opportunity to the project managers to take maximum benefits from their projects by developing strategies that are based on performance metrics by eliminating unwanted complexities and uncertainties. Recognizing that project management is itself a process and by adding Six Sigma methodology could bring value and are best applied within the organization.

Each Six Sigma project carried out within an organization follows a defined sequence of steps and has specific value targets, for example: reduce process cycle time, reduce pollution, reduce costs, increase customer satisfaction, and increase profits.

## II. PURPOSE OF USING SIX SIGMA IN PROJECT MANAGEMENT

- To improve the organizations productivity
- To reduce the wastage and cost of manufacturing
- To improve the quality of the product
- To reduce the time required to manufacture a product
- To improve the profit of the organization
- To improve the customer satisfaction towards quality of the product and better service.

## III. LITERATURE REVIEW

**McGarland, et, al.** The fundamental limitation in the project management techniques is their inability to deal with subjective judgements that are imprecise and vague.

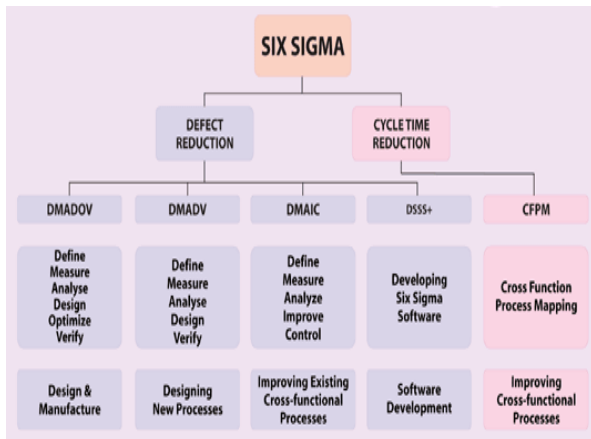
**Coronado, et, al.** To achieve the organizational objectives, many organizations in the past like Allied Signals, and Motorola have successfully implemented quality methodologies like Six Sigma across all departments within their organization and have achieved remarkable improvement in the market share, product reliability and customer satisfaction.

**Lucus, et, al.** Six Sigma is an operational system that speeds up the improvements in the business system using various statistical aspects by getting the right projects conducted in right way.

**Anbari, et, al.** Six sigma strategies, tools, techniques, and principles pointed out that six sigma is more comprehensive than prior quality initiatives such as Total Quality Management (TQM) and Continuous Quality Improvement (CQI).

**Six Sigma = TQM + Stronger Customer Focus + Additional Data Analysis Tools + Financial Results + Project Management.** **Hahn, et, al.** Six Sigma is a disciplined and statistically based approach for improving product and process quality. On the other hand, Sanders and Hild (2000) called it a management strategy that requires a culture change in the organization.

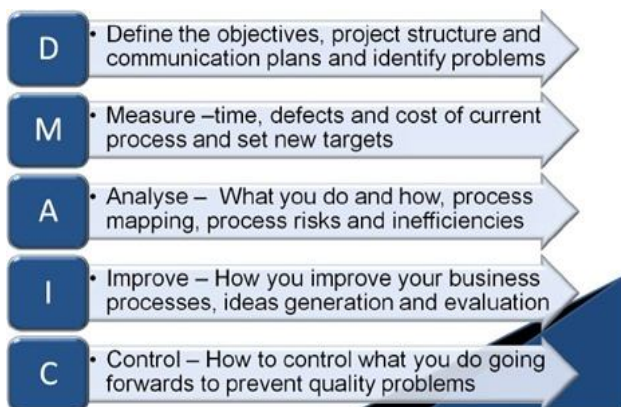
**IV. METHODOLOGY OF SIX SIGMA**



**Fig 1: Six Sigma Methodology**

**DMAIC Process**

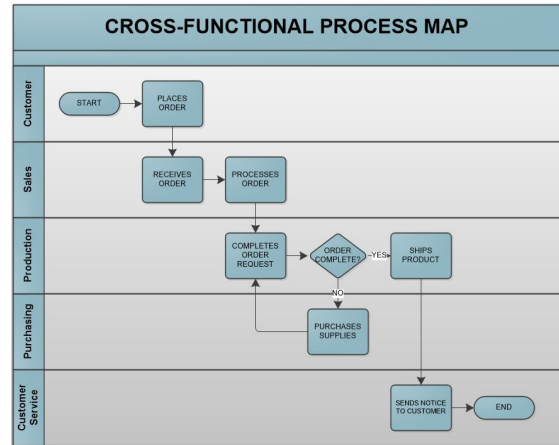
DMAIC is a closed-loop process that eliminates unproductive steps, often focuses on new measurements, and applies technology for continuous improvement.



