Comparative Analysis of Two Similar Mega Projects for Identifying the Factors Responsible for Delay in Completion

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Abstract*—Completing the project on time is no doubt one among the most vital aspect for any construction manager. The most important three constraints for any project are scope-time-cost. The interaction among the three constraints is the focus of any construction managers. Every activity is inter linked with one another, so the importance of each activity is too understood well. If the project gets delayed from the scheduled duration will definitely exceed the estimated budget. In this study, two mega projects of almost similar cost that are being built in Gujarat are taken. The personal interviews were conducted from Managers and Engineers with proper formulated questionnaire. The responses were understood statistically and properly recorded. The major problems which are identified and are responsible for the delay of the project are late approval of the material samples, slow decision making, change order in the design during the course of work, delayed approval & revision of drawings, poor coordination, excessive mistakes & discrepancies in good construction drawings provided by the consultant and lack of use of planning tools like MS-Project and Primavera.

***Keywords*— Contractor, Construction, Consultant, Client, Planning, Project**

I. INTRODUCTION

In construction industry, the project management is traditionally learnt 'on the job', which is a long-drawn process and typically takes 3-4 projects before someone gets a grip of it. With increasing competition among contract bidders, the main focus is upon the accomplishment of the work with maximum efficiency from minimum consumption of resources, especially capital but without compromising with quality standards and that too within a limited duration of time. Project Management is the application ofknowledge, skills, tools and techniques to a broad range of activities to meet the requirements of a particular project. Project management aims to achieve the stated goals of the project leading to completed facility, by virtue of planning, executing and controlling time, funds, and human & technical resources. The planning essentially consists of setting objectives, identifying resources and forming strategy. Executing consists of allocation of resources, guiding execution, coordinating efforts and motivating the staff. Controlling consists of measuring achievement goals, reporting, resolving problems. The planning, executing and controlling are performed on a continuous basis till the goals of the project are realized. Successful project management means meeting all the three goals of scope, time and cost, with a due care of quality of work as a whole. The involvement of numerous different type and nature of works, and hundreds or many times thousands of numbers of activities make it a very sophisticated job to perform. Since most of the activities are inter-related, the importance of every single activity is to be understood well. Any project if getting delayed from its actual planned duration, will definitely exceed the budgeted cost by its completion. Similarly, the project it is ahead of its schedule, will get completed at a considerable low cost, resulting in high profits.

The study includes specific analysis of two construction projects of high repute being presently built in Gujarat. First is the construction of Tank Design, fabrication & Erection Works, including Cathodic Protection System (Say Project A) at Mundra, Gujarat for HMPL's 5th Crude Blending and Additional Tankages Project for HPCL as the client organization and the second project Tankage Works (Part-B) for MDPL Capacity Expansion & Palanpur Vadodara Pipeline Project (Say Project B) in Vadodara, Gujarat with HPCL as the client.

Both projects being constructed are Tankages having similar nature of activities involved in construction. Following are some major activities that are common for both projects:

The total project cost of each project is more than Rs. 30 Crores. Both projects are located in well developed areas of Gujarat, so the weather conditions and surrounding features at site are same.

II. LITERATURE REVIEW

John B. Dalton emphasized that the design process itself is the key ingredient to built-in-quality. The purpose of Quality Assurance in the design process is to ensure that there are effective and documented procedures to control the quality of management at these critical points and that these procedures are infact carried out without any shortcuts being taken. Maintaining the Integrity of the Specifications.

U.J. Pathak, Amit A. Mahadik and Prasad R. Kashid in 2014 said that quality control techniques have been used extensively and beneficially in the areas of manufacturing and industrial engineering to control process and prevent defects before they happen, ultimately saving millions of dollars. It is necessary to analyze and improve constructability of project and help to increase speed of construction.

Kang Sik Wei in 2010 tried to figure out the causes, effects and methods of minimizing delays in construction projects with the help of a questionnaire survey constituting 52 different factors responsible for the construction delays that lead to 6 effects of delays. He finally sought possible

Published By:
International Journal of Engineering Research in Current Trends

solutions for the same from a list of 15 different actions/methods.

Gould & Joyce in 2009 said that the beginning of a project, when the amount of money spent in the project is at its low point, the possibilities of influencing the design and the direction of the project is at its highest.

Greeshma B Suresh and Dr. S. Kanchana in 2015 said that the construction industry is the tool through which a society achieves its goal of urban and rural development. It is one of the sectors that provides important ingredient for the development of an economy. They identified the following top ten major factors of construction delay : Shortage of construction materials, Effect of subsurface conditions and natural disaster, Delay in material delivery, Low productivity of labour, Rework due to errors, Late procurement of materials, Unqualified workforce, Low productivity and efficiency of equipment, Delay in quality control, Poor site management and supervision, Poor communication between parties and Lack of high technology.

