

Construction Project Cost Management Aid of Software Application

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Abstract— *The main objective of the project is to do effective management in the cost for the construction activities of an apartment building located at Sankarankovil near Tirunelveli. This study is to be managing the issues due to unexpected delays with very optimum cost. The project management tool used is Microsoft Project 2013. Microsoft Project is used to do the planning, scheduling, resource allocation and costing for the construction activities in this project. The Gantt chart was drawn based on the sequence of activities in the construction site with the corresponding duration and it also shows the resource allocation for the activities which helps in the calculation of the estimation. The resource sheet helps in the determination of the total estimation for the completion of apartment building. After the listing of activities and allocation of resources and scheduling, estimation is done by both the methods i.e., manually and by using Microsoft Project software and they are compared. By using this software, the total estimation of the building was resulted based on the control of duration.*

Keywords— *effective management; delays; costing; Microsoft Project; Gantt chart; resource allocation; efficient;*

I. INTRODUCTION

Project is a non-repetitive one-time venture to build something of lasting value, amidst formidable uncertainties to be overcome. It is a job that has a beginning and an end (time), a specified outcome (scope), at started level of quality (performance) and a budget (cost). Organization performs work. Project management is an art and science of mobilizing and managing people, material, equipment and money to complete the assign project of work on time within the budgeted cost and by specified technical performance standards. There is always a dynamics link between these three forces. A project is essentially a set of operations or activities to be

completed in logical order. In project management, a schedule is a listing of a project's milestones, activities, and deliverables, usually with intended start and finish dates. Those items are often estimated by other information included in the project schedule of resource allocation, budget, task duration, and linkages of dependencies and scheduled events.

The key objective of the construction project management is to complete the project with the allotted time, resources and within the budgeted cost. Project gets starts at the right way but as it proceeds further, gets off the track. The project leads to some delays in the construction site which can be managed by additional resource allocations and appropriation of overtimes for the labours thereby resulting in the uncertainty of cost. Some of the delays that makes the MS Project estimation modified when compare to the manual estimation are shown.

- a) Unexpected recess
- b) Weather conditions
- c) Labour Strike,
- d) Changes made to the existing design etc...

The resource allocation is made in the resource sheet and their rates are accustomed with each resource. They can be people, equipment, facilities, funding, or anything else. The rates for the every activity are set as per the requirements of the resources and their estimation is calculated. Estimation is an inherent aspect of project management. Project estimation techniques are critical survival tools for predicting when a project will finish and how much it will cost. Estimation is a part of the planning process and it is a technique used to predict future values for variables such as cost and duration. An “estimate” is fundamentally an educated assessment of developing the project management plan includes estimating activity resources, task durations, and costs, it's imperative to use proven and sound estimation techniques for a reliable project plan. MS Project

helps in calculating an “overhead” task such as weekly project management activities. Estimation is calculated by adopting both resource allocation and rates liable in the resource sheet.

II. LITERATURE REVIEW

A. *Sambasivan. M & Soon. Y (2013), discussed that,*

The problem of delays in the construction industry is a global phenomenon and the construction industry in Malaysia is no exception. The main purpose of this study is to identify the delay factors and their impact (effect) on project completion. Earlier studies either considered the causes or the effects of project delays, separately. It also aids to identify the delay factors and the effect on the project completion by doing a case study in ongoing projects. The delays in construction industry have many after effects among which the main are time extension, cost overrun, disputes, arbitrations and litigations. The main intent of this study is to identify the delays that result in cost extension factors for project completion. By analyzing the reasons for delay, possible recommendations are given. This study takes an integrated approach and attempts to analyze the impact of specific causes on specific effects. The major effects of delay are cost impact, reduced labour productivity, postponement in work, change in labour allocation etc. Not all delays can be rectified, but few of them can be overcome by improving management responsibilities.

B. *Sandip Pawar et al., (2012) contended that,*

The project management technique of planning and scheduling using tools and devices are helpful in comparing the project with stipulated cost, time and quality. Resource tracking, Minimize the uncertainty and Cost Effectiveness is focused in this project. . Earlier studies have mostly emphasized on the major causes or the effects of project delays. The delays which are caused solely by the contractor or its suppliers are called inexcusable delays. The software tool used for planning and scheduling is Primavera project planner enterprise for construction. The objective of maximizing the efficiency of the project strategy with respect to cost and time has to be balanced against the risks associated with new methods of working and the overall quality of the finished deliverables. The study covers three case studies of the process of planning, scheduling the activities and monitoring. A general re sequencing model had been proposed to overcome the delay factor from the critical area, to minimize the delay of the construction and to reduce the time, cost and it also helpful to concentrate on the major areas in the project. Resource planning is one aspect, which decides the systematic execution of the project at worksite. . It helps to plan and evaluate the resources for the Construction of the building project. This

study also compares the cost variation due to the delay of the project and re scheduling the project by crashing process

III. CONTROLLING OF DELAYS

The cost can be affected mainly due to delays in the project due to various reasons. The causes for the delays can be indentified and are listed below.

