

# PROJECT PLANNING USING TASK DECOMPOSITION AND TASK SCHEDULING

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**Abstract :** Project planning and scheduling are termed as key and testing instruments in controlling and checking venture execution, yet numerous overall construction development projects seem to give deficient regard for successful administration and meaning of task arranging, including preplanning stages. To be sure, some arranging issues have been totally ignored, bringing about inadmissible undertaking project execution. There is an absence of information of, and understanding about, the criticalness of utilization of project planning and scheduling in construction projects. In this manner, improvement in such information ought to be consolidated with new administration techniques or instruments to improve authoritative learning and reconciliation with regards to extend arranging and planning. The consequence of the basic project management planning tools/ techniques such as spreadsheets, benefit/ cost analysis, WBS, expert judgment and cost of quality, has the highest awareness and use both in the public/ government representative organizations and in private consultancy firms. Additionally, expanding attention to extend the executives arranging instruments/procedures was watched and that has likewise prompted an expansion in the utilization of project management planning tools/ techniques. The discoveries of this examination, along these lines, connote the need of making more consciousness of advanced project management tools/ techniques, to ensure better performance.

**IndexTerms - Project, Project Management, Project Planning, Project Management Tools/ Techniques.**

## I. INTRODUCTION

Project is a succession of interesting, complex, and associated exercises having one objective or reason and that must be finished by a particular time, inside spending plan, and as per detail.

Project is a progression of mind boggling, associated exercises with a typical reason:

- Our best regular setting is a project to create or refine a program, however standards of project management apply to generally extend.
- Major factor of effective project management is to see a project as a progression of interrelated jobs.
- Mostly different courses pay attention around how to play out a solitary complex assignment, for example, building up a utilization case or planning a decent human-PC interface.
- However there are 5 variations on how we plot the task over the course of events of the project.

Project plan is very more extensive idea. An undertaking project plan communicates the goals and necessities of the project as far as are:

- Project Venture Range
- Project Venture Planning
- Supply Necessity
- Project Venture Price Evaluation
- Project Venture Value and

Project Venture Risk Administration

## II. PROJECT MANAGEMENT PLANNING TOOLS

Planning tools/ techniques of Project Management are devices/systems which for the most part serve to adequately design towards the effective execution of tasks. A sum of 17 Tools/Techniques was considered under this procedure gathering. They are:

### 1. Work Breakdown Structure (WBS):

It manages separating of the tasks into sensible individual segments in a progressive structure. Such a structure characterizes errands, that can be finished autonomously of different undertakings, encouraging asset allotment, task of duties and estimation and control of project.[1]

2. **Decomposition Technique:** It is utilized to make the WBS by subdividing the undertaking expectations into littler sensible assignments or work segments called work bundles. It is likewise utilized in the movement definition process for subdividing the work bundles into littler, progressively reasonable parts called schedule activities. [2]
3. **Expert Judgment Technique:** This alludes to judgment gave dependent on ability in an application region, learning territory, discipline, industry and so forth as proper for the action being performed.
4. **Modular Approach:** Furthermore identified as —Bottom-up estimating is an assessing system which depends on making gauges for each work bundle (or action) in the work breakdown structure and abridging them to give an all out gauge of expense or exertion required (APMBOK, 2006).[3]
5. **Benchmark Job Technique:** Furthermore identified as —Comparative or comparable to estimating is an assessing method which utilizes memorable information from comparable undertaking to decide the most proper expense and time (APMBOK, 2006).[3]
6. **Parametric Estimating Techniques:** This is termed as an assessing strategy that utilizes a factual connection between recorded information and different factors
7. **Gantt chart:** This is a specific kind of bar outline utilized in undertaking the board demonstrating arranged movement against time.
8. **Linked Bar chart:** An enhancement to the Gantt outline is linked bar diagram. This is a bar graph that expressly demonstrates the reliance interfaces between activities.[3]
9. **Project Network Diagrams:** This is a illustrative introduction of undertaking information in which the venture rationale is the primary determinant of the arrangements of the exercises in the illustration.
10. **Critical Path Analysis:** It alludes to the strategy for computing the basic way and buoys in a system. [3]
11. **Line of Balance:** Is an administration control technique for gathering, estimating and introducing realities of time, cost and achievement, against a particular target.
12. **Spreadsheets:** Spreadsheets are typical mechanized instruments which can give information expected to cost assessing, cost planning and cost control.
13. **Other Simulation/ Statistical tools:** Simulation/Statistical devices are modernized apparatuses that are broadly used to help with expense assessing (PMBOK, 2000). [4]
14. **Advantage/Cost Analysis:** An investigation of the connection between the expenses of undertaking an action or task, beginning and intermittent, and the advantages liable to emerge from the changed circumstance, at first and recurrently.[3]
15. **Benchmarking:** This includes contrasting real or arranged task rehearses with those of different ventures to produce thoughts for development and to give a standard by which to quantify execution. [4]
16. **Flow-charting:** A stream outline is any graph that indicates how different components of a framework relate.
17. **Cost of Quality:** This alludes to the complete expense of all endeavours to accomplish item/administration quality and incorporates all work to guarantee conformance to necessities just as all work coming about because of non conformance to prerequisites.

