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Resource Allocation with Primavera-P6 Software

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Abstract: ***Now a day everyone depended on software technology and machines. in civil engineering department most of work do with software's just like for designing using cad, 3d model using BIM tools, structural design and analysis using staad, cost and estimate using excel, for project planning use primavera. So that we use of primavera software for project planning, scheduling, resource levelling, cost and valuation. Every project need resources for execute. Now a day calculation of resources and time project is easy and fast with use of primavera software or as like other software's for example MSP project, Smartsheet, Wrike, Workfront, Autodesk BIM 360, Synchro 4D, Procore etc. In project depend many type of resources for example labour, machine's, material, money and space. Resource allocation use for control and calculate of resource time and quantity for project task. Resources depend on time and cost of project. In resource allocation resource are constraint and time change with tasks. Three types of resource are uses in industries like labour, non-labour and materials.***
Keywords: Construction project, planning, scheduling, resource optimization, primavera p-6

I. INTRODUCTION

Now a day in world depend on time, money and resources. In construction industries are also need time, cost, and resource for completion of project. In project working time is always change but we set the time of project or we calculate possible time for project completion. For project schedule planning time and resources is most important part. If we haven't time then project will not start and not a complete in given time. Resource is physical part of projects because we can't control time and can't stop it but we can change and control resources and cost. In project scheduling time calculate on base of task or project activities. We show the schedule through the schedule of which task will start and when it will be fished. When the task ended at the fixed time, so the next task also goes at the right time, but when a task was not completed at the time when it is not complete its effect is on project because all task depends on each other. There are many reasons why a task is not completed on time such as due to weather, deal of document, recently change planning, government issue, resources issue, accident issue etc. now a day more work are do through software's so that I use primavera software for planning and scheduling for project.

In construction industries need labours, materials, machines, documents and spaces for completion of project task and activities, that type of item call resources. All project depends on resources but resources depend on cost so that indirectly project also depends on cost. Here two type of resources are used first is labour and second is non-labour. In labour resource came humans or living persons such as engineer, manager, mistri, carpenter, drivers, Masson, contractor etc. In non-labour resources take machines, equipment, documents, vehicle etc. with use of software's we can do work easily, least time, analyse and better presentation.

II. PRIMAVERA P6

The history of project management software is perhaps as old as the history of the computer. Artemis, can plan, Hard Hat Manager, Microsoft Project, Primavera Project Planner, Primavera Sure Trak Project Kick Start and Scitor's Business Solutions-PC suite are some of the project management software available in the market, besides Microsoft Excel, which is also used by managers

Primavera system, Inc. is the world's leading provider of project, program and portfolio management software solutions. It provides the software foundation that enables all types of businesses to excel in managing their portfolios, programs, projects and resources. Primavera help companies make better portfolios investment decision, improve governance, prioritize their project investments and resources, and deliver tangible results back to the business. Primavera has product solutions specific to certain industries like construction, aerospace, manufacturing and power.

III. RESOURCE ALLOCATION

A resource is a physical variable, such as labour, finance, equipment, and space, which will impose a limitation on time for the project. When the resources are limited and conflicting demands are made for the same type of resource, a systematic method for the allocation of resources becomes essential. Resource allocation usually incurs a compromise and the choice of this compromise depends on the judgement of managers. There are basically two approaches in solving such a problem. Although their nomenclatures are so far not standardized, they may be called resource smoothing and resource levelling. In resource smoothing, the total project duration is maintained to the minimum level. In resource levelling, the main constraint would be on the resources. The project duration time consequently is exceeded.

A. Objective

1) To study the importance of resource used in this project.
2) Detailed integrated planning of the project tasks to be accomplished, developing realistic schedules.
3) Presenting the effect of the of present progress on the project completion time and taking any corrective action required in time.
4) To study the effects of resource on project.
5) To study how to find out the over allocated resource and how to balance it.
6) To study PRIMAVERA software, its features and benefits of primavera.

