INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X
Impact factor: 6.078
(Volume 6, Issue 2)
Available online at: www.ijariit.com

An attempt of best scheduling approach for a construction project

Sandeep Manohar Joshi
smjoshi.1977@gmail.com
JSPM's Imperial College of Engineering and Research, Pune, Maharashtra

Dr. Navnath V. Khadake
nvkhadake_civil@jspmicoer.edu.in
JSPM's Imperial College of Engineering and Research, Pune, Maharashtra

ABSTRACT

The current study is an attempt made to decide best scheduling approach to a construction project in order to deliver it on time, quality and cost. The major constraints typically observed in any construction project are time overruns, cost overruns. It is therefore necessary for a project manager to attempt a best scheduling approach based on study of project ideals and project constraints. A Project ideal is measure for success. Common project ideals identified are Highest client satisfaction, Highest quality for deliverables, shortest time possible and lowest cost possible. The typical project constraints are Knowledge, Time, cost, resource and risk constraints. After having a project PIC analysis, best scheduling approach is decided like Agile approach when knowledge is constraint or when ideal is highest client satisfaction, Critical path method when time is dominant and time is ideal, Resource Critical Path (RCP) approach in any resource constrained project. A logical sequence of activities with assigned duration and resources is made and schedule is prepared. Critical path method is the approach which used widely in a construction project. Critical path and critical activities are studied in advance with use of MSP 2016 or any other computer software and critically monitored so that these activities are completed on time and there should not be any delay in completing these activities.

Keywords— *Schedule approach, Project ideals and constraints, Critical path method, Agile project management*

1. INTORDUCTION

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. A schedule is commonly used in the project planning and project portfolio management parts of project management. Elements on a schedule may be closely related to the work breakdown structure (WBS) terminal elements, the Statement of work, or a Contract Data Requirements List

1.1 Planning a Construction Schedule

There are a number of things that should be considered when planning a construction project schedule. Design, necessary permits and cost must all be taken into consideration. The scheduling process forces the contractor to imagine how they will complete the project. It provides a thorough planning process and helps create a clear plan that can be shared with everyone else involved. Construction schedules typically focus on two major aspects; determining how long each activity will take to complete and determining who is responsible for completing each activity.

Construction schedules help identify and manage the activities necessary to complete each task as well as the order in which each task must be completed. Before a project schedule can be created, the schedule maker should have a work breakdown structure (WBS), an effort estimates for each task, and a resource list with availability for each resource. If these components for the schedule are not available, they can be created with a consensus-driven estimation method like Wideband Delphi.

The reason for this is that a schedule itself is an estimate: each date in the schedule is estimated, and if those dates do not have the buy-in of the people who are going to do the work, the schedule will be inaccurate. To develop a project schedule, the following needs to be completed:

- Project Scope
- Sequence of activities
- Tasks grouped into 5 project phases.
- Task dependencies map
- Critical path analysis
- Project milestones

1.2 Benefits of well-planned Schedule

A properly executed construction schedule can help manage materials, labor and equipment. It also allows for adjustments to accommodate unexpected events. This allows construction management to complete projects on-time and on-budget.

2. OBJECTIVES

- To propose and the importance and the need of planning, scheduling in construction project works.
- The objective of this study is to define best scheduling approach for a project in order to deliver project successfully in terms of time.
- To study dimensions of project –Project Ideal and Project Constraint Matrix.
- To study issues of scheduling and the role of Tracking and Monitoring of project's progress from start to completion.
- To showcase the various features such as project tracking, updating, Gantt charts and uses of the MS Project 2016 software in construction project management.
- To study advantages and disadvantages of Critical Path Method Approach.
- To showcase an ideal schedule for Construction of New Passenger Terminal Building.

3. LITERATURE REVIEW

The scheduling of activities is the first major requirement in project management. Activity scheduling is probably single most important tool for determining how project's resources should be integrated. The schedule serves as a master plan from which both customer and management have an up-to-date picture of operation. Certain guidelines to be followed while preparing schedule are –

- All major events and dates must be clearly defined If for any reason the customer's milestone dates cannot be met, the customer should be notified immediately.
- The exact sequence of work should be defined through a network in which interrelationships between events can be identified.
- Schedules should be directly relatable to the work breakdown structure. If the WBS is developed according to a specific sequence of work, then it becomes an easy task to identify work sequences in schedules using the same numbering system as in the WBS. The minimum requirement should be to show where and when all tasks start and finish.
- All schedules must identify the time constraints and, if possible, should identify those resources required for each event.

Project Charter: The original concept behind the project charter was to document the project manager's authority and responsibility, especially for projects operated away from Head office. The Charter is a legal agreement between the project manager and the company. When the project carter contains a scope baseline and management plan ,the project charter may function as the project plan.

Project Ideals: An ideal provides a measure for success. Better achievement of the ideal will never satisfy a client because the project ideal can never be achieved. Improving on the project ideal gives companies a competitive advantage in the market place. Doing a project at the lowest cost possible is an example of a project ideal.

For example, organizations that develop new products often try to be the rest to market. Their project ideal is the shortest time possible. These organizations would be happy if the product development lifecycle shrunk from 24 months to six months to three months or better, to a single month (and best of all if it were all done yesterday). The ideal will never be achieved entirely; it guides your direction, but it is not a destination. When will we have new products that appear instantly? Common project ideals are easily identified. Project managers typically strive towards one of the following,

Highest client satisfaction: Some projects have one client with an impossible challenge. A project that changes the salary system in an organization may have as the ideal maximizing the satisfaction of the employees. You'll never satisfy all employees, but the challenge is to satisfy as many as much as possible.