### III. OBJECTIVE

- to recognize project management terminology,
- to explain roles and responsibilities for key players,
- to construct a work breakdown structure,
- to develop a technique for scheduling of task in the project.

### IV. PROBLEM STATEMENT

Projects are limited by their product quality and process quality requirements:

- Cost – mostly labour cost, but also hardware, software, training, etc.
- Calendar time (schedule)
- Requirements/objectives and/or quality
- Resources – people (skills), facilities, equipment, etc.
- In reality we can only control and manage – at most - two of these constraints

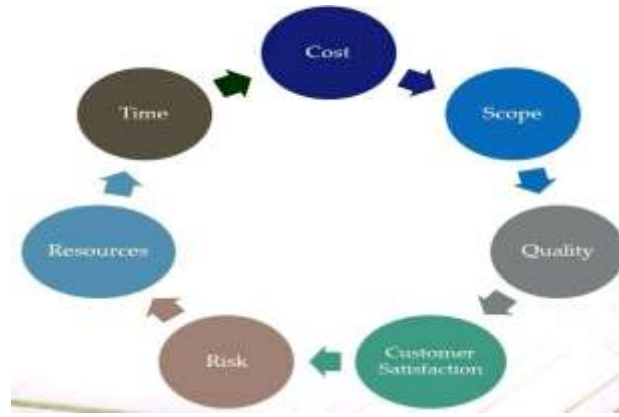


Figure 1: Project life cycle.

The proposed system considers the various segments of successful planning of the project in which the crucial task is scheduling for which we will be using the shortest job first methodology the less time taking parts will be done at earlier stages. The complete project is first divided into several tasks and then SJF is considered.

## V. LITERATURE REVIEW

According to expression of *Baldwin and Bordoli* (2014) [5], that paying little respect to the definition picked for project planning, it has the goal of accomplishing various regular variables including the creation of sensible schedules and costs, the fulfillment of a project to characterized principles of quality, project criteria, project assets, wellbeing and security, and meeting project partners' desires. As per the point of view of the investigation revealed in this proposition, project planning can be seen as a deliberate method including the total meaning of the extent of preplanning stages, the recognizable proof of critical variables influencing project planning execution and control, just as the ID of jobs and practices of project partners engaged with the improvement and usage of project planning. Liable upon the spectator or author, booking is viewed as either an essential piece of, or yield from, project planning. The motivation is a depiction of task practices recognized by the work breakdown structure (WBS), as a noteworthy part of the importance of the scope of project. Moreover, the idea of project scheduling manages the legitimate sequencing of exercises and the expansion of movement spans. Related thoughts are joined by it, for instance, resource stacking and following headway in the midst of undertaking project execution (Yang, 2007). Even more starting late, it has been battled that arranging and booking should be seen as two free, yet solidly related, practices that should not be performed at the same time work out. Baldwin and Bordoli (2014) disentangled the goal of planning and scheduling as pursues: "The major focus of organizing is to ensure that things happen successfully. This anticipates that objectives should be developed, undertaking project to be perceived and headway to be evaluated. Plan related to assignment gives the reason to assessing progress, the explanation behind ordinary review and a reviving of the course of action".

## VI. RESEARCH METHODOLOGY

The proposed work carries from decomposition of the complete project into different activities and for the better visibility and understating ability we will be using activity diagram for the representation of every activity to be followed in the project, then the selected or defined activities are considered for job scheduling using SJF technique.

To get the fruitful fulfillment of the project undertakings the arrangement is to be done more carefully, which includes various steps. In the proposed work the major focus is on the decomposition of the tasks in smaller segments and then scheduling the same in a optimized way that the work is delivered with considered parameters like cost, time, quality, etc. Following the tentative steps considered in the research proposal:

**Step 1:** Complete detailed information about the project is gathered,

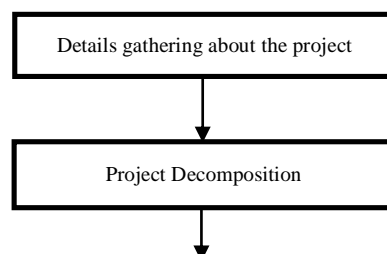
**Step 2:** The project work is then decomposed into several small tasks which can be individually considered,

