Study of Six Sigma Concept For Construction & Its Implementation in commercial Project

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Abstract- *Growth of country mainly depends upon the construction projects. Either privet projects or public sector projects to fulfill future demand of construction project proper project planning and management must be done in proper way. Any construction project depends upon proper supervision, quality control, safety. Main aim of this paper to improve quality in construction project with help six sigma.*

Keywords- TQM, Quality, Construction.

I. INTRODUCTION

Great expenditures of time, money and resources, both human and material, are wasted each year because of inefficient or non-existent quality management procedures. The manufacturing industry has developed Total Quality Management (TQM) concepts, first applied in Japan and in recent years used in the United States, which have increased productivity, decreased product cost and improved product reliability. Japanese construction companies, benefiting from the experiences of Japanese manufacturers, began implementing TQM during the 1970s.

Quality in Construction

Requirements may be simple or complex, or they may be stated in terms of the end result required or as a detailed description of what is to be done. But in popular terms, quality is obtained if the stated requirements are adequate, and if the completed project conforms to the requirements. Some design professionals believe that quality is measure by the aesthetic of the facilities they design. building's psychological impacts on its inhabitants, the ability of a landscaping design to match the theme of adjacent structures, and the use of bold new design concepts that capture people's imaginations. Because aesthetic definitions of quality are largely subjective, major disagreements arise as to whether quality has been achieved or not. Since objective definitions of aesthetic quality do not exist, design professionals generally take it upon themselves to define the aesthetic quality of their designs. Quality can also be defined from the view point of function, by how closely the project conforms to its requirements. Using this definition, a high quality project can be described by such terms as ease in understanding drawings, level of conflict in drawings and specifications, economics of construction, ease of operation, ease of maintenance, and energy efficiency. In the construction industry, quality can be defined as meeting the requirements of the designer, constructor and regulatory agencies as well as the owner.

Factors that affect quality

Establishing the project requirements for quality begins at project inception. A careful balance between the owner's requirements of the project costs and schedule, desired operating characteristics, materials of construction, etc. and the design professional's need for adequate time and budget to meet those requirements during the design process is essential. Owners balance their requirements against economic considerations and, in some cases, against chance of failure. The design professional is obligated to protect public health and safety in the context of the final completed project. The constructor is responsible for the means, methods, techniques, sequences, and procedures of construction, as well as safety precautions and programs during the construction process] Project requirements are the key factors that define quality in the process of construction. The process of construction can be broken down into three main phases, namely,
(1) The planning and design phase,
(2) The construction phase, and
(3) The maintenance and operation phase.

Construction industry-specific factors

While the evolution of quality control in the construction industry is parallel to that of the manufacturing industry, many dissimilar characteristics distinguish the two industries. The following differences, some of them significant, must be considered when applying a quality program to construction.

- Almost all construction projects are unique. They are single-order, single-production products.
- Unlike other industries, which usually have a fixed site with similar conditions for production each construction production site always displays different conditions.
- The life-cycle of a construction project is much longer than the life-cycle of most manufactured products.
- There is no clear and uniform standard in evaluating overall construction quality as there is in manufactured

items and materials; thus, construction projects usually are evaluated subjectively.

Quality of codes and standards

According to the ASCE manual, the primary purpose of codes and standards is to protect the public's health and safety. Compliance with codes and standards should be an issue addressed early in the design phase. Without early identification of the appropriate codes and standards, reworking plans and specifications can result in considerable cost and delay. The design professional must be knowledgeable about the provisions of codes and standards before starting the design process because the building codes directly control the minimum standards of many components of a building project, and are responsible for much of the controlling the construction process are much more restrictive than in most manufacturing and service industries.

Stasiowski and Burstein underline that quality design begins with sound engineering and scientific principles, must satisfy the criteria of applicable codes and standards, but also the owner's project requirements. Codes and standards refer to the minimum criteria. Owners, however, may have particular requirements.

Six Sigma.

Organizations commonly use Six Sigma DMAIC program. The use of the five-phase improvement cycle DMAIC, within Six Sigma companies, has become increasingly common. DAMIC acronym refers to the terms: define, measure, analyze, improve, and control. It is an improvement methodology for current processes that are not meeting required specifications, but only need incremental improvement. DMAIC consists of the following 5 steps:

- Define customer need, requirements, and what needs to be improved.
- Measure current processes.
- Analyze the data, process, root cause, and develop a plan to improve existing processes.
- Improve existing processes and methods of measuring success.
- Control gains and repeat the process.