Highest quality for deliverables: At the top-end of the market is where the competition on quality takes place. The competition often focuses on simply and objectively measured quality standards, like processor speed in the computer chip market, storage capacity in ash memory, energy-production in solar panels or energy storage capacity in batteries. They will never be high enough; the bar is always rising. Software development projects often suffer from bugs. Clients desire bug-free software, but that ideal will never be realized, unfortunately.

Shor test time possible: Research and development organizations that develop new products often try to shorten their development cycle to be the rest on the market. If you could deliver yesterday that would be best. The current race for affordable solar panels and 500-mile car batteries are two examples.

Lowest cost possible: Implementation-type projects such as software or hardware upgrades often are cost-oriented. The knowledge exists, there are few unknowns and the goal are to do it most efficiently. If it could do for free, that would be best. Maintenance projects and regulatory-compliance projects are often in this category since these are projects that just cost money without generating extra revenue.

Project Constraints: The difference is that the closer you come to the ideal, the more satisfied the client will be. The client won't necessarily be happy yet. Only if constraints are met will the client be happy and the project considered successful. Project managers face the challenge of maximizing the project ideal while respecting project constraints. Then if all goes well during project execution, the client will certainly be happy. When constraints are met, the project isn't necessarily successful, but it isn't

a failure either. Where ideals are the criteria for success, constraints are the criteria for failure. For clients, ideals are satisfiers, whereas constraints are dissatisfiers. The different types of project constraints are:

(a) Knowledge-constrained: Knowledge projects are constrained by the speed with which new ideas or findings are generated to meet the quality requirements of the project. These are the typical R&D types of programs, such as new product development. There are many unknowns and the progress forward depend heavily on solving the scientific or technological problems and on receiving favorable test results. You can and many knowledge-constrained projects in the pharmaceutical, defense and high-tech industry.

(b) Time-constrained: The project team faces the challenge to finish before a certain hard deadline. The project duration is driven by the logical sequence in which tasks have to be performed. Y2K-projects are prime examples of time-constrained projects; if it wasn't done by the turn of 2000, the project had failed or so the thinking went.

(c) Cost-constrained: This type of project has a set budget. There simply is no more money available. The expenses have to be tightly managed to stay within the xed budget. This seems to be the main concern, for example, in government projects where yearly budgets are often xed. Common construction projects like bridge building and road pavement (not the high-prole construction projects) are often cost-constrained as well.

(d) Resource-constrained: In this type of project, the availability of resources is limited and inflexible. Resources can't easily be found (because of a scarcity of expertise), can't be hired (because of hiring freezes) and can't be trained (because of the nature of the expertise, special skills or talents required). The scarce resources drive the schedule more than the network logic. You'll have to make do with the resources available, and if you can't deliver the project product with the resources you have, the project fails.

The Project management plan usually contains component plan which describes the base plan:
Scope Management Plan: describes the scope baseline which includes scope statement, WBS, WBS dictionary.
Schedule Management plan: describes the steps for planning, monitoring and controlling the schedule.

4. NETWORK SCHEDULING TECHNIQUES

Management is continually seeking new and better control techniques with the complexities, masses of data and tight deadlines that are characteristics of highly competitive industries. Scheduling Techniques helps achieve these goals. The most common techniques are:

- Gantt Charts or bar charts
- Milestone charts
- Networks
- Programme Evaluation and Review Technique.

In the early 1960s, the basic requirements of PERT/time were as follows:

- All of the individual tasks to complete a program must be clear enough to be put down in a network, which comprises events and activities; that is, follow the work breakdown structure.
- Events and activities must be sequenced on the network under a highly logical set of ground rules that allow the determination of critical and subcritical paths. Networks may have more than one hundred events, but not fewer than ten.
- Time estimates must be made for each activity on a three-way basis. Optimistic, most likely, and pessimistic elapsed-time figures are estimated by the person(s) most familiar with the activity.
- Critical path and slack times are computed. The critical path is that sequence of activities and events whose accomplishment will require the greatest time.

Networks are composed of events and activities. The following terms are helpful in understanding networks:

- Event: Equivalent to a milestone indicating when an activity starts or finishes.
- Activity: The element of work that must be accomplished.
- Duration: The total time required to complete the activity.
- Effort: The amount of work that is actually performed within the duration. For example, the duration of an activity could be one month but the effort could be just a two-week period within the duration.
- Critical path: This is the longest path through the network and determines the duration of the project. It is also the shortest amount of time necessary to accomplish the project.

For a complex construction projects, use of Microsoft project planning tools like MSP 2016, Primervear P6 is suggested for project manager.

Agile Project Management: As companies become reasonably mature in project management, there is a tendency to go from formal to informal project management, minimize the need for excessive documentation (possibly even hoping for paperless project management), and trust that the project team will make the right decisions. In order to support the existence of the more informal approach to project management, techniques such as agile project management have surfaced. There are several forms of agile project management. Agile Project management characteristics are:

- Structured focus on people
- Leadership style is participative.
- Amount of documentation is minimal
- Customer feedback throughout project.
- Project direction is responding to change
- Constantly evolving solution.

5. REFERENCES

[1] Project Management –A system approach to planning, scheduling and Controlling by HAROLD KERZNER, twelfth edition.
[2] "How to choose best scheduling approach to your project" by Eric Uyttewaal

