Project Evaluation and Review Technique (PERT)

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The Project Evaluation and Review Technique (PERT) is a project management tool used to represent and analyze the tasks involved in completing a project. It helps in scheduling, organizing, and coordinating project activities, offering a blueprint for effective management and control. PERT emphasizes the proper sequencing and timing of tasks.

In PERT, a visual representation called the **PERT Chart** is used. This chart maps out all tasks and their dependencies, similar in structure to the Work Breakdown Structure (WBS).

What is a PERT Chart?

A PERT chart is a graphical project management tool that outlines the sequence and duration of project activities. It helps identify the **critical path**—the sequence of dependent tasks that determine the shortest time to complete the project. The chart supports planning by highlighting dependencies, time estimates, and key milestones.

Components of a PERT Chart:

- **Nodes:** Represent tasks or milestones, often labeled with task names and durations.
- **Arrows:** Indicate task sequence and dependencies. An arrow from Task A to Task B means Task A must be completed before Task B.
- **Time Estimation:** Estimates how long each task will take.
- **Critical Path:** The longest path through the network, determining the shortest project duration.
- **Milestones:** Key events or deadlines in the project timeline.

How a PERT Chart Works:

PERT charts break down projects into tasks, showing their sequence and dependencies. Each task is represented by a node, and arrows connect dependent tasks. By analyzing the network, teams can find the critical path and make informed decisions to ensure timely project delivery.

Steps to Create a PERT Chart:

1. **Identify Project Tasks:**
   - List all the required tasks to complete the project.
   - Break down the overall objective into smaller, manageable actions.

2. **Define Task Dependencies:**
   - Determine which tasks rely on the completion of others.

- Establish a logical task sequence.

3. **Estimate Timelines:**

   - For each task, estimate optimistic (O), most likely (M), and pessimistic (P) durations.

   - Calculate Expected Time (TE): TE = (O + 4M + P)/6.

4. **Calculate the Critical Path:**

   - Identify the longest sequence of dependent tasks that affects the overall project timeline.

5. **Manage Task Progress:**

   - Monitor progress, adjust schedules as needed, and ensure timely completion of critical tasks.

PERT Chart vs Gantt Chart:

Feature	PERT Chart	Gantt Chart
Purpose	Visualize task sequence & dependencies	Schedule tasks over time
Focus	Task relationships and order	Task duration and timelines
Representation	Network diagram	Horizontal bar chart
Time Estimation	Probabilistic (O, M, P)	Fixed start and end dates
Complexity	More complex, better for large projects	Simpler, more readable
Flexibility	Highly adaptable	Less flexible
Best Use	R&D projects	Construction or production

PERT vs CPM:

Aspect	PERT	CPM
Full Form	Project Evaluation and Review Technique	Critical Path Method
Definition	Manages uncertain activities	Manages known, time-bound activities
Orientation	Event-oriented	Activity-oriented
Model Type	Probabilistic	Deterministic
Focus	Time estimation and scheduling	Time-cost optimization
Precision	High accuracy	Reasonable accuracy
Job Nature	Non-repetitive	Repetitive
Crashing	Not applicable	Applicable
Dummy Activities	Not used	Used
Suitability	Research and development projects	Construction and engineering

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Characteristics of PERT:
- Facilitates informed decision-making.

- Provides a planning foundation.

- Aids in optimal resource utilization.

- Uses network-based time analysis.

- Helps in reporting and progress tracking.

- Identifies critical path activities.

- Estimates project completion probabilities.

- Visualizes task dependencies and timelines.

Advantages:

- Offers realistic completion time estimates.

- Highlights slack time in activities.

- Identifies start and end dates.

- Clearly shows critical path tasks.

- Simplifies complex data into diagrams.

Disadvantages:

- Can be complex to implement.

- Time estimates are subjective.

- Maintenance is costly and difficult.

- Real-world activity duration may differ from assumptions.

- May underestimate total project duration due to overlooked alternate paths.

Conclusion:

PERT is a valuable tool for managing complex projects by clarifying task sequences, identifying dependencies, and forecasting project completion. It enhances planning, scheduling, and resource allocation, increasing the likelihood of on-time and successful project delivery.

https://www.geeksforgeeks.org/software-engineering-critical-path-method/

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