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An Attempt of Project Management by Critical Chain and Dynamic Progress Method – A Case Study of G+1 Residential Building Project

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Abstract: A Attempt made to study all dimensions related to project management technique by using a widely used Critical path analysis. CPA was introduced back in 1950's, which at that time was a major improvement. Since then it is widely used accepted approach for project planning and effective management.

CPM is based on "duration" as a main deciding factor to calculate end date of project and all its dependent factors to calculate and end date of project and all its dependent like critical activities and path. Using CPM as a duration based approach, often it provides estimates that are 60% under the actual completion schedule and @30% under the actual cost.

But now a day's projects are becoming very complex in nature and demands integration of sizable amounts of agencies involved, it is becoming very essential for a project manager to develop an approach which suits the requirements and "duration" as an outcome. Critical chain project management and Dynamic Progress Methods can be new alternative methods which can overcome the drawbacks of CPM method.

DPM starts resources as the foundation and builds upwards from there. A case study under consideration gives a comparison of CPM Vs DPM and scope of future research in DPM. Also the use of softwares MSP 2016 and its limitation on Critical path method is very important.

Keywords: Project management technique, Critical path method, Duration, Critical chain project management, Dynamic progress method

I. INTRODUCTION

When introduced Critical path method was a great improvement in the field of project planning and management James E Kelley Jr. and Morgan R. Walker officially introduced the CPM to the world by an article titled "Critical path planning and scheduling" published in March 1959.

A. Critical Path Schedule Approach

Critical path is defined as the pathway of interconnected activities for which there is no extra time available to perform tasks. In some cases, there may be several critical paths through project that have no extra time available, in that case, pathway with longest duration is often considered the critical path. There are mainly 3 types of dependencies between predecessor task (represented by first letter) and a successor task (represented by second letter) are –

- 1) *Finish to Start:* The predecessor task must finish before the successor task can start. This is most frequently used relationship to define relationships between activities.
- 2) *Start to Start:* Both the predecessor and successor task must start on same time.
- 3) *Finish to Finish:* Both the predecessor and successor task must finish on same time.

II. OBJECTIVES

- A. To study in Critical path methodology in detail with its limitations.
- B. To study suitability of Dynamic Progress Method, Critical chain project management, which overcomes limitation of Critical path method.
- C. A case study of construction of ground floor residential building.

III. LITERATURE REVIEW

- A. From the various literature reviews, the critical path method analysis was studied in detail with all its merits and demerits and advents of Dynamic progress method compared with real life case study project.
- B. In CPM method since each duration of activity is based on totally experience of project management team and duration as output, there are very likely chances that duration assigned is very approximate and does not relate to actual duration of task completion and vary up to 60% under estimated. This uncertainty will not give practical projection of end date of completion of project and also misinterpret the calculation of critical path. The limitation of CPM is also applicable when resources are allocated to a activity, CPM approach with Microsoft planning as computer tool will not take account the efficiency of each resource and evenly distributed to all over span for particular activity. The studies show that cost projection given by this approach are @ 40% accurate.
- C. The recent studies made to overcome the limitation of CPM are adopting resource oriented approach that is resource are main inputs and deciding factor. The approaches are critical chain project and Dynamic progress method which tries to overcome the shortfalls of existing system. The use of software like Pmblox can give rise to solution.

IV. METHODOLOGY

The present study considers CPM approach using Microsoft project planning 2016 as a planning software which defines critical path activities, and steps are as follows –

