Resource Planning & Resource Allocation in Indian Construction Industries

Adil Nisar¹, Akash Agrawal², Shakti Suryavanshi³

¹Student, M.Tech Civil Engineering, SHUATS, Allahabad, India
²,³Assistant Professor, Department of Civil Engg., SHUATS, Allahabad, India

Abstract—In resource planning, we need to identify the quantities of resources required to accomplish the work and schedule these resources over the time of the project.

It has been observed that the project delays occur due to insufficient supply of resources. In large scale projects, preparing an accurate and workable plan is very difficult. Computer packages like MS Project and Primavera project planner are used in construction industry. Project management techniques can be used to resolve resource conflicts and also useful in minimizing the project duration within limited availability of resources to make the project profitable.

A network schedule that does not include resource constraints assumes that an unlimited quantity of resources is available to the project. Schedules developed without resource constraints may not be feasible or realistic when actual resources are considered.

Project managers must take complex decisions under different scheduling needs (such as smooth resource utilization profiles and resource constraints) and under conditions of uncertainty that sometimes extend beyond task durations. The present study deals with resource scheduling for a fast track project with constrained durations.

The main aim of this study is to analyze the Project management techniques by scheduling various construction activities, allocation of resources and resource levelling using Primavera – P6 for residential building. This paper analyzes resource constrained project using Primavera – P6 by resource levelling and compares the time cost implications with scheduled time and estimated cost.


I. INTRODUCTION

The basic objective of resource planning and resource allocation is to supply and support the field operations so that established time objectives can be met and costs can be kept within the construction budget.

It is the responsibility of the project manager to identify and schedule future job needs so that most efficient employment is made of the resources available.

The project manager must determine long-range resource requirements for general planning and short term resources for detailed planning. He must establish which resources will be needed, when they must be on site, and the quantities required. The project plan and schedule may have to be modified to accommodate or work around supply problems.

The term resource allocation is used in the case where required resources are assigned such that available resources are not exceeded. Resource levelling is an attempt to project activities in a manner that will improve productivity and efficiency.

This Thesis will describe the use of computer applications in resource allocation and resource levelling. It will concentrate on how to use the resource levelling in Primavera project planner software application.

II. PRIMAVERA P6 SOFTWARE

Following objectives are met using this software:

- Making strategic decisions
- Precise control of time up to the end of project
- Identifying required resources, resource prioritization and estimation in long period of time
- Reorganizing projects based on new priorities without any negative influence on the quality
- Reporting during project accomplishment
- Just-in-time announcement of critical situations

a) Resource and Time Allocation in Primavera

There are three types of resources available in Primavera: Labour or human resource, non-labour and material (usable resource).

b) Comparing Progress with Baseline

Comparing resources and the initial time of a project is one of the main and most important objectives of project management and is displayed as follows
III. RESOURCE LOADING

- Resource loading allows the planner to assign resources such as labour, equipment and material to each activity in the project schedule.
- These units might be craftsmen, pieces of equipment or quantities of construction materials.

IV. RESOURCE AGGREGATION

- Resource aggregation totals each type of resource used in the schedule for each time unit between scheduled project start and finish.
- Look at the early and late start and finish dates.
- Simply compares the amount of resources required to the maximum amount of resources that are available for use.
- In the real world can we get more resources.

V. TIME-AND-RESOURCE-CONSTRAINED SCHEDULING

- Time constrained or resource constrained.
- Time use an end date.
- Resources schedule the project on available resources.
- Schedules can be time constrained or resource constrained but not both.
- Time- get more resources
- Resource- a shortage extend the time
VI. RESOURCE AVAILABILITY ANALYSIS

- Simply compares the amount of resources required to the maximum amount of resources that are available for use.
- In the real world can we get more resources.
- When the assigned resources exceed those available:
  - Shift non-critical activities within the schedule
  - Obtain more resources
  - Extend the schedule to lower the demand during the original schedule.