Causes for the delay

1. Delays in contractor's payments
2. Shortage of material in construction
3. Change in material
4. The weather condition
5. Shortage of manpower (skilled, semi-skilled and unskilled labour)
6. Frequent change of staffs
7. Poor site management
8. Improper management of the engineers
9. Unexpected holidays

Some of the delays are delay in submission of drawings, space constraints, and delay in payment by client, delay in material supply and local problems like strikes.

Delays in the project

In this construction project, the cost issues are due to unexpected holidays and shortage of resources. The unexpected holidays are listed below.

1. May Day
2. Pooja holidays
3. Diwali holidays
4. Chief Minister death
5. Demonetization
6. Pongal holidays
7. New Year holidays

The calendar is set in the MS Project with considering the delays. The delays can be controlled by conferring the overtimes for the labours and also giving additional resources to complete the project within the scheduled time. The holidays are compensated by giving the overtime to the labours so that the scheduling can be controlled within the limited time without any delay to the customers. The overtime is given for the Sundays after the long delay due to the demonetization. The problem with the

material deficiencies are control by exchanging the activities having the enough materials and equipment.

The holidays that are not included in the manual scheduling are shown below as in the MS project.

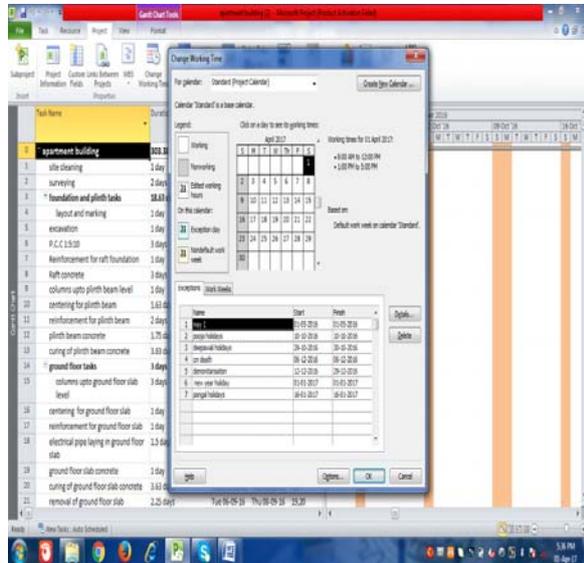


Fig. 1 Exceptions of working days

The overtime on the Sundays are shown below as in the Ms Project.

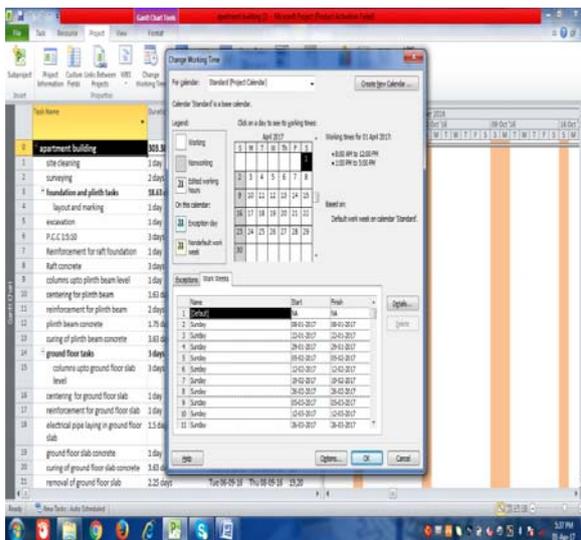


Fig. 2 Overtime days

In the overtime days like Sundays the same working is allotted (from 8 am to 5 pm). These overtime days requires additional resources to complete the project.

So that the cost can be increase due to the rate increasing for the additional resources and delay for the labours who are present on the overtime days. The manual estimation is done by not considering the unexpected delays. So the cost would be lower when compare to the MS Project estimation.

IV.RESOURCE SHEET

The resource sheet helps in calculating the rates for each resource as per their quantity.

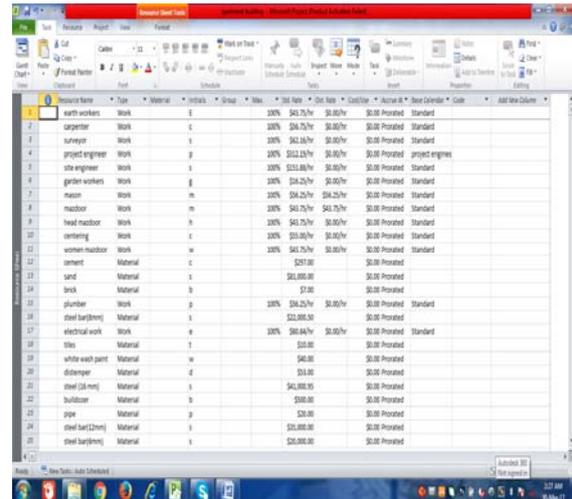


Fig. 3 Rates for the resources(contd.)