Ar. Meena V. and K. Suresh Babu in 2015 found that the most common factors of delay on almost every project are external factors, financial difficulties, shortage of labour, insufficient labour productivity, owner interference and improper planning. They listed several other factors also that contributed in consumption of valuable time: Weather conditions, External factors, Lack of funds, Deviation of scheduling, Lack of communication, Poor decision making process, Lack of coordination/Wrong delegation of authority, Lack of inspection, Improper

III. METHODOLOGY

The main objective of this research work is to identify the problems associated with the delay in construction projects, and to suggest ways to overcome such problems in real time. The literature reviews although clearly figures out the main reasons responsible in delay of a project, but the outcomes have not been cross-checked with projects in real time. The analysis will start on the basis of the identified factors responsible for timely completion of construction projects with the help of research works done in the past. A questionnaire will be formulated to conduct personal interviews with the senior engineers and managers of Project A and B. The questionnaire will consist of four sections namely Respondent's Profile, Factors Affecting Completion Time, Consequences of Construction Delays and Ways to Complete Work Within Scheduled Time. A rating scale from 0 to 4 will be provided for recording the responses, the value of which will be analyzed using statistical techniques. The survey will be conducted by means of direct interactions to get realistic and explained responses With the help of the personal interviews, the identified factors will be co-related to the actual conditions of work specifically for the concerned projects of the respondents. Since the status of both the projects is completely opposite in terms of time duration, it will therefore give a very clear idea of the differences between the approach used to execute the projects by their respective managers and engineers. The responses shall be recorded and analyzed statistically which will ultimately figure out the much realistic factors responsible for successful completion of projects within the desired time-frame. The identified factors after the interviews, will be inculcated in a fresh project management plan using Primavera P6. The factors that may affect the timely completion of any activity will be assigned to the respective activity id that will keep the responsible person alert in advance about the possible risks or issues of involved with that activity.

IV. RESULT ANALYSIS

The feedback from the respondents has been analyzed using the Relative Importance Index method, to statistically state the intensity of each question asked.

Relative Importance Index (RII) was selected in the study to rank the criteria according to their relative importance. of the various causes and effects of delays. The same method is going to adopted in this study within various groups (i.e. clients, consultants or contractors). The five-point scale ranged from 0 (not answered/not contributing) to 4 (very highly contributing) will be adopted and will be transformed to relative importance indices (RII) for each factor as follows:

$RII = \sum W/A*N(0 \leq RII \leq 1)$

Where:

W – is the weight given to each factor by the respondents and ranges from 1 to 4,

A – is the highest weight (i.e. 4 in this case) and;

N – is the total number of respondents.

The RII value had a range from 0 to 4 (0 not inclusive), higher the value of RII, more contributing were the factor of delays. The RII was used to rank (R) the different causes. These rankings made it possible to cross-compare the relative importance of the factors as perceived by the two groups of respondents (i.e. clients and contractors). Each individual causes RII perceived by all respondents should be used to assess the general and overall rankings in order to give an overall picture of the causes of construction delays in Indian construction industry.

V. CONSLUSION

According to the results collected by questionnaire survey conducted and thereafter interpretation of the received data through statistical analysis, following conclusions can be made:

1. On part of the client/owner of the project, following problems have been identified: late approval of material samples, slow decision making, delayed approval and revision of drawings, change orders in the design during the course of work and poor communication and coordination. These problems must be taken care of seriously to avoid undesirable delays.
2. Consultants were also held responsible in this analysis for causing delay. Delay in providing the design documents, and excessive mistakes and discrepancies in good for construction drawings were the key issues for the execution team that should not happen in order to achieve uninterrupted progress.
3. Poor communication and coordination between the parties involved in the project, lack of proper planning and coordination, difficulties in financing the project and utilization of proper planning tools like MS Project, Primavera etc were found to be the major factors on part of the contractor that obstructed the timely completion of work.
4. The progress of the project gets affected when the construction materials are not procured on time and when specially required materials and building components are manufactured late.
5. Shortage of labourers at site is yet another issue that was raised by the site engineers which needs to be rectified in order to finish work on time.Further, the respondents expressed following problems-cum-suggestions that

should be seriously worked out to avoid unnecessary construction delays:

6. Approval of specialized agencies for work took too much time.
7. Timely payment from client against running bill was yet another issue of concern.
8. Communication channels were too long, this posed to be a problem for day-to-day needs.
9. Unpredictable financial recoveries/penalties imposed by the client on account of milestones, part-rates etc causing financial strain on the contractor, was another issue.
10. The contractor on a project also gave a suggestion that Mobilization Advance given to them should be made interest free as it unnecessarily increases financial strains on the contractor.
11. It was expressed very strongly that the decision takers for any project must be available at site so that issues can be resolved without losing any time.
12. Lack of project specific experience of the Government Officials was held responsible for their slow speed of decision making.
13. It was also figured out that progress can be tracked, but not enhanced by using planning tools.

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This Paper is presented in conference
Conference Title : Advances in Mechanical and Civil Engineering
Organized By : Mechanical and Civil Engineering Department, SIRTE Bhopal, M.P.
Date : 25th June - 26th June 2021