

# Perceptions of the Project Participants on the Technical and Managerial Factors Affecting Performance of Indian Construction Projects

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**Abstract** - Managing of construction projects, deals with the completion of the same within the budgeted cost and the schedule time. In reality the most of the Projects face both time and cost overrun. Hence identifying the real time factors which govern the performance of the construction projects becomes very essential. For every project the technical and managerial aspects of the project are responsible for its smooth progress at various stages. These factors include practical difficulties faced by the builders, project engineers and project managers. This study discusses about the perspectives of the project participants on the technical and managerial factors identified and said to influence the progress of the project. The factors that are attributed to be very important from these perceptions are identified as critical factors. The proper management of these factors will definitely aid to achieve best project performance results.

**Key words:** Construction Management, time management, project schedules, factor analysis, multiple regression.

## 1. INTRODUCTION

A construction project is time bound and employs huge resources of men, material and machinery. The money involved is from millions to billions. Technical breakthrough has greatly influenced the construction industry.

In the process of executing a project, time management is a crucial one. Extension of project duration leads to cost overrun. But today's clients are willing to compromise to some extent in the time-cost tradeoff, allowing the increase in cost so as to complete the project on a fast track. The additional cost incurred in early completion of a project is comparatively less when compared to the loss one is likely to incur in the delayed starting of one's business at the premises so constructed.

Hence the project manager becomes highly responsible for time bound completion of the projects. In the process he experiences many hurdles and he has to overcome them. Some of the problem areas faced by him are the involvement of the consultants, resource mobilization, customer satisfaction and cooperation, planning and scheduling of construction activities, review and monitoring of construction progress, quality control and safety management.

## 2. LITERATURE REVIEW

In the process of scheduling of construction activities there is no certainty in factors causing delay and that only certain variables are being monitored (Jeffrey et.al. 1997). As a

result, the identification of factors causing delays becomes essential. They are however, onerous tasks.

Rockart (1982) is of the opinion that the few key areas of activity are present in a project for which favourable results are absolutely necessary to achieve the target. Also it was reported that critical factors are the fundamental issues inherent in the project, that requires day-today attention and operate throughout the life of the project.

Schultz et al. (1987) identified critical success factors like project mission, top management support, and project scheduling. Work sequence in a resource-constrained schedule may not be stable with a schedule update as the project proceeds, while the sequence is consistent in a CPM schedule (Willis 1985).

The factors approach, as devised by Waldron (1968), stated that the cumulative impact of the various factors (overtime, shift work, etc.), on the productivity of labour equate to the total number of work hours that are consumed beyond the budgeted amount.

Hyun et. al. (2004) through his studies states that both the worker attendance ratio and the worker change ratio should be monitored during the construction process so as to manage workflow properly. In addition, appropriate labour management strategies to improve both worker loyalty and labour resource stability should be developed.

Changes may occur on a project for a number of reasons, such as design errors, design changes, additions to the scope, or unknown conditions. Changes may or may not have an impact on labour productivity. Projects impacted by change cause the contractor to achieve a lower productivity level than planned.

Change orders have long been identified to have a negative impact on construction productivity, leading to a decline in labour efficiency and, in some cases, sizeable loss of man hours (Barrie and Paulson 1996). Change orders have been known to cause productivity losses with additional financial resources spent on claims and legal disputes (Ibbs et.al. 1998).

A crowded jobsite, where numerous workers, equipment, material, temporary facilities, as well as permanent structures share the limited space during construction is a major cause of productivity decrease and schedule interference or delay. According to the studies of Sy-Jye Guo (2002) space management involves three primary aspects of research viz., site layout planning, focusing on the shortest

route for construction equipment and operations and finally space scheduling

Role of management is essential and critical in the monitoring of the progress of the project. Robert et.al. (2003) identified six indicators that consistently perceived as being highly significant which are, Quality Control, On-Time Completion, Cost, Safety, Unit, and Units/Man Hour. This suggests that the six indicators may be used as the foundation for reporting performance, with additional indicators supplementing the monitoring system depending on construction sector, management level, and experience. Alexander and Josephson (2006), through an interview study encompassing 13 site managers and seven foremen and top managers in 13 construction projects, report that the site managers are generally pleased with their work situation even though they are critical of the demands made of them to handle a variety of heterogeneous activities. However, a work situation fraught with unanticipated challenges and ambiguities easily leads to excessive workloads and long working hours. The study also underlines the needs of construction firms to regard their middle managers as a central function and resource.

**3. NEED FOR THE PRESENT STUDY**

All the facts discussed above led the researcher to a fact that everything on paper, when put into execution, encountered practical difficulties and the ground reality is an important issue to be addressed. All practical problems, difficulties, constraints in the field, that are mainly responsible for any possible delays, demand an efficient monitoring and control. It is necessary to identify those areas or factors that need to be monitored real time during the progress of the project, make necessary changes and choose alternatives at the appropriate stage of the works so that any likely delay in future may be avoided. Hence it is imperative to identify the critical factors to be monitored in the real time management of construction projects.

**4. METHODOLOGY OF THE STUDY**

The study was taken up in two phases. The first phase involved in the identification of various factors related to technical and managerial aspects, which are likely to cause delay of various activities involved in the project. This was done through personal discussions with various project participants – consultants, builders, project engineers and project managers. About 39 factors were identified in this stage. These factors are given in Table 1.