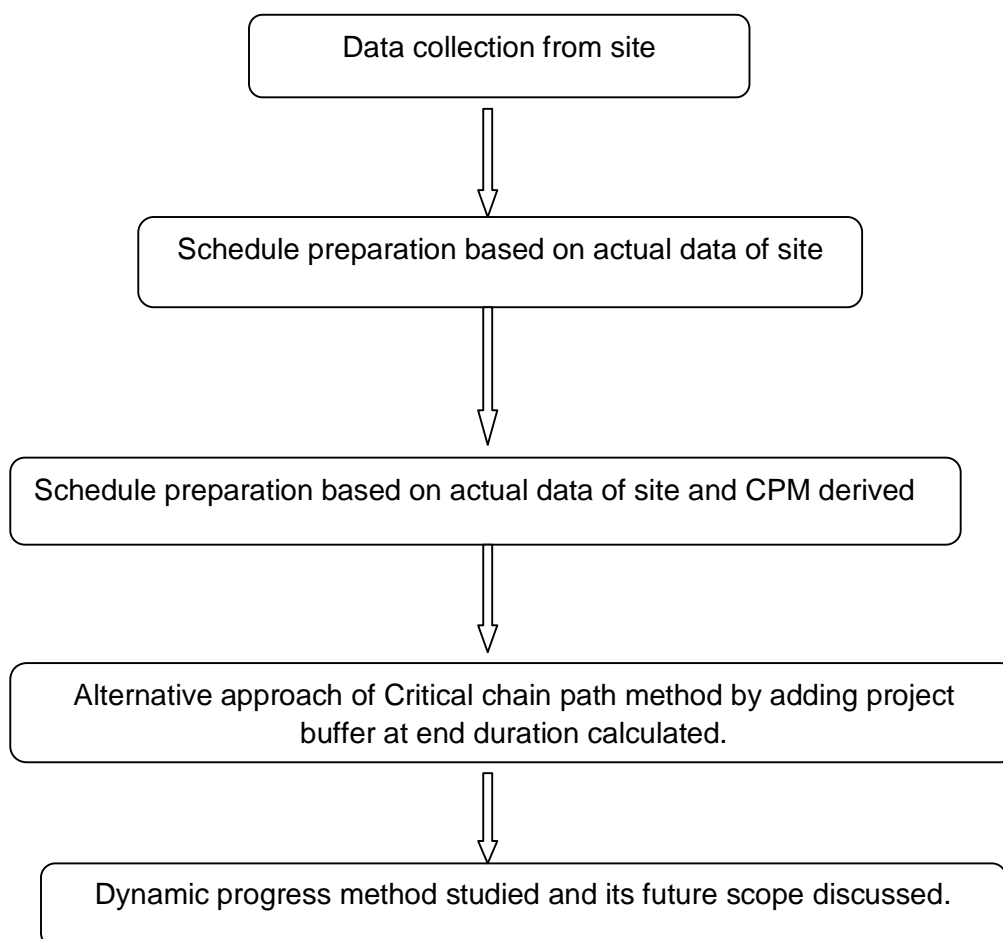


Fig -1

The methodology of this paper is represented in Fig – 1.

A. 5 Critical Path Network For Project with MSP 2016

The project considered here is a construction of residential building of total estimated duration is of 306 days with critical path as defined by Red color in Gantt Chart view.