IV. LITERATURE REVIEW

Raz and marshell introduced the early and late scheduled dates, which are the early and late dates of the activities, by considering both precedence relations and resource constrains. A heuristic algorithm was applied for the calculation of the early scheduled dates.
Glodratt proposed a methodology for the identification of the critical chain, which is defined as “the longest chain of dependent steps”, where “dependencies between steps can be a result of a path or a result of a common resource”.
Bowers used some perturbations of the network in order to generate the alternative schedules. Tormos and lova complement the concept of backward and forward total slack for the calculation of resource constrained activity criticality index (RC ACI), and they integrated their method into Microsoft Project 98. Fondahl remarks that, as soon as resources are considered in a project, the original calculated network data, which are used as priority rules, are activity attributes and many have no meaning in resource constrained scheduling Lu and lI proposed the Resource Activity Critical Path Method (RACPM), in which “the dimension of resources is considered in addition to activity and time”.

V. METHODOLOGY

The study has been carried out in two phases. In phase one, collecting the required data and calculating the quantities are assigned in Primavera with some specific duration to the requirement of assigned activity with respect to quantity resource which will be assigned to these activities and in phase two, find out the over allocation resource and resource leveling will be performed.
Collecting the data about the resource used in a construction project by drawing of project and quantity survey of project. Understand the resource and data which is collected from site.

A. Case Study

In my case study work on a example of construction project and assign resources with time. The basic phases, as suggested earlier, of network analysis are planning, analyzing, controlling and allocating of each event and activities in relation to time and resources of each activity. In our case take activities and events for a 1 floor residential house project. I am taking 13 activities (show in table 7.1) and each activity relation with time and resources.
In this project taking 2 types of resource first is skilled and second is unskilled resources (Show in table 7.2).

Table 7.2 Resources detail

Activity	Skilled	Unskilled
Study plan layout	2	-
Clearance of site	-	10
Earthwork	3	5
Procurement of P.C.C.	-	5
Laying of foundation	4	6
Procurement of brick	1	4
Erection of building	5	10
Laying of conduit pipe lines for electrical wires	1	3
Laying of electrical wires	2	-
Laying of water pipe lines and taps	1	4
Laying of water pipe lines and taps	1	2
Connecting building to electricity and water	1	-
Finish	3	1

Each activity in independent, and indicates such work as preparation of designs, scrutiny of tenders, laying of pipes, foundations, erection, construction, procurement of materials, etc. Other examples are laying of foundations erection of frames, install mill work, install siding, install plumbing, install wiring and fixtures, paint wall, complete exterior and interior decoration. After the completion of all these events the house is ready.

Table 7.1	Project activities database		
Activity ID	Activity name	Original Duration(d)	Predecessors
A	Study plan layout	1	-
B	Clearance of site	2	A
C	Earthwork	7	B
D	Procurement of P.C.C.	2	A
E	Laying of foundation	10	C, D
F	Procurement of brick	20	A
G	Erection of building	30	F, E
H	Laying of conduit pipe lines for electrical wires	12	F, E
I	Laying of electrical wires	3	H
J	Laying of water pipe lines and taps	10	F, E
K	Laying of water pipe lines and taps	5	J
L	Connecting building to electricity and water	4	I, K, G
M	Finish	10	L

