

27.12: Scheduling Tools

Learning Objectives

- Differentiate between Gantt charts, PERT, and the critical path method



As you might expect, operations managers find that complex processes involve complex planning and scheduling. Consider the Izmailovo Hotel in Moscow shown in the photograph at the right. Built to house athletes during the 1980 Olympics, the complex has 7,500 guest rooms and is one of the largest hotels in the world. Think about cleaning all those rooms—in four thirty-story-high towers—or checking in the thousands of guests. No small operation! Although the Izmailovo doesn't produce a tangible good, it relies on many of the same operations management principles used in manufacturing to stay in business. To increase operational efficiency in complex processes like those of running a giant hotel, operations managers use three common planning tools: Gantt charts, PERT, and the critical path method (CPM).

Gantt Charts

A Gantt chart is a timeline. Multiple projects can be added to the timeline with start and finish dates, and milestones and deadlines are also reflected. This chart is used to determine how long a project will take, the resources needed, and the order in which tasks need to be completed.



Let's look at a Gantt chart for producing a birdhouse. Suppose the following activities are required to build and package each birdhouse:

1. Determine which birdhouse the customer has ordered
2. Trace pattern onto wood
3. Cut the pieces of wood from the birdhouse pattern
4. Assemble the pieces into a birdhouse
5. Paint birdhouse
6. Attach decorations to the birdhouse
7. Prepare customer invoice
8. Prepare packing and shipping label
9. Pack birdhouse into shipping carton
10. Deliver carton to shipping department

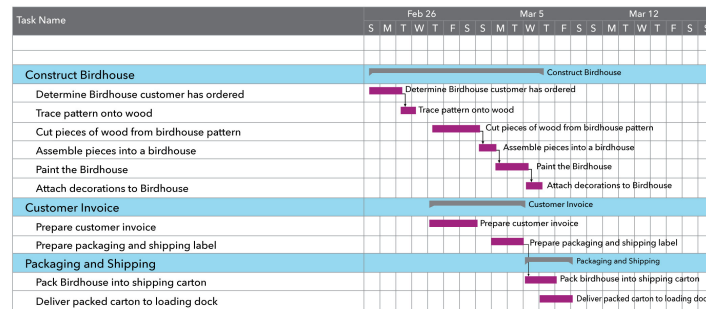


Figure 27.12.1: Gantt chart

Above is the corresponding Gantt chart: As you can see, the tasks on the list are displayed against time. On the left of the chart are all the tasks, and along the top is the time scale. A bar represents each work task; the position and length of the bar indicate the start date, duration, and end date of the task. At a glance, we can determine the following:

- What the various activities are
- When each activity begins and ends
- How long each activity lasts
- Where activities overlap with other ones, and by how much
- The start and end date of the whole project

Critical Path Method (CPM)

In the critical path method (CPM), the manager identifies all of the activities required to complete the project, the relationships between these activities, and the order in which they need to be completed. Then, the manager develops a diagram that uses arrows to show how the tasks are dependent on each other. The longest path through these linked activities is called the critical path. If the tasks on the critical path are not completed on time, the entire project will fall behind schedule.

To better understand how CPM works, look at Figure 2, which shows a CPM diagram for constructing a house. All of the tasks required to finish the house and an estimated time for each have been identified. The arrows indicate the links between the various steps and their required sequence. As you can see, most of the jobs to be done can't be started until the house's foundation and frame are completed. It will take five days to finish the foundation and another seven days to erect the house frame.

The activities linked by the solid arrows form the critical path for this project. It tells us that the fastest possible time the house can be built is 41 days, the total time needed for all of the critical path tasks. The noncritical path jobs, those connected with dashed arrows, can be delayed a bit or done early. Short delays in installing appliances or roofing won't delay construction of the house because these activities don't lie on the critical path.

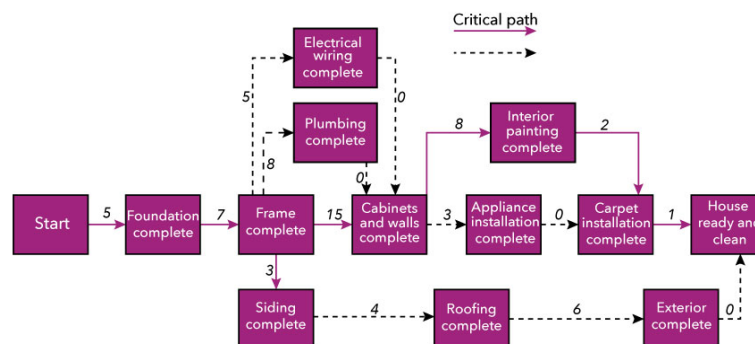


Figure 27.12.1: A CPM Network for Building a House (Attribution: Copyright Rice University, OpenStax, Modification by Lumen Learning; CC BY 4.0 license.)

PERT

Like CPM, the **program evaluation and review technique (PERT)** helps managers identify critical tasks and assess how delays in certain activities will affect operations or production. In both methods, managers use diagrams to see how operations and production will flow. PERT differs from CPM in one important respect. CPM assumes that the amount of time needed to finish a task is known with certainty; therefore, the CPM diagram shows only one number for the time needed to complete each activity. In contrast, PERT assigns three time estimates for each activity: an optimistic time for completion, the most probable time, and a pessimistic time. These estimates allow managers to anticipate delays and potential problems and schedule accordingly.

? Practice Question

<https://assessments.lumenlearning.co...essments/14465>

Did you know...?

PERT was developed by the U.S. Navy. The Navy's Special Projects Office devised this statistical technique for measuring and forecasting progress while they were designing the Polaris-Submarine weapon system and the Fleet Ballistic Missile capability.

CPM was first used for major skyscraper development in 1966 for the construction of the former World Trade Center Twin Towers in New York City.^[1]

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1. Kerzner, Harold (2003). Project Management: A Systems Approach to Planning, Scheduling, and Controlling (8th ed.) ↵

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