“The Planning, Scheduling and Delay Analysis of Construction Project – A Case Study”

1 Mohankumar Badiger, 2 Vighneshwar Anil Vernekar, 3 Kavya Venkatesh, 4 Yaseen G Khan, 5 Netravati Aralikatti
Department of Civil Engineering,
Visveswaraya Technological University, Belgaum

Abstract: Delays in the completion of construction projects are often unavoidable. The project schedule which is planned at the beginning of the project is prone to being changed for many times and unfortunately causes delays. As a result, schedule delays may be a major problem for contractors as well as the owners, resulting in costly disputes, controversial issues and adverse relationships between all the project participants. Therefore, the identification, quantification and analysis of delays become essential. Contractors are prone to see most of the delays in the responsibility of the owner, while owners usually want to put the blame on the contractor or third parties. Consequently, it is necessary to analyze schedule delays and research the most significant causes of delay in construction projects to avoid or minimize their adverse impacts on the project and project participants.

1. Introduction

In India, due to an increasingly local and international competition construction companies are always striving for maximum efficiency and a competitive operational advantages. Companies are always looking for improvements in equipment features, communication tools, from this will get profit, efficiency management techniques, and training resources. They are also narrowing their focus to specialize in certain projects instead of taking up all forms of it. This specialization requires a very streamlined approach for controlling techniques and extremely good planning for the best services. If proper planning of work is done the company could be saved from making loss. In construction there was a time when all the projects were labor intensive and planning of those days meant proper utilization of labor to make optimum progress in construction in the most effective manner. But now a day’s technological advancement and scientific inventions have added in new research in the construction industry. Construction is considered as a group of activities, having inter-relations, which may include the role of to worker those are specialized and specialized work using the latest knowledge and technology available (i.e. use of software (M.S.P), machineries, etc), to be undertaken in most effective way, failing which construction will be stop, leads to delay.
2. Case Study

- RESIDENTIAL APARTMENT BUILDING
- Brief description of project
  Project consist of residential building

<table>
<thead>
<tr>
<th>Project Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Land Area: 2394SQF(60*39.9)</td>
</tr>
<tr>
<td>Status of Project: Construction in Progress</td>
</tr>
<tr>
<td>Floor Levels: Ground Floor + 3 Floors</td>
</tr>
</tbody>
</table>

- Location of project

![Fig1: Jk Public High School Santosh Nagar Hubli](image)

- Project Description
  Building structures: The project is designed for Ground + 2 upper floors, amenities and landscaping as per client’s requirement. All structural elements are designed as per Indian standards. Super Structure: Super structure of the main building is conventional RCC framed structure with tie beams at basement level.
  Steel: All reinforcing steel shall be High Yield Strength Deformed bars of grade Fe-415 & 500.
  Concrete: Grade of concrete is as follows.
  - Columns: Grade of concrete for all columns is as per schedule. Basic grade of concrete used is M20 and high grade concrete used is M50.
  - Foundations, Retaining walls & other concreting below ground level: For above structural elements with concrete grade M20 with minimum cube strength 20 N/mm² at 28 days with minimum cement content of 310kg/cum.
• Roof Slabs from Ground floor level to Terrace floor level: Concrete grade M20 with minimum cube strength of 20 N/mm² at 28 days with minimum cement content of 310 kg/cum. As per the trail mix and approved by structural consultant minimum cement content is 290 kg/cum.
  
  • Project configuration – Building

Building is divided into three levels i.e. ground and two upper floors.
The ground is dedicated for car parking DG room & Electrical/Communication room and. The upper floors are dedicated for the residential purposes.

• Specifications

FLOORING
• Bedrooms, Living Dining & Kitchen: Vitrified Tiles (600mmx600mm) of reputed make.
• Toilets & Utility flooring: Anti-Skid Ceramic tiles.
• Lobby & Common area flooring: Natural Stone or tile.
• Staircase Flooring: Natural Stone.

DAODOING
• Kitchen Dadoing: Ceramic Tiles for 0.6m ht above cooking counter.
• Toilet Dadoing: Ceramic Tiles up to 2.25m height.
• Utility Dadoing: Ceramic Tiles up to 1.2m height.
• Lobby Cladding: Combination of Granite & Tiles.

KITCHEN
• Granite platform with stainless steel sink of single bowl with drain board.

PAINTING
• All interior wall Faces: Oil Bound Distemper over a coat of plastofix (putty).
• Exterior facial of the building: Ace/Equiv. Exterior weather proof paint.
• Ceiling: Oil bound Distemper.

JOINERY
• Main Door: Teak wood door frames with HDF moulded Panelled Shutter with French polish and reputed make hardware.
• Bed Room, utility & Toilet doors: Hard wood frames with HDF moulded Panelled door with enamel painting with reputed make hardware.
• Balcony Door: UPVC sliding door.
• Windows: UPVC glazed windows.
• Ventilators: UPVC glazed ventilators.
• Balcony & staircase Railing: MS Railing.
• Elevation – Projected Balconies: SS railing with Glass.

3. Data Collection And Analysis

• Data Collection

The data collected for carrying out the construction project are- BOQ and Productive Constants chart

Bill of Quantities (BOQ):

The Bill of Quantities or BOQ, which contained the budget allocated for the Apartment Building, was provided by the project consultants. This helped to understand the scale of the project and proceeded to use the BOQ to:

• To generate the cost flow for the project.
• To obtain the required manpower to complete this stage of the project.
• Finally, to optimise the obtained, required manpower.

• Plan And Drawing Of Project

![Fig 2: Planning](image-url)
4. Baseline Schedule (Plan):

4.1 Un-optimised

---

**Fig 4.1**

**Fig 4.2**
4. Baseline Schedule (Plan):

4.2 optimised

---

Fig 4.5

---

Fig 4.6
Conclusion

The construction of the Residential Apartment Building has been managed using the project management software known as Microsoft Project. In this report, a detailed study has been carried out on optimisation for a Residential construction project, starting from excavation to finishes. Using MS Project software, baseline plan and schedule has been prepared and with respect to baseline plan different kind of resources has been assigned, then visual aids in the form of bar graphs (histogram) has been generated which indicated the undesired fluctuations in the requirement of resources with respect to time. Using these visual aids, resource has been optimised by modifying the particular activities duration and by modifying predecessors without affecting the project duration. Even though a proper planning and scheduling and optimisation of resource is done and if not followed in the execution of the project, the project will get delayed. Due to which in this case study a 195 days of delay has accumulated with the project schedule. Finally, the present thesis is aimed at, understanding the process of planning, scheduling and optimisation of the various resources required for carrying out a project by optimizing the resource of requirement of a construction project.
Future Scope

The future scope of this method of optimisation can also be used to optimise various resources involved in the construction project such as material, equipment, etc. which in turn help in overall optimisation of the entire project. This will help to understand the effect of various optimised resources in a project and also helps to find which resource has the significant impact. This further will help to concentrate more on that particular resource which has significant effect on any other project implemented. This optimisation method can be used for large scale infrastructure projects dealing with hundreds of crores to find its effect and this will give the reason why the necessity of Planning, Scheduling and Manpower Resource Optimisation in a Construction Project – optimisation is needed in any proposed project, which can give results in similar proportion to the results already seen in this current project.

References