**Fig 2: DMAIC Process**

**Cross Functional Process Mapping**

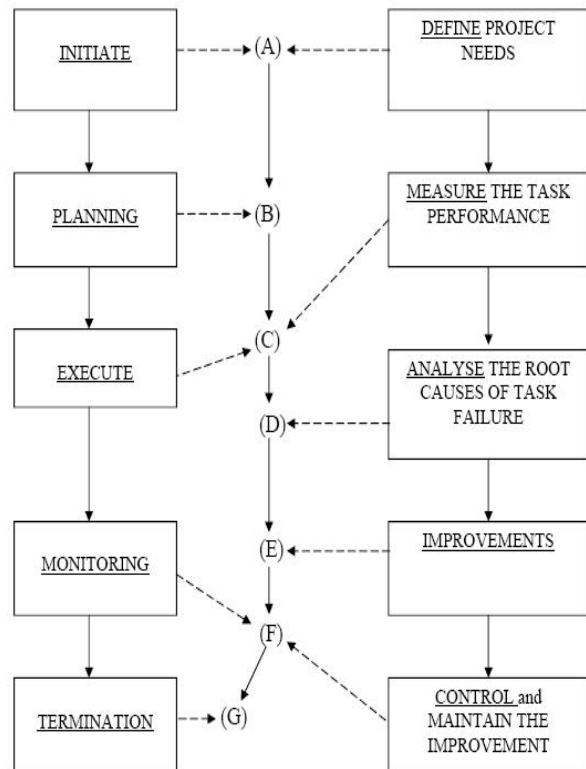
A deployment flowchart is a business process mapping tool used to articulate the steps and stakeholders of a given process.



**Fig 3: Cross Functional Process Mapping**

**V. FRAMEWORK BETWEEN PROJECT MANAGEMENT and SIX SIGMA**

During research, the integrated model based on the principles of both Six Sigma and project management was developed. Both methods have their own steps and phases to follow; the integrated model merges the concepts of both of them to form one single model. The proposed integrated framework between Project Management and Six Sigma is shown below:



**Fig 4: Framework between Project Management and Six Sigma**

**Phase A** of the integrated framework is similar to both methodologies which involves identifying the project objectives. The purpose of this phase is to determine the nature and scope of the project. If this phase is not performed well, it is unlikely that project outcome will meet the Customer demand accurately.

This phase includes a cohesive plan that encompasses the following areas:-

- Developing the project charter
- Capturing the voice of customer
- Identifying critical success factors

**Phase B** of the integrated framework is taken from project management process that involves deciding on how work should be conducted to improve/eliminate the constraint or meet the project objective. This phase not only involves the use of techniques like PERT/CPM for project scheduling but involves a much wider scope of a project. It begins by setting the project goals, identifying bottlenecks in the project tasks, cost estimating/budgeting, risk management, resource usage estimating and the milestones to be covered to ensure that project is completed successfully.

**Phase C** of the integrated framework is the combination of the execution stage of project management discipline and the measure stage of Six Sigma methodologies. In the execution stage, the project management team directs the performance of the planned activities and tasks interfaces that exist within the project. Measurements of the deliverables will help the project manager to visualize the things that are hard to see. This step uses a variety of statistical tools like Histogram, scatter plot, quality control graph to read the current situation of the CTQ (critical to quality) and project parameters.

**Phase D** of the integrated framework follows the spirit of Six Sigma methodology to determine the performance of project processes aiming to achieve the project goals. It is followed by an analysis in finding the root causes of a problem if the performance of the tasks lags behind or not within the control limits defined by the customer. Cause and effect diagram or Five Whys are powerful means to organize the brainstorm of ideas to identify the root causes that causes the problem. Using various tools at this phase takes advantage of Six Sigma sequencing by enabling the project to flow smoothly from phase C to phase E.