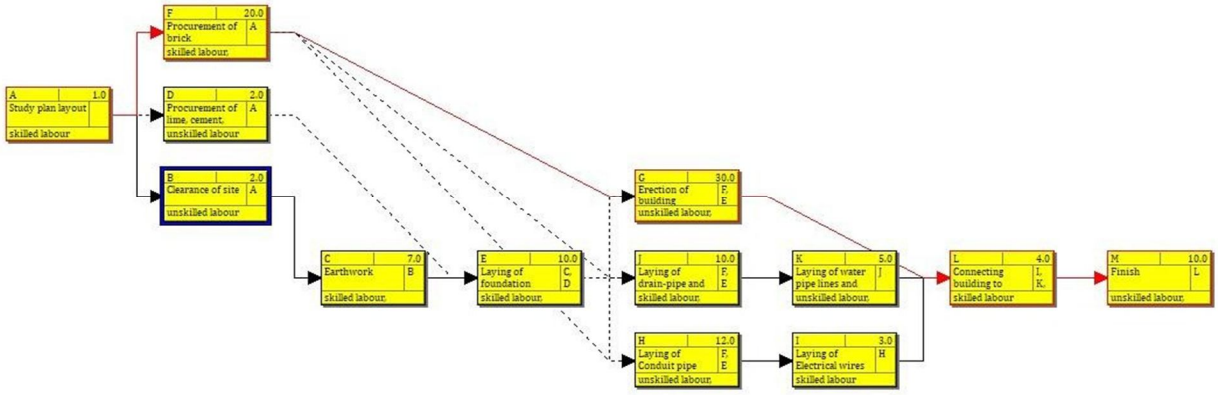
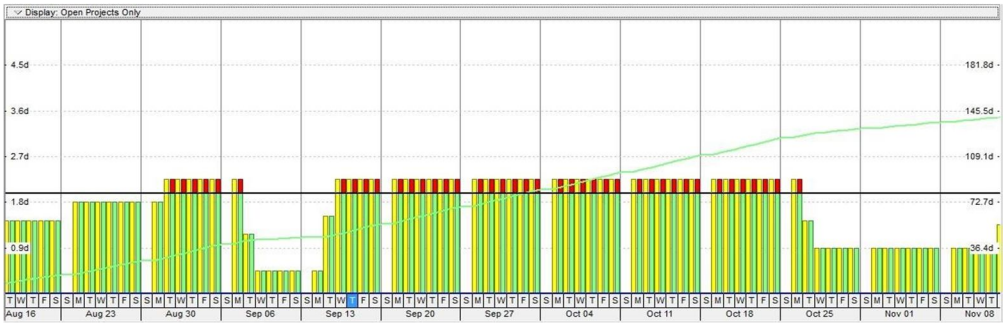
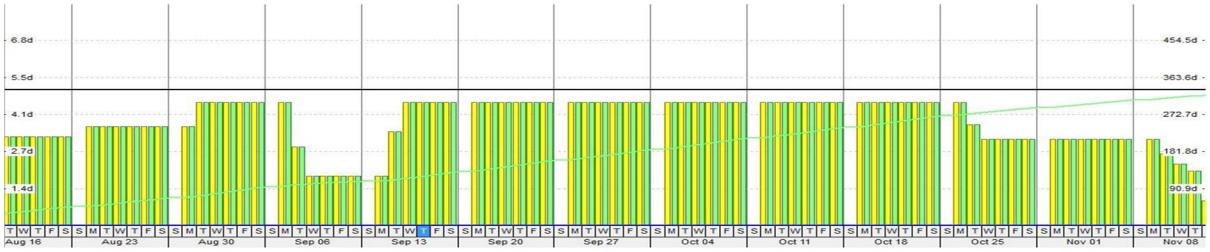


Fig.7.1 - Network Diagram

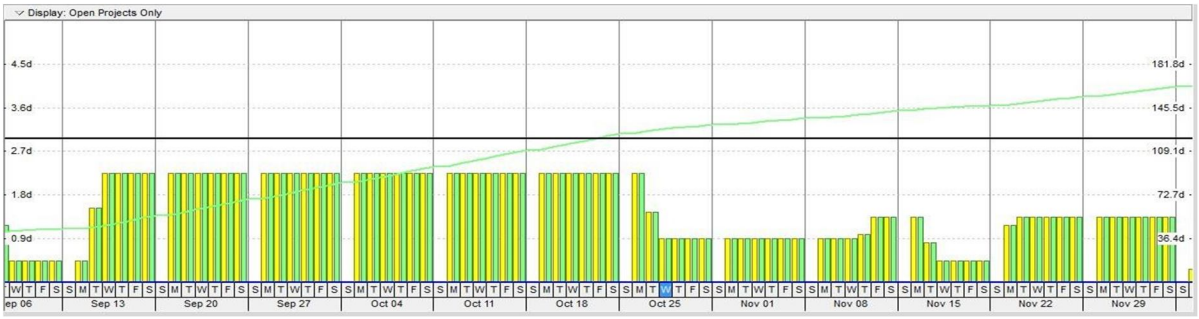


Skilled Resource graph



Unskilled Resource graph

Fig.7.2 – Resource graph before allocation



Skilled Resource graph

Fig.7.3 – Resource graph after allocation

VI. RESULT

In project we calculate resources, in fig 7.2 skilled graph reach form out of limit of resource, so that for keep in limit of resource we extend the limit of skilled resource (show in fig. 7.3) because we are using constraint in time. If we have resources are constraint than we change time or duration for allocation.

