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Abstract- This paper presents tools of Six Sigma for Telecom Industries; these can achieve powerful operational improvements that produce sustainable business benefits. Six Sigma Qualtec's dedicated Six Sigma for Telecom practice is specifically designed to help traditional and modern telecommunications providers, become more efficient in their operating procedures. By learning and implementing improvements such as Voice of the Customer (VOC), Six Sigma, Business Process Management Design for Six Sigma and Lean Enterprise principles, those companies will be able to dramatically improve the way they do business thus attracting and keeping customers in this hyper-competitive industry. This paper maps some of the changes in the telecom markets that resulted from competitive entry and gives an insight into the dynamics of competitive markets in relation to quality improvement. Additionally, the presentation seeks to demonstrate that in the quest for the particular competitive outcome via independent and transparent regulation.

Keywords *- Six Sigma, Telecom Industries, DMAIC, Quality improvement.*

I. INTRODUCTION

In many organizations and industries, Six Sigma means a business management process that provides important and tangible business results to the bottom line by the continuous process improvement and variation reduction. As a data-driven, by the statistically-based approach, Six Sigma aims to deliver near zero defects for every product, process, and transaction within an organization.

Quality management has been an extremely important management strategy for achieving competitive advantages and improvements. Traditional quality concepts like Statistical Quality Control1, Statistical Process Control, Zero Defects and Total Quality Management, have been major key players for many years; While Six Sigma is a more recent initiative quality improvement to gain popularity and acceptance in many industries as well as service industries across the world. The basic elements of Six Sigma like Statistical Process Control, Failure Mode Effect Analysis, Gage Repeatability and Reproducibility and there are other tools that have been on reduction of rejects and enhancing the quality. Six Sigma provides a basic framework in which all these tools can be performed with management support .

Though Six Sigma was originally developed for manufacturing processes, but today service firms and service functions within almost every sector and also used by some service industries like telecom, hospitals etc. are mainly using Six Sigma to improve profits and performance. They are using Six Sigma in their marketing, finance, information systems, legal, and human resources processes in order to solve the major problems. So Six Sigma methodology has a major role to play under these circumstances to pinpoint the major problem areas and devise powerful strategies to tackle and such problems which improve the customer experience.

II. SIX SIGMA METHODOLOGIES

In the midst of 1980s, Motorola was the initial developer of Six Sigma. Six Sigma is a disciplined and significant methodology that uses data and statistical analysis to measure and improve a company's operational performance. It focuses on identifying and eliminating "defects" in processes and has produced hundreds of millions of dollars and provides profit in a wide variety of industries.

A large part of the success of Six Sigma lies in its ability to add a communication layer in industrial processes. Visual information systems can populate the working environment with clear signals for parts delivery or tool changeover. Six Sigma and process improvement provides a suitable strategy with appropriate indicators toward continuous improvement.

Six Sigma methodology and major statistical methods ensure the throughout improvement in quality and reduction in rejects with the definition of targets and visions. Implementation of Six Sigma will be achieved through a series of successful projects in service industries. Transactional Business Process Project: an improvement of a transactional business process that extends across an organization; such as order processing, inventory control and customer services.

Traditional Quality Improvement Project: aimed at solving chronic problems in crossing multiple functions of an organization.

III. SIX SIGMA MODEL

Six Sigma improvement model mainly has five phases: Define, Measure, Analyze, Improve and Control (DMAIC).

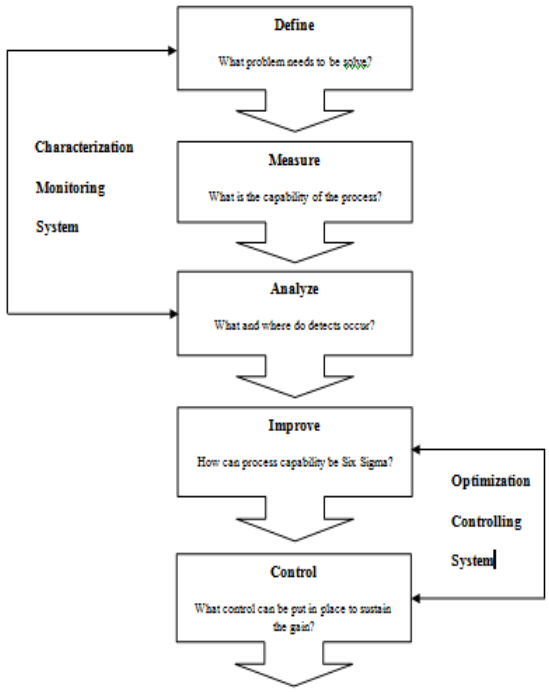

Fig. 1 : Six Sigma DMAIC Model

Phase 1- Define : In the Define phase, the Black Belt forms the team, including members from different departments affected and dictated by the problem. The team clearly specifies the problem and quantifies its financial and quality impact on the company. The team identifies metrics to assess the impact of the problem in the past, and also to document improvements as the problem is fixed.