**Step 3:** The tasks are represented using the activity diagram for better understanding and visibility,

**Step 4:** task scheduling is done using the SJF (Shortest Job First) technique and also the precedence of the activity is also counted like which task will results in better results when considered after a completed task,

**Step 5:** The task on the basis of time computed and precedence is matched for quality and performance and completion of every of the task is ensured,

**Step 6:** Work is integrated, evaluated and made available for client/user.



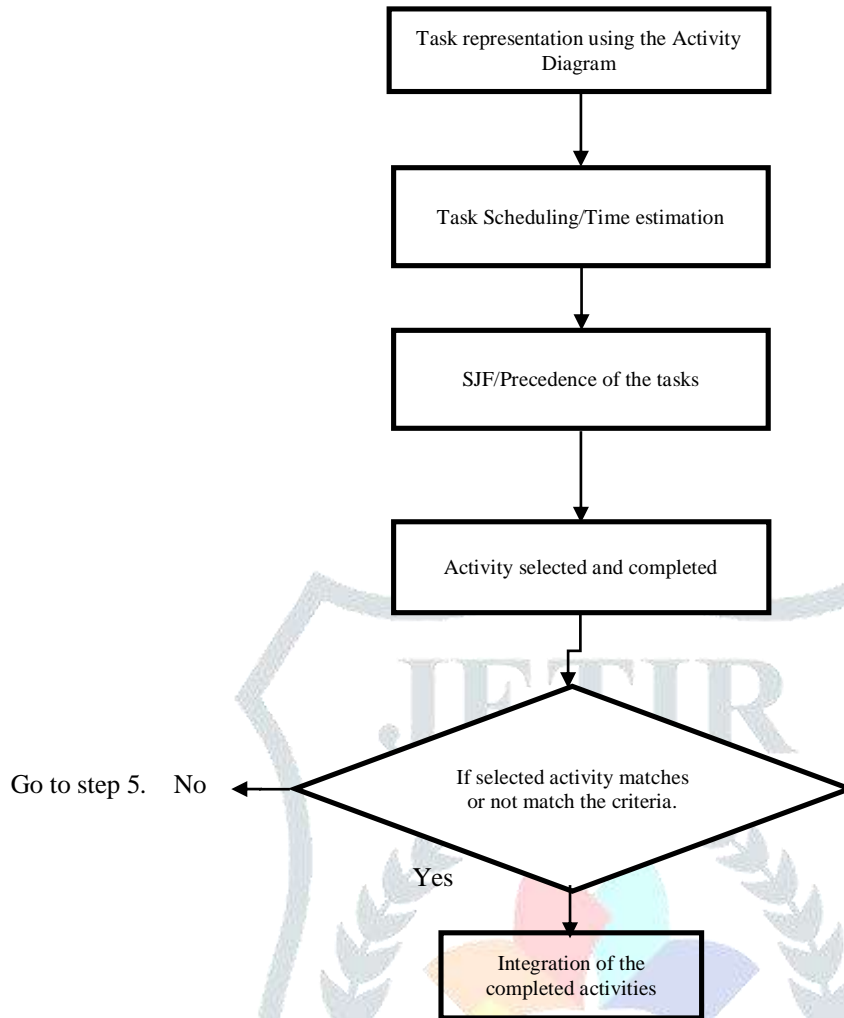


Figure 2 Proposed Architecture.

## VII. RESULT AND ANALYSIS

The scheduling of the tasks considers two different techniques as SJF(Shortest Job First) and precedence ordering of the activities, the purpose of the adding precedence with SJF is just to ensure about scheduling that the tasks are followed one after other in a segment like the completed tasks is used for the completion of other activity. SJF is a time based scheduling technique in which the time for the completion of the activity is estimated and then on the basis of the time the task is considered. Considering a simple example of a project having 5 different phases or activities when decomposed then the work will counter as under:

- A. Activity 1.
- B. Activity 2.
- C. Activity 3.
- D. Activity 4.
- E. Activity 5.

The precedence of the defined activities are considered like whether any of the activity depends on the completion of other then the precedence of the activity will be lower as compared to independent activity. Considering Activity 3 and 5 are the independent activities and for activity 1, the activity 2 is to be done first, and also the activity 4 relies on activity 2. Hence the precedence will be like first to consider activity 3 and 5, then activity 2 and then any from 1 and 4.

Below are the time estimation of the defined activities:

- Activity 1: Will take 5 weeks to complete,
- Activity 2: Will take 3 weeks to complete,
- Activity 3: Will take 7 weeks to complete,
- Activity 4: Will take 15 weeks to complete,
- Activity 5: Will take 3 weeks to complete.

**On the basis of SJF the precedence should be like:**

Activity 2 followed by Activity 5 followed by Activity1 followed by Activity 3 followed by Activity 4. After adding the precedence with estimated time the order will be as under:

Table 1 Showing the precedence ordering of activities.