VII. CONCLUSION

The conclusion of this research on resource used in the construction industry is to optimize or Minimize or to neglect on wastages of the resource in construction project, resource optimization has been done by using project management software of primavera P6. Hereupon optimization was done to this resource and by modifying predecessors without affecting the duration of the project. These resources were leveled in such way that their allocation is prettily within maximum probability.

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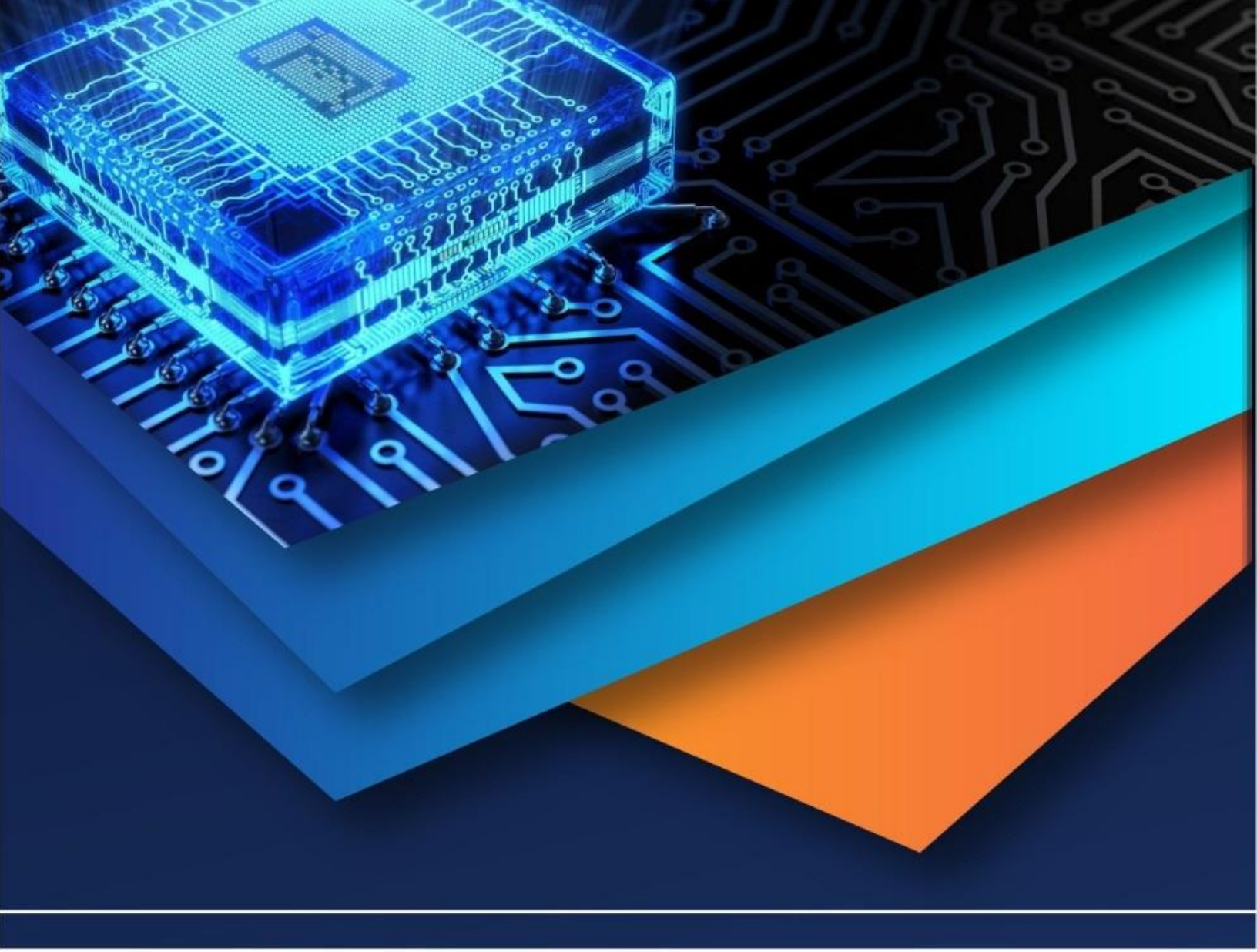

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