

# Optimization of Service Quality in ABC Industry by using Six Sigma Tool

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**Abstract**— Today industrial service organizations are more interested in improving their processes by decreasing the variation as the competitive environment leaves no room for errors and defects. Variation is the biggest enemy of quality which is defined by the customers. We must deliver the services at the ideal targets demanded by the customers. In this article, we will study various literatures related to quality improvement in service industries by using six sigma. The aim of this project is to reduce the number of defects of a service provided by ABC Industry and to increase the customer satisfaction by using six sigma. In present study, we perform identification of the problem and study of literatures. After this stage the primary and secondary data with voice of customer collected by visiting the company and identified defect opportunities. Further the data analyzed to measure the initial six sigma level. By implementing solutions to reduce the defect opportunities final sigma level will be measured with DMAIC process.

[Note\*: Because of security reasons instead of company name we used ABC].

**Key words:** Six Sigma, Quality Improvement, DMAIC

## I. INTRODUCTION

Six Sigma is a technique and tool for process improvement. It was first implemented by engineer Bill Smith while working at Motorola in 1986. Today, it is used by many industrial sectors. Six Sigma seeks to improve the quality of product or process by identifying and removing the causes of defect and minimizing variability in production and business processes. It uses a set of quality management, mainly statistical methods, and creates a special infrastructure of team within the organization, who are experts in these methods. Every Six Sigma project carried out within an organization follows defined steps and has specific value targets. i.e. reduce process cycle time, pollution, costs and increase customer satisfaction and profits.

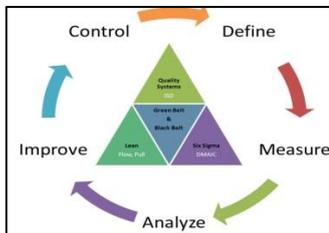


Fig. 1: Six Sigma Process

The term Six Sigma (it was written in this way when registered as trademark on December 28, 1993 by Motorola) derived from terminology associated with statistical modeling of manufacturing processes. The quality of a manufacturing process can be described by a sigma rating which indicates the percentage of defect-free products. A six sigma process is one in which 99.99966% of

all opportunities to produce some feature are statistically expected to be free of error (3.4 defects per million opportunities). Motorola set a target of "six sigma" for all of its manufacturing operations, and this target became a by-word for the management practices used to achieve it.

### A. Service Department Process

- Type of problem (breakdown or wear out job)
- Type of job with all detail
- Equipments required as per job
- Manpower required as per job
- Selection of travelling mode for manpower
- Expenditure of manpower
- Sending the tool and equipment depending on their weight

Provide the permit and challan for vehicle Providing gate pass or permission to the manpower with their equipment to the plant.

### B. Defect Opportunities

process	opportunities			
Dimension and material of wear out	Not accurate	Improper instruments		
Required equipment	Not available	not in working condition	More time required to procure	Improper document permit, delivery
transport of equipment and manpower	invalid transport	Non availability	Improper document of vehicle	
Manpower	Not available	Physically and mentally unfit	Less skilled	Less experienced
Turning operation	Material not available	Poor quality of turning process	Misalignment of pattern	Poor quality of welding

Fig. 2: Defect Opportunities

### C. Calculations for current sigma level

Questions	Positive	Negative	Total negative
Timely supply	II	I	1
After dispatch timely information of all the dispatch detail	I	II	2
Response against queries	III		0
Attitude	II	I	1
Overall rating	I	II	2
		Total no. of defects	6

Fig. 3: Calculations for current sigma level  
Total no. of feedback forms = 3

Opportunities in a single feedback form = 5  
Total no. of opportunities =  $3 \times 5 = 15$

DPU is calculated by dividing the total number of opportunities with the number of feedback forms =  $15/3 = 5$   
DPMO = from six sigma calculator

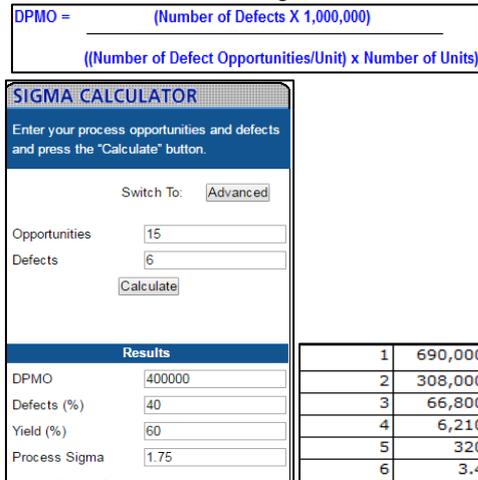


Fig. 4: Sigma Calculator

DPMO = 400000  
Sigma level = 1.75

## II. LITERATURE REVIEW

### A. Behnam Nakhai and Joao S. Neves

In this study, the purpose of this paper is to critically evaluate the contributions of six sigma methodology to the improvement of service quality. Since its development in the late 1980s, six sigma has been extensively applied in manufacturing and quasi-manufacturing settings. This study aims to explore the challenges of six sigma in reaching a much wider field of application. following findings achieved.