VII. RESOURCE LEVELING

- Attempts to keep the requirements for a construction resource as constant as possible over the duration of the project.
- Non-critical activities are shifted within the schedule using the available total float in order to level resource usage and the planned project completion date is unchanged as a result of the levelling process.
- This techniques are used when the project duration is fixed.
  - Basically delaying the scheduled performance of non-critical activities.
  - The daily total resource usage of the project decreases at the beginning of the project and increases at the end.


VIII. MATERIAL AND METHODS

Introduction

This chapter includes the methodology used in this research. It provides the information about the research strategy, research design, population, sample size, various approaches to data collection and data analysis. It also identifies the questionnaire design, pilot study, validity content, and reliability.

Research strategy

In this study, the questionnaire of this study is designed to get the factual information about local practices of contractors in managing construction resource in building projects as well as the opinions of contractors about these practices.

Survey forms were sent to following 10 companies:
1. Shalimar Constructions, Lucknow
2. Chauhan Builders, Lucknow
3. Avinash Group, Lucknow
4. Era Construction, Lucknow
5. Walimakers Constructions
6. Aqama Builders & Developers
7. Samiah International Builders Pvt. Ltd.
8. Chandra Mohan Builders
9. MI Builders
10. Qualtech Builders Pvt. Ltd.

IX. RESULT AND DISCUSSION

The impact of the workers increasing the duration and cost of the project:

Table 4.15 shows the waste proportion of the degree of the influence factors which related to the workers in increasing the duration and the cost of the project, the limited number of the workers is 91.6% and absence of worker is 85.4%. The lowest as 25%, which is factor of difference in political affiliation and party for workers, and this requires that the program helps the project manager to find alternatives in the limited number of the workers absence of workers and also helps to know the requirements of each working day of the days of the project.

Table 4.15

<table>
<thead>
<tr>
<th>NO</th>
<th>Factor</th>
<th>Very high degree effect %</th>
<th>High degree effect %</th>
<th>Very very high degree effect + High degree effect %</th>
<th>Mid degree effect %</th>
<th>Little degree effect %</th>
<th>Very little degree effect %</th>
<th>Weight percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The limited number of the</td>
<td>45.8</td>
<td>48.1</td>
<td>81.6</td>
<td>8.3</td>
<td>0.88</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Aging workers</td>
<td>25</td>
<td>72.1</td>
<td>16.7</td>
<td>4.2</td>
<td>2.1</td>
<td>0.79</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>The absence of</td>
<td>45.8</td>
<td>39.6</td>
<td>85.4</td>
<td>14.6</td>
<td>0.86</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>The differences of workers in</td>
<td>10.4</td>
<td>14.6</td>
<td>25</td>
<td>29.2</td>
<td>20.8</td>
<td>25</td>
<td>0.53</td>
</tr>
<tr>
<td>5</td>
<td>Imprecise prediction</td>
<td>12.5</td>
<td>45.8</td>
<td>58.3</td>
<td>27.1</td>
<td>12.5</td>
<td>2.1</td>
<td>0.71</td>
</tr>
</tbody>
</table>

Factors which related to equipment that impact on the duration and cost of the project:

The below table 4.16 shows that the most influential factors which related to the equipment on the duration and cost of the project is the quality of construction equipment (93.7%), the availability of construction equipment in the market (89.6%) and how to use of construction equipment (79.2%). This requires the computerized to facilitate the worker of project manager in the management and requires companies rehabilitate workers to the right way to deal with the equipment.
As mentioned before, resources are often limited and this tends to shift the activities forward in time until resources become available. In this report we have presented two ways to approach constrained allocation problems. These were the heuristics and optimization models. The former identifies feasible solutions to the problem using simple priority rules, such as shortest task first, to determine which task should receive resources and which task must wait. The latter solution finds the best allocation of resources to tasks but limits the size of problems that can be efficiently solved.

X. CONCLUSION

After we have identified the resources needed to complete the project, we must be able to allocate them in order to undertake the construction operation. When applying resource levelling, we assumed that we have an unlimited supply of resources required for the tasks, but we must remember that the real world situation may be different. The goal of resource levelling is to assign resources to project activities in a manner that will improve productivity and efficiency.

REFERENCES