Six Sigma differs from other quality approaches used in organizations because it emphasizes the definition of measures of customer satisfaction and employs teams to continually lessen the DPMO for each measure. The Six Sigma figure of 3.4 DPMO is so minute that it is viewed as perfection. The fact that it is not actually zero permits individuals to believe in the Six Sigma approach. Organizations implementing Six Sigma reveal product and service quality improvement, cost reduction, and significant savings due to Six Sigma projects focus on bottom line results. The success of six Sigma projects is also due to its results orientation, data driven and ability to align the goals with objectives across the organizations.

The aim of Six Sigma is to improve the quality near perfection which means 3.4 defects per million opportunities (DPMO), to maximize the customer satisfaction and business benefits. This goal will occur when the sigma level is 6. For instance, at 3 sigma level 93.3% of items meet requirements and are without any defects (yield) where 66,800 defects occur per million opportunities (DPMO), but improving the performance to 5 sigma level reduces the number of defects to 320 items per million opportunities. Therefore, any companies work on Six Sigma should strive for the goal 6 sigma level performances.

In order to obtain high quality of 6 sigma level at the low price, Six Sigma uses the statistical metrics and techniques to measure the processes performance and rate the defects, and teaches involved people appropriate tools to analyze their performance and improve the way of business. Moreover Six Sigma systematic strategy leads the employees and processes to maintain and control the achieved high performance.

Six Sigma for Construction

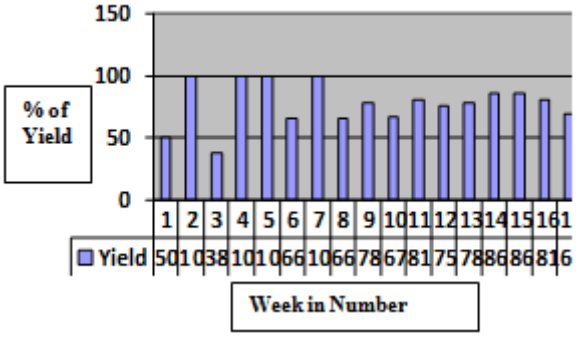
Application of Six sigma methodology will provide a guideline in making the process more effective and profitable.Six sigma have both management and technical components: On management side it focuses on getting the right process and goals. The right projects and right people to work on the projects .On Technical side it focuses on enhancing process performance using process data, statical thinking and methods. Six sigma methodology can be used to gain deeper understanding of construction and explore new knowledge of contemporary practices can help extend the theory of six sigma to provide a deeper understanding and improvement in construction process. Six sigma DPMO methodology has produced remarkable result in continuous organizations several leading companies in India have implemented consents related to lean to improve competitiveness on many organizations and factors they get benefited.

Six Sigma Implementation.

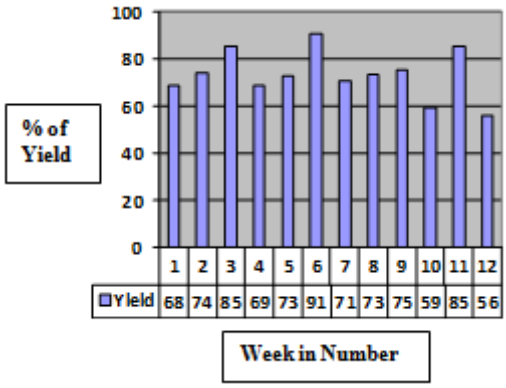
To calculate six sigma level of commercial project we have considered Request For Inspection Format (RFI) for

RCC activity and by implementing six sigma concept of DPMO we have increase the six sigma level of project gradually.

Graph Yeild For B Zone Before Six Sigma Implementation (Weeks in Nos. V/s % of Yield)



Graph Yeild For B Zone (commercial) After Six Sigma Implementation



Nos of oppurtunities = Number of checks in checklists
Nos of Deffects = Number of deffects found in R.F.I
DPMO=(Nos. of deffects/Nos of oppurtunities)*10,00,000
[Six sigma level = Ref. Chart has been taken from Dr. R.S. Chalapathi's Book Six Sigma Tool Master, Chapter 16]
Yield = (((10,00,000-DPMO)/10,00,000))*100)

II. CONCLUSION

The construction organization needs positive thinking and top management (i.e. Owner) supposes to start on the Six Sigma implementation journey. They have to make fundamental changes in their strategic of production, quality improvement and adaptation of new technology which in return takes companies to their customer satisfaction and needs. In the implementation process, it can be seen that Six Sigma value has increased from 2.6 to 3.6 after its implementation. In other words it can be said that the yield increased from 86.4% to 98.2 %. Yield states the acceptable number of rectifications thus minimizing the number of defects. It can be stated that the number of defects have reduced to 1.8% after implementation of six sigma.

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