- The relentless drive toward adopting six sigma to services has led both to a limited field of applications and to unrealistic expectations as to what six sigma is truly capable of achieving, particularly in knowledge-based environments.
- service quality is more difficult for the consumer to evaluate than product quality
- Service quality perceptions result from a comparison of consumer expectations with actual service performance and quality evaluations are not based solely on the outcome of a service but also involve evaluation of the delivery process [1]

### B. Ayon Chakrabarty and K.C. Tan

In this study, authors discussed an extensive review on the services, six-sigma, and application of six-sigma in services. In order to improve service quality focus on service process is necessary. Six-sigma is a philosophy which also concentrates on the improvement of process. So, six-sigma if properly applied can be useful for services. This study focuses on the application aspect of six-sigma to wider range of services. A case study is conducted in call center services to identify, analyze and compare critical to quality characteristics (CTQs) and KPIs with other types of services available in literature. following finding achieved by the this research.

- The wider applicability of six-sigma depends on identification of key performance indicators (KPIs) for different types of service processes
- The review identified that the application of six-sigma is still not wide spread in services as in manufacturing. Wherever applied, it is also limited to some particular departments like in health care
- The case study done here provides an understanding of CTQs and KPIs in a different type of service environment. A summary and analysis of KPIs provides an understanding that irrespective of different services there is some uniformity in KPIs [2]

### C. Aminudin Omar & Zainol Mustafa

In this study, authors provides summary of limitations and suggestions for implementation of Six Sigma in the service industries. As providing high quality services becomes the major focus in many service organizations, a better understanding of the unique characteristics of services offered will be of advantage. This in turn will help assist in identification of areas to improve by implementation of quality program initiatives such as Six Sigma in such organization. Many service processes are not visible, intangible, and even immeasurable. As such, they are not amendable to improvement using a Six Sigma approach. Following findings achieved.

- SS can be used to develop a system to track quality improvement progress to create a more consistent process for service delivery. Consistency of process should lead to other benefit including improved quality levels, reduced waste, increased focus on the customer and increased profitability
- SS approaches suggest that the process of problem identification and understanding the process should involve employees, management and customers. There are two concerns for services which are; obtaining and using customer input and clearly understanding service processes [3]

### D. Neha Gupta

In this paper, author presented an overview of the process which explains how six sigma increase the overall quality improvement task into a series of project management stages: Define, Measure, Analyses, Innovation, Improve and Control. We will describe dependence of six sigma on Normal Distribution theory and also process capability. It gives a small note on the assumptions made in six sigma methodology of problem solving and the key elements involved .A brief view on Defects per Million Opportunities (DPMO) Analysis is given and following findings achieved.

- Six Sigma is a smarter way to manage business
- It is a vision of quality that equates with only 3.4 defects for million opportunities
- six sigma processes exposes the root causes and then focuses on the improvements to achieve the highest level of quality at acceptable cost essentials to achieve and maintain a competitive advantage and high levels of customer satisfaction and loyalty [4]

### E. Aditya R. Wankhade

This paper deals with the implementation of six sigma methodology in service sector. Industrial, manufacturing

and service organizations are interested in improving their products and processes by decreasing the variation, because the competitive environment leaves little room for error. Variation is the enemy of quality which is defined and evaluated by the customers. following findings achieved.

- Customers judge the quality of process not only based on the average, but also by the variance in each transaction with the process, want consistent, reliable and predictable processes that deliver the best-in-class level of quality, this is what the Six Sigma process strives to achieve
- The DMAIC methodology is central to Six Sigma process improvement projects process in which specific tools are employed to turn a practical problem into a statistical problem, generate a statistical solution and then convert that back into a practical solution.
- This article attempts to summarize the literature on six sigma application in services. It shows that there is a limitation in the spread of six [5]

### III. PROBLEM FORMULATION

By conducting the industrial visit in ABC Industry. Consulting with the Marketing Engineer of the industry it has been observed that the industry wants to check the feasibility of implementation of six sigma for optimizing the service provided by them by using six sigma tool. The aim of this project is to reduce the number of defects of a service provided by ABC Industry and to increase the customer satisfaction by using six sigma.

### IV. RESEARCH METHODOLOGY

In present study, we perform identification of the problem and study of respective literature reviews. After this stage the primary and secondary data collected with voice of customer by visiting the company and identified defect opportunities. Then analysis of the data performed to measure the initial six sigma level. By implementing solutions to reduce the defect opportunities final sigma level will be measured and in the final stage derived solution, improvement and control will be implemented practically in the industry.

### V. CONCLUSIONS

With successful completion of this project, the company ABC Industry will be directly benefited. In this paper we have calculated the initial sigma level of service provided by ABC Industry. By implementing solution can reduce defects and variations in the process of services and will significantly increase the reliability of the product and customer satisfaction will be the part of our next paper.

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