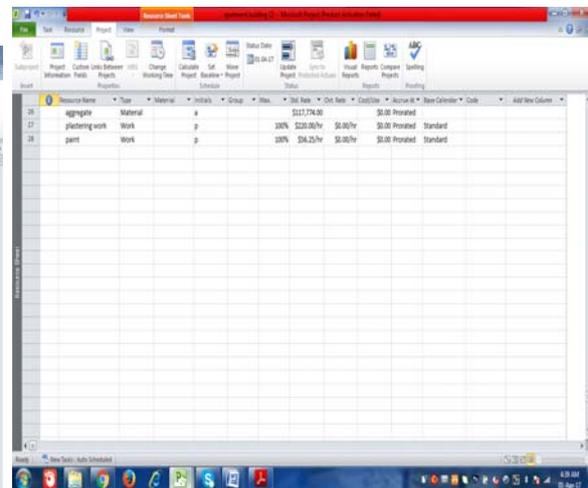


Fig. 4 Rates for the Resources

These resources and their rates are imported in the resources of the every activity. By allotting the resource and duration of every activity, the estimation is calculated.

This screenshot shows the MS Project interface for a task named 'apartment building'. The task list includes activities such as site clearing, surveying, foundation and plinth tasks, reinforcement for slab foundation, and various concrete and masonry works. The columns show task duration, start and finish dates, and associated costs.

Fig.8 Estimation (contd.)

This screenshot shows the MS Project interface for a task named 'electrical wiring'. The task list includes preparation of cables and primer, application of coat of distemper, hanging of P.V.C. flooring, and hanging of electrical drops and boxes. The columns show task duration, start and finish dates, and associated costs.

Fig.11 Estimation (contd.)

This screenshot shows the MS Project interface for a task named 'removal of ground floor beam centring'. The task list includes cutting of ground floor slab concrete, brick work in ground floor, electrical lowering in ground floor, internal W/S sanitary lines, and plastering in ground floor. The columns show task duration, start and finish dates, and associated costs.

Fig.9 Estimation (contd.)

This screenshot shows the MS Project interface for a task named 'cut off of distemper and 2nd coat of white wash'. The task list includes roof work construction, external wall plastering, hanging of aluminum windows, final coat of external wall finish, OHTS works, and masonry and OHT work centring and reinforcement. The columns show task duration, start and finish dates, and associated costs.

Fig.12 Estimation (contd.)

This screenshot shows the MS Project interface for a task named 'electrical drops and boxes in 2nd floor'. The task list includes internal W/S sanitary lines, plastering in 1st floor, cement concrete mosaic flooring, ceramic tiles flooring, curing of flooring, and various floor slab and beam centring tasks. The columns show task duration, start and finish dates, and associated costs.

Fig. 10 Estimation (contd.)

This screenshot shows the MS Project interface for a task named 'cleaning and plaster of some concrete'. The task list includes hanging of roof tiles, cleaning of roof and internal painting, line concrete and roof, curing for floor concrete, hanging of roof tiles, supply of door frames and window grills, supply of W.C. pipe and fittings, and supply of wall tie bolts, corrugated and rebar ties per party.

Fig.13 Estimation.

The estimation derived from MS Project will be further higher when compare to the manual estimation due to the management of delay using additional recourses and overtime.

VIII CONCLUSION

BASED ON BOTH THE METHODS (MANUAL AND MS PROJECT) OF ESTIMATION, THE FOLLOWING CONCLUSIONS ARE ARRIVED.

The delay causes some of the issues in the construction site. It is controlled by allotting the additional resources and overtimes. This increases the cost of the project after tracking higher than the estimated cost before tracking. Both the estimation are compared which showing that the estimation calculated by using MS Project is higher because the rates includes the management of delay by increasing the recourses and overtime to overcome the issues of issues. The project is completed with both critical and non critical paths. The tracking of the project is done from 11.06.2016 to 30.03.2017. The remaining portion of the overheat tank are to be complete and these can also be tracked in this project. The overall estimation calculated before tracking is Rs. 95, 62,837. This does not include the amount for the overtime and extra resources. The overall estimation calculated after tracking by using Microsoft project is Rs.1, 00, 28,189. This includes the overtime cost and additional resources cost. The time of the activity includes the weekly leave i.e. Sunday. Other unexpected leaves are not included in the manual scheduling. On this comparison between the manual and software methods of estimation, it is concluded that “Computer Aided Scheduling” is most efficient and time saving one and also makes the project, cost effective with Proper Planning.

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