Phase 2- Measure : In the Measure phase, the Black Belt team studies and discusses the process and measurements associated with the problem. The team produces process maps and analyzes the accuracy and precision of measurement systems. The team establishes new metrics. The team identifies major potential causes for the problem by applying a variety of tools.

Phase 3- Analyze : In this Analyze phase, the Black Belt team determines the major important problems what actually causes the problem. By this way, they apply a variety of statistical tools to test hypotheses and experiment on the process. After the relationship between the causes and effects is understood, the team can determine how best to improve the process, and how much benefit to expect from the improvement.

Phase 4- Improve : In this Improve phase, the Black Belt team implements changes to improve process performance. By Using the metrics already deployed and implemented, the team monitors the process to verify the expected improvement.

Phase 5- Control : In this Control phase, the Black Belt team selects and implements methods to control and work on future process variation. These particular methods could include documented procedures or statistical process control methods. This important step assures that the same problem will not return in the future.

IV. PROBLEMS FACED IN SERVICE INDUSTRIES

Six Sigma projects encounter challenges in the case of service industries, because of some special features of this sector. Finding these solutions regarding to these categorization, will be the next step.

A. High customer satisfaction

Service functions have been an integral part of most of the corporations. Organizing service functions into a business entity creates a totally different mindset and attitudes. A service organization acts differently because of a focus on customer requirements and prompt feedback from other different customers. Service offerings are experienced much faster than these products, which sometimes are stocked in a warehouse: After service delivered, the customer experiencing problems.

B. Various customer's need

Service organizations consist of particular transaction and interaction components. The transaction component implies some more process dependence for outcome of high volume functions. Such industries include fast food restaurants, direct mail, banking, and health care, telecom, insurance and ticketing. These interaction components require more personal care and attention for outcomes of low-volume and high value services. Such industries include sit-in restaurants, specialized health care and more personal services. The transaction services are expected to be delivered faster, better and cheaper, while the interaction services are more expected to be delivered better services.

C. Relatively unpredictable volumes

An unpredictable volume in service sectors is one of the most challenges for implementing any quality tools. Because regarding to this challenge, concentricity and measuring rejects is so predict the distribution of customers, but every prediction will have errors.

D. Nature of task unpredictable

In manufacturing factories each process and operation is fixed and clear, but in service sectors there are many tasks must customer satisfaction and variant requirements, unpredictable ineluctability tasks.

E. Lack of qualified information about quality

In manufacturing industries although materials are handling between different stations, data and information also it can easily transfer and analyze. Frequently the range of productions is constant and variety of production is less as compare to service industries. So factories collect data from their fixed procedures and operations and then different kind of information visibility challenge.

F. Lack of quality indicators and factors

Obviously there is lack of information in service industries in comparison with manufacturing industries, measuring the quality will have so many challenges. The root causes of these problems are:

i) Some lack of information
ii) Rapid variant and changing business strategy
iii) Difficulty to define and analyze quality indicators and factors
iv) Major driven by customer whim

G. Lack of established quality program

Control and getting feed back is also an important part of any improvement in an organization. So due to lack of quality indicators and factors, established quality program causes poor performance of Six Sigma. There are many papers which discussed about critical factors for implementation of Six Sigma.

V. DEVELOPING THE METHODOLOGY IN TELECOM INDUSTRIES

We executed and implemented DMAIC, the five-phase process improvement methodology of Six Sigma, to meet the objectives set for the quality in telecom company improvement project:

Phase 1: Define opportunities, Phase 2: Measure performance, Phase 3: Analyze factors impacting performance, Phase 4: Improve performance, and Phase 5: Control performance.

A. Phase 1 - Define opportunities

The Define phase is to make clear understanding of scope and objective to publish project charter and problems; All relevance stakeholders have been understood. Also, the organization's purpose and scope will be defined during the phase. One of the key major success factors of Six Sigma is that it starts with an understanding of what service processes are critical to telecom industries in achieving these objectives. These are also called the critical to quality (CTQ).This have a structured approach and with clarity as far as the phase goals, tasks, deliverables, and techniques are concerned . Understanding the cost of service delivery process is an important index and tool that makes us to evaluate the process based on and scoring the mentioned process. Also, identifying the problems and defining the measurable objectives and results are the most important objectives of this phase. The most desired result is to set a definitive vision, scope, and strategic approach for quality improvement operations.