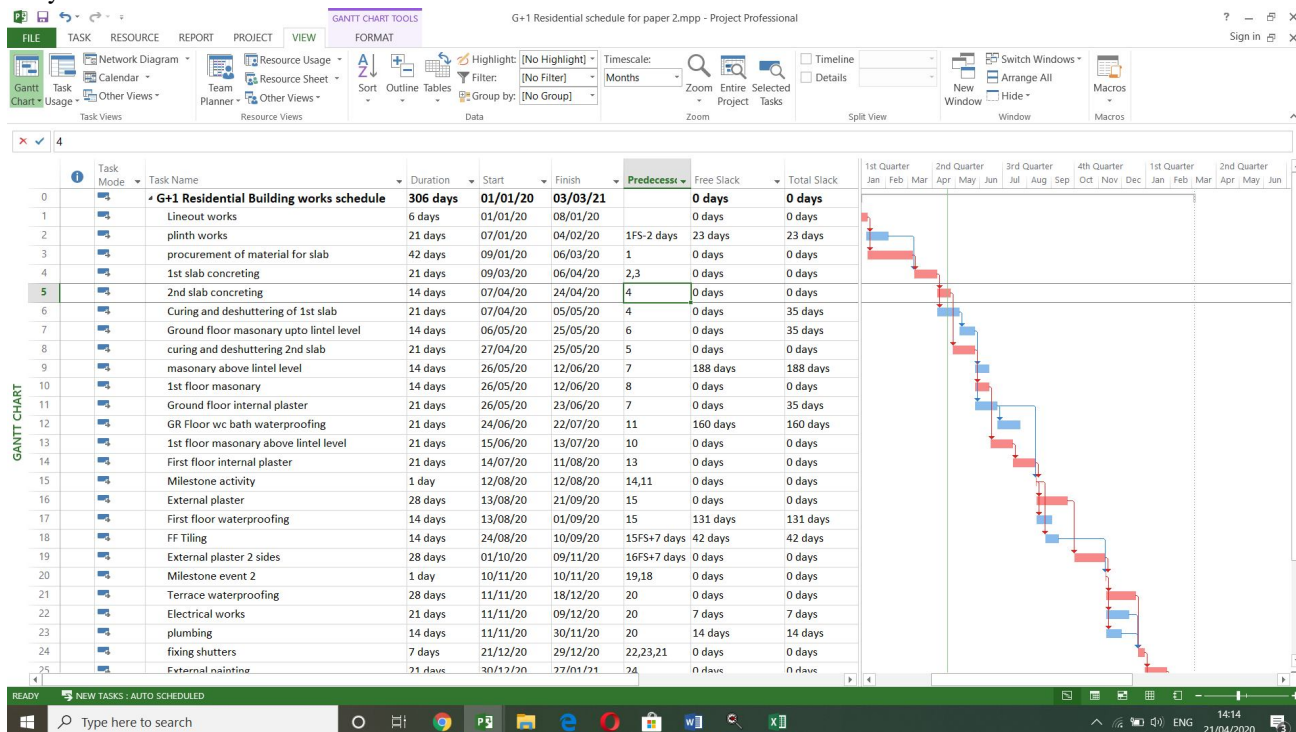


Fig no 2- Schedule prepared in MSP with durations as shown

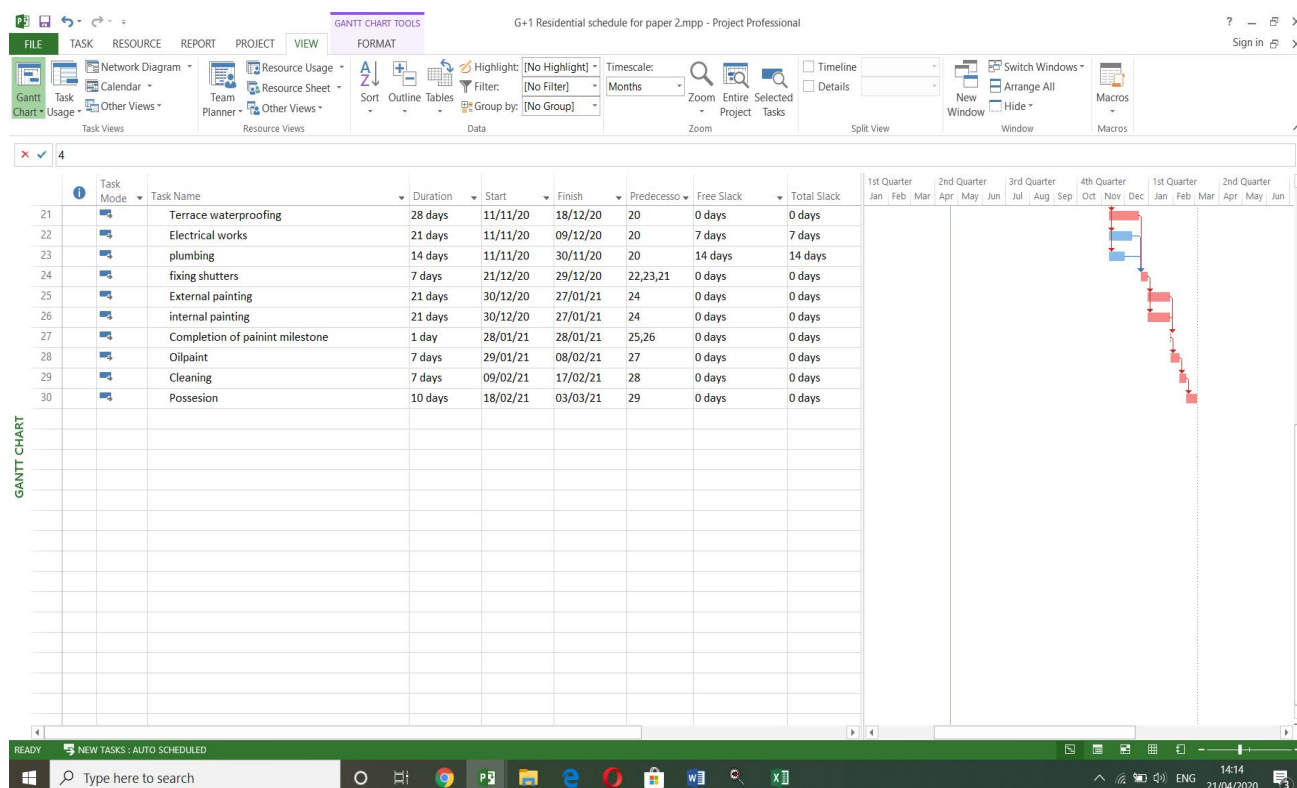


Fig no 3 – Second part of schedule with durations defined for activities

Here Critical path as defined and critical activities as listed are as follows –

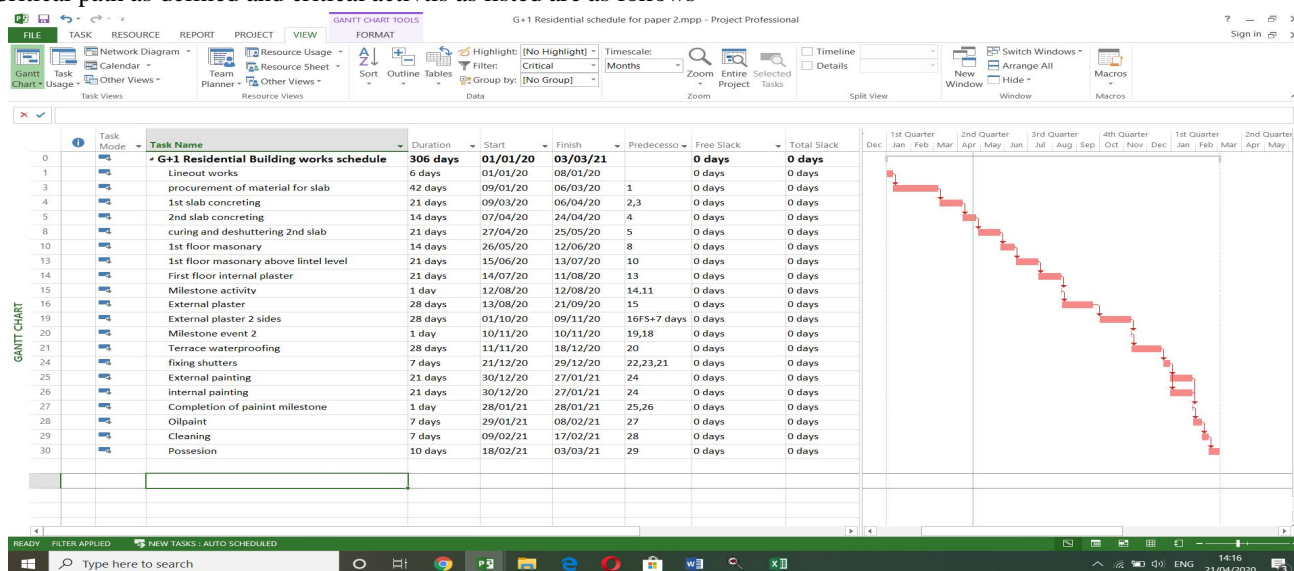


Fig no 4 -Critical path with zero slack and shown in Gantt chart with red

From above data it is very clear that activities with '0' Days as free slack are the critical activities and hence slippages on completing above tasks will delay the overall schedule.

B. CCPM Approach

The new approach tries to cover the flaws in the CPM method as –

Since CPM uses a factor of safety in assigning duration to every activity since it is totally based on duration, CCPM approach eliminates this factor of safety in assigned duration with optimizing resources critically and reviewing duration critically, hence duration is optimized for critical activities and ultimately overall duration of project is reduced.

CPM uses Parkinson's law effect, that every activity will expand to fill the extra time that is allowed for it. CCPM approach this is how stripping extra time of every activity.

For critical path method, extra time is placed at the end of project called project buffer, whereas in CCPM approach, buffers are placed at the end of activities by analyzing the path and network, thus reduced the end duration.

In the case under consideration, it is illustrated as follows -

New assigned durations based on approach of Critical chain project management approach, the revised schedule completion dates come to 237 days from 306 days. That means there is saving of 69 days.