**Table 1 – List of Factors**

Factor No.	Factor Name
01	Working Drawings Available On Time
02	Changes In Plan, Designs And Working Drawings Occurring Frequently
03	Change Of Technology Based On Architects/Consultants Instructions
04	Feedback From Quality Control Reports Received Without Delay
05	Changes Observed At Site As Against Planned

	Details
06	Mistakes In Work Leading To Change Or Re Work
07	Building Utility Changes During The Execution
08	Usage Of Alternate Materials And Hence Changes In Design
09	Implementation Of Alternate Technology To Reduce Time And Cost
10	Timely Finalization Of Working Drawings Based On Site Conditions
11	Inaccurate Site Information At Tendering Stage Leading To Changes In Planning And Designing
12	Delay In Decisions Related To Constructional Details And Working Drawings
13	Site Incompatibility Of Construction Equipments
14	Site Restrictions For Activities Like Fabrication, Erecting Scaffolding And Lifts For Material Handling
15	Site Area Restrictions For Storage Of Building And Form Work Materials
16	Selection And Training To Right Skilled Worker
17	Disputes Arising In Interpretation Of Specifications
18	Sequential Coordination Among Activities
19	Adopting Of New Technologies And Materials
20	Constructional Difficulties Due To Foundation Shoring, Shifting Of Pipe Lines, Power Lines Etc.
21	Involvement And Commitment Of Project Participants
22	Involvement And Commitment Of Technical Personnel
23	Delay In Finalization Of Utility Or Change In The Utility Of The Building By The Owner And Architect
24	Clearance Of Technical Drawings By Clients And Architects
25	Meeting Of Project Participants And Delivery Of The Results Of The Discussions
26	Coordination Between Material And Equipment Suppliers
27	Controversies Among Project Participants Leading To Suspension Of Work
28	Timely Clearance Of Bill Of Quantities And Payment To Builders
29	Project Cash Flow Starting From The Client Level Upto The Site Engineer Level
30	Effective Mobilization Plan For Resources

The second phase involved in the identification of the most critical factors which has high influence in causing the delay of the project and that requires the most critical attention at various stages in the real-time monitoring of a construction project based on the perceptions of the respondents. This was done through a questionnaire, circulated to 250 project participants. The respondents were requested to rate each factor on a four point scale indicating the effect it has in the delay of an activity. The ratings are 1 – No Effect, 2 – Marginal Effect (The delay caused can be fully revived), 3 – Significant Effect (the delay caused can be partially revived),

4 - Adverse Effect (the delay caused is beyond revival). Background information about the respondents, consisting of their role in construction field (Builders, Consultants, Project Managers), the types of projects they handle (Residential Project, Commercial Projects, Industrial), their experience in construction (less than 10 years, 10 to 20 years, more than 20 years), and the size of the projects they are involved (less than 1 Crore, 1- 10 Crore, more than 10 Crore), the Class of Clients they serve (Private Sector, Public Sector, Government Projects) were collected.

**5. RESULT DISCUSSIONS**

About 95 responses were received. The responses were entered in the Data File of the SPSS Software (Statistical Package for Social Scientists) for analysis. One way Analysis of Variance (ANOVA) with Tukey’s B Post Hoc test was done for different background information of the Respondents to identify the factors that are perceived differently by the group of respondents. Those factors which had significance value of less than 5%, was said have atleast one of the group of participants perceiving it differently and attach more importance to the same. From the ANOVA conducted for different background information of the respondent revealed that TEN out of the THIRTY factors are important. These factors are given in Table 2. The groups which attach more important to these factors are discussed below.

**Table 2 Most Important Factors Identified through ANOVA**

Factor Number and Name
06 - Mistakes In Work Leading To Change Or Re Work
07 - Building Utility Changes During The Execution
11 - Inaccurate Site Information At Tendering Stage Leading To Changes In Planning And Designing
13 - Site Incompatibility Of Construction Equipments
16 - Selection And Training To Right Skilled Worker
17 - Disputes Arising In Interpretation Of Specifications
21 - Involvement And Commitment Of Project Participants
26 - Coordination Between Material And Equipment Suppliers
27 - Controversies Among Project Participants Leading To Suspension Of Work
29 - Project Cash Flow Starting From The Client Level Upto The Site Engineer Level

Builders handling Residential Projects attach importance to all the factors in Table 2, except the Facto No. 29 – Project Cash Flow Starting from the Client Level upto the Site Engineer Level. This factor was attributed to be more important from the Project Manager’s Perspective handling Commercial Projects.

These Builders have a field experience of Less than 10 years and probably this is the reason that they are not able to handle these factors efficiently.

Project Managers are directly involved in the day to day progress of the project. Cash flow is an important aspect in their perspective as they have to deal with the procurement of resources and mobilization of the labour by making the necessary payment at the appropriate time. All these respondents who have perceived the above factors as important factors handle projects of budgeted cost less than a Crore and mainly execute projects in the private sector.

The Respondents handling Government Projects seem to have understood the system of the execution of the Government Projects and hence have adapted to the same.

**6. CONCLUSIONS**

The study reveals that the Changes or Rework that take place during the execution of the project are mainly the reasons for the delay of the project. It is seen that this occurs in Residential Projects which have a budgeted cost of Less than One Crore Indian Rupees. In case of small projects where the owner of the project may like to make the changes based on his requirements or any additional facilities he may feel to incorporate. Hence changes occur. However, if the Architect or the Consultant has a clear vision and able to satisfy the client’s requirements at the design stage this delay could be minimized.

Specifications are to be clearly framed and the same incorporated in the drawings so as to avoid ambiguity. This will facilitate the Builder to prepare of a schedule of the resources required and mobilize the same as and when required, based on its availability and its compatibility at the site.

There should be a proper coordination among the project Participants and any controversies should be avoided. Controversies mainly arise only due to misinterpretation of the specifications and the requirements of the clients and the consultants with the owner which can be easily eliminated when there is a healthy discussion with a motive to sort out the issue.

The Client and the Builder should ensure proper cash flow in the project. The project manager should be delegated with appropriate fund management responsibilities to take care of the day-to-day requirement of the funds.

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