Six deliverables has been produced in the Define phase:

1) Project charter and planning;
2) Data collection;
3) Stakeholder analysis and evaluation;
4) Critical to Quality (CTQ) outline in telecom industries;
5) Cost of poor quality and improvement;
6) Overall overview of the process to be improved.

B. Phase 2 - Measure performance

Measure performance phase focused on the distribution, anthology, and refinement of telecom industries. Planning for collection of the different measurements has been done in the Measure phase. It defines the imperfections of quality measurements, evaluate the "as is" process, and create a current-state assessment of the current service delivery. This phase will help the organization rank the potential causes of quality improvement, which would be useful in investigation through benchmarking the current process performance. This phase creates four deliverables as follows:

1) Process capability and performance;
2) Critical input and proves variables that can affect output quality;
3) Service delivery defects;
4) Critical Success Factors (CTQ) summary chart.

C. Phase 3 -Analyze factors impacting performance

The Measure phase produces the baseline performance of the service delivery processes. Indeed, in this phase the collected data in the Measure phase have been examined to generate a high ranking list of the sources of variation in telecom industry and identify the root cause of problems.

Eight deliverables has been formed in the Analyze phase:

1) Cause and Effect Diagram of problems
2) Frequency plots and graphs
3) Data and information flow diagram
4) Affinity diagram
5) Critical Success Factors (CTQs) benchmarked to identify opportunities for improvement;
6) Regression analysis of data.
7) Scatter plots and diagrams
8) Threats and opportunities.

D. Phase 4 - Improve performance

The aim of improve performance phase is to identify some options for solutions which can be useful for the identified problems during analysis phase. So, the alternative policies could be rank and select for future improvement. Recommendation and implementation of the solutions are the most important objectives of this phase.

In this phase mainly five deliverables has been produced:

1) Data and information flow diagram;
2) Risk Assessment;
3) Design of different experiments
4) Ranking different solutions;
5) Improvement planning for quality improvements.

E. Phase 5 – Control performance

The problem has been assessed and an improvement process put in place, putting a solution in place can fix problems for the moment, but the work in phase 5 is designed to ensure the problem stays fixed and secure. Also, the obtained knowledge in the improvement project can be consulted in other areas to help accelerate improvements of service delivery. Six deliverables would be obtained in this phase:

1) Control charts for quality improvement
2) Quality control process charts
3) Standardization charts for quality
4) Process metrics defined and implemented in telecom sector
5) Control Plan implemented
6) Risk mitigation actions complete and implemented

VI. RESULTS AND DISCUSSION

Six-sigma has been a powerful and most effective tool in manufacturing industries reduce rate of rejects and to enhance productivity. The telecom sector is diversified and the features are different from manufacturing industries. Thus, the use of Six Sigma in telecom industries and its benefits are limited. From the analyses of the service models, telecom industries structures and also by comparing between the features of service and manufacturing industries, the main challenges in application of Six Sigma in telecom industries can be identified. Further analyses of these challenges showed that the proper implementation of Six Sigma in telecom industries requires not only the effective operational strategies, but also customers needs and satisfaction must be considered and designed into the implementation phase.

VII. CONCLUSION

Six Sigma is such a process that brings additional benefits to telecom industries and help organizations to adopt best practices for service delivery by a quality process which ensure its success. In particular, its business orientation will ensure that service improvement activities are focused on dealing those services that impact the customer. As a result, the impact that it help in increasing the quality in telecom industries has on the business overall will be greater.

At first glance, telecom industries and Six Sigma appear to be mutually exclusive. However, as this paper discusses, these two approaches are highly complementary and can be highly used in combination effectively to continually improve business processes. Process optimization, continuous improvement, measuring quality of service and process improvement, and maximizing the payback of telecom organizations with finding the best services are the most important point for combining the Six Sigma and telecom industries in this paper.

One of the most important limiting factors in this field is the difficulty in quantifying and gathering data from service processes and telecom industries, because these organizations don't mention to quality data and quality program. Quality of the service must define and measured by defining quality factors and standards. Also quality programs which are focused on particular opportunities must be established strongly. Customer has a main factor in telecom industries. So for proper implementing of Six Sigma in telecom industries, the operational strategies and customer (needs and satisfaction) must be considered.

This is one of the differences is the application of DMAIC (Define, Measure, Analyze, improve and Control) to a telecom project. As mentioned most of service industries don't have a proper attitude about customer and related qualified data. This is a new approach to six sigma phases with considering customer and operational strategies in telecom industries.

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