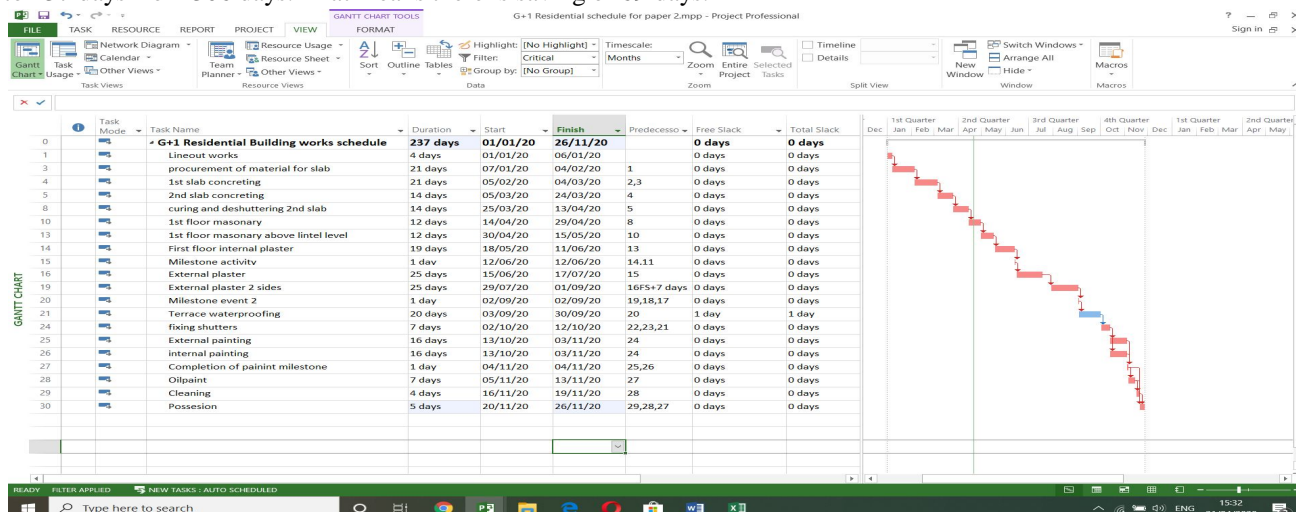


Fig 5- Schedule prepared with CCPM approach –

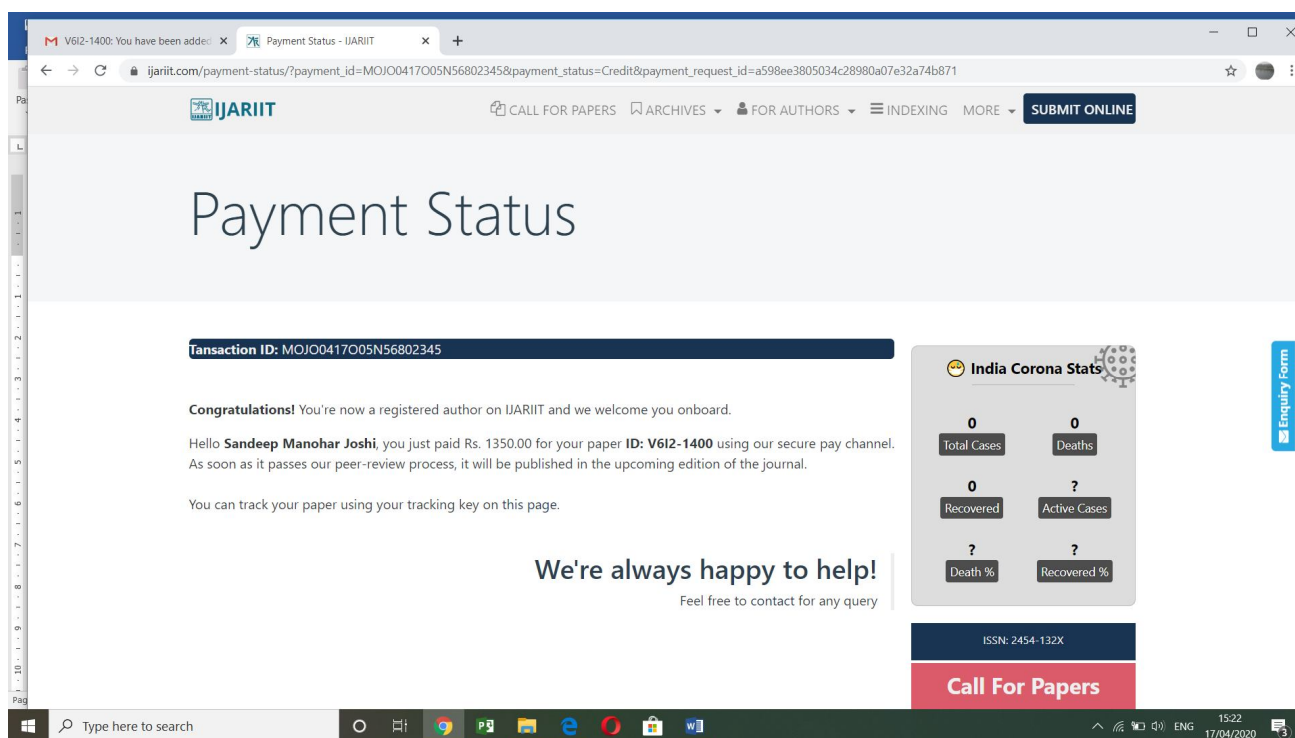
V. CONCLUSION

After studying the results of case study, a CCPM approach was seen to be the most suitable approach than the existing CPM approach since it eliminates few drawbacks of CPM methods as stated above.

There is still new emerging approaches like Dynamic Progress monitoring approach which can be still studied further to see its feasibility since this approach is very based on Resources efficiency, resource as an input and takes into account the other factors like it information to top management from time to time during project execution. Management corrective actions are suggested with effective use of pmBLOX software are mainly to add resources, Work extra, shift resources, reduce work hours etc.

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