**Phase E** of the integrated framework applies Six Sigma strategies using various technical and statistical techniques like Brainstorming, Design of experiments and Kaizen to eliminate root causes in the failure tasks to achieve better

project performance. The purpose of this phase is to utilize current capacity and incur maximum benefits from the task outcome without creating additional expenditure in the project.

**Phase F** of the integrated framework is the combination of monitoring stage of project management discipline and controlling stage of Six Sigma methodology. This phase is designed to ensure that the improvement/changes made in the previous phases are supported by the entire project without any delay in project duration, cost overruns and quality issues. The purpose of this phase is to continually monitor the project variables and measure the project activities (after improvement) to ensure that it stays within specified control limits. One of the Six Sigma tools that can be used at this phase to monitor the process performance and provide feedback on solution performance is SPC (Statistical Process Control). It helps to audit the improvements and assures that the modifications made in the project activities will be properly sustained to run the project to a successful end.

**Phase G** of the integrated framework is taken from last stage of project management discipline where project is terminated through the project charter. It includes the successes during the project, lessons learned and analysis of the gains from the project outcome. The review should be presented to management to determine how well the project output integrated with missions, strategies, customer requirements and objectives of the organization.

## VI. THE BENEFITS OF ADOPTING SIX SIGMA IN PROJECT MANAGEMENT

- Cultural changes in managing projects.
- Improvements in project tasks over long run, thereby minimizes repeated problems.
- Enables better decision making.
- Better budget, schedule and quality awareness at each phase of project management.
- Improvement in the lead time in new product developments.
- Reduction in non value added and wasteful activities for project management.
- Improvement in quality of projects and product delivery (time to market).
- Increases profit (bottom line cost savings) and better customer satisfaction.
- Help to clarify project objectives and prioritization of project tasks.
- Improved customer confidence in delivering project on time, within budget and improved quality

- Reduction in customer complaints and better time management.

## VII. PROJECT MANAGEMENT APPLICATION

**Scope:** Applying Six sigma in scope management would enforce clear definition of requirements and rigorous change management.

**Time:** Applying Six Sigma in time management would require better scheduling, immovable deadlines, careful progress monitoring, risk management, and enforces better resource management.

**Cost:** Applying Six Sigma in cost management would imply absolute budgets, enforce careful cost controls, and effective forecasting.

**Quality:** Applying Six Sigma in scope management would enforce unyielding quality targets, careful selection of standards, realistic assessment of capabilities.

## VIII. CONCLUSION

In this paper, we have proposed a Six Sigma implementation model for Project Management in organization. Our contribution is observed through upgrading the Six Sigma approach to a continuous improvement and reduce cycle time adapted model coherent with the DMAIC and Cross functional process mapping approach. This model has treated the requirements of customers and the internal objectives of the organization.

## REFERENCES

- [1] Shah Mani Vijay, "Integration of Six Sigma with Project Management", (2012) vol.3, issue 1, pp 29-32.
- [2] Masoud Hekmatpanah, Mohammad Sadroddin, Saied Shahbaz, Farhad Mokhtari, Farahnaz Fadavinia, "Six Sigma Process and its Impact on the Organisational Productivity", (2008) vol.2, issue 7, pp 731-735.
- [3] Md. Enamul Kabir, S.M. Mahbubul IslamBoby, Mostafa Lutfi, "Productivity Improvement by using Six Sigma", (2013) vol.3, issue 12, pp 1056-1084.
- [4] Taieb Ben Romdhane, Ahamed Badredaline, "A New Model to Implement Six Sigma in Small and Medium sized enterprises", (2016) vol.5, issue 8, pp 1-22.
- [5] Jiju Antony, Ricardo Banuels, "Key Ingredients for the Effective Implementation of Six Sigma Program", (2002) vol.6, issue 4, pp 20-27.
- [6] Young Hoon Kwak, Frank T Anbari, "Benefits Obstacles and Future of Six Sigma Approach", (2004) vol.5, issue 6, pp 1-8.
- [7] Mcgarland M.R and Hendrickson C.T, "Expert system for construction project monitoring", (1985), vol.111, issue 3, pp 293-300.
- [8] Seiler R K, "Reasoning about uncertainty in certain expert systems-Implications for project management system", (1990) vol.8, issue 1, pp 50-54.