Activity order	Activity Number	Precedence	Estimated time in weeks
1.	Activity 2	High	3
2.	Activity 5	Normal	3
3.	Activity 1	High	5
4.	Activity 3	Normal	7
5.	Activity 4	Normal	15

Table 1. Shows the order of activity completion where for the task scheduling the SJF and the precedence ordering is being considered which results is proper utilization of the resources and tools. In the proposed methodology for the scheduling the time to complete the task is estimated with available techniques and then the same is merged with the precedence order of the tasks where the precedence is decided on the basis of the independency of the task and inter-relatability of the activity.

**Types of Task Reliance**

- FS: At the time A ending, B might begin
- FF: At the time A ending, B might end
- SS: At the time A begin, B might initiate
- SF: At the time A begin, B might end

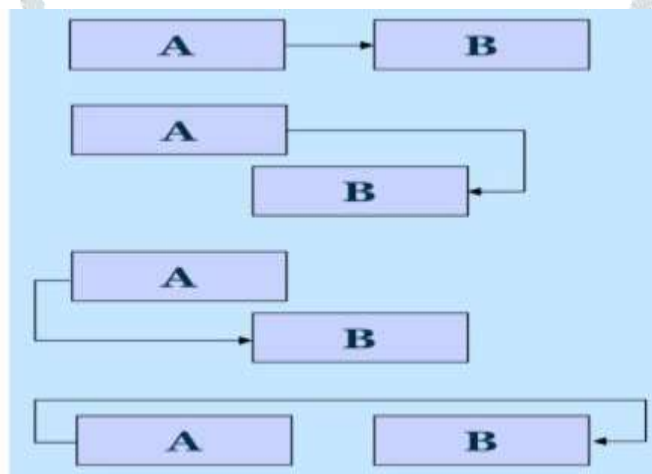


Figure 3 Dependencies of the activities.

For the analysis the descriptive study is being considered where we will be considering many of the categories and parameters for the evaluation of the work.

Table 2 Evaluation of the proposed methodology.

Factors	Traditional methods	Proposed Methodology
Visibility of activities	Not available	Available
Ordering/scheduling	Not available	Available
Time/Effort Estimation	Partially eeconsidered	Available
Resources/tools/technique s estimation	Partially considered	Available

Table 3 Study on the basis of time, cost, resources and other related factors.

Parameters	Traditional methods	Proposed Methodology
Time	Always Exceeds	On time

Cost	Overrun	In decided budget
Manpower	No proper utilization	Less required
Tools/techniques	Not used efficiently	Maximum utilization
Information channel	Not proper	Good
Expert Judgment	No	Considered
Project decomposition	Not considered	Specialized technique is being used.
Scheduling	Random	Specialized technique is being used.

Table 4 Work related reliability analysis.

Parameters	Traditional methods	Proposed Methodology
Level of Awareness of Project Management Planning scheduling	NA	High
Level of Utilization of Project Management Planning scheduling	NA	High
Level of Success of Project Management Planning scheduling	NA	High

Table 5 Verification of research methodology based upon certain parameters.

Parameters	Traditional methods	Proposed Methodology
goals and tasks integration, i.e. an overall view on the project considering all possible activities within it	No	Critically made
managing tasks that practically means an ability to delegate tasks and set patterns of their realization	No	Available
interpersonal communication and decision making	No	Maintained
project costs management	No	Done using the task scheduling
risk assessment of project realization	No	Considered partially

### VIII. CONCLUSION

Task supervisor in projects is mainly worried from the earliest starting point of the undertaking project to manage numerous logbooks, due dates, spans, and deferral. Toward the end he/she needs to discover a benchmark utilized as alert that dependably gives a reasonable sign whether the undertaking's destinations still can be met or can't. Time administration begins with the imperatives of the item plan, the project venture span and timetable, the asset logbooks, just as the exercises and their evaluated length. Chronicled data with respect to time the board plans is a significant resource for the association that executes its target by undertaking project. Procedures, arrangements, formats, WBS, exercise learned, gauges and contracts assume a significant job in building up the development of these kinds of associations.

In the work done the things like proper utilization of the resources, time frame is being considered as the major concern for which the proposed methodology focuses on the scheduling of the tasks. For better scheduling better decomposition is needed means structure break down so that the work is properly divided into small activities and also better visibility and understand ability of the activities are required. For better readability in proposed methodology activity diagram is used for the representation of the activities. When the scheduling is considered the technique used is the merger of two well proven and used techniques as SJF and precedence ordering where the estimated cost is the matter of consideration and also the precedence order of the tasks is of consideration.

If the one in all about the methodology is being considered then the work provides better visibility of the activities and efficient scheduling of the activities which actually makes the difference for the successful completion of the project.

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