

Project Feasibility Study

ALLOCATING RESOURCES TO THE PROJECT

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PMG201

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Lecture 9



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OVERVIEW

- **Expediting a Project.**
- **Resource Loading.**
- **Resource Leveling.**
- **Allocating Scarce Resources to Projects.**
- **Allocating Scarce Resources to Several Projects.**
- **Goldratt's Critical Chain.**

ALLOCATING RESOURCES TO THE PROJECT

Projects compete with each other for the same resources in two different ways.

The problem here is which project gets to use the resource first and which must wait.

The project that must wait may suffer a schedule delay that makes it late. Just as **projects** may compete for resources, different **activities** of the same project may compete. Two or more concurrent activities **الأنشطة المتزامنة** might require the same personnel, or equipment, or even work space. **One activity will be given priority, and the other(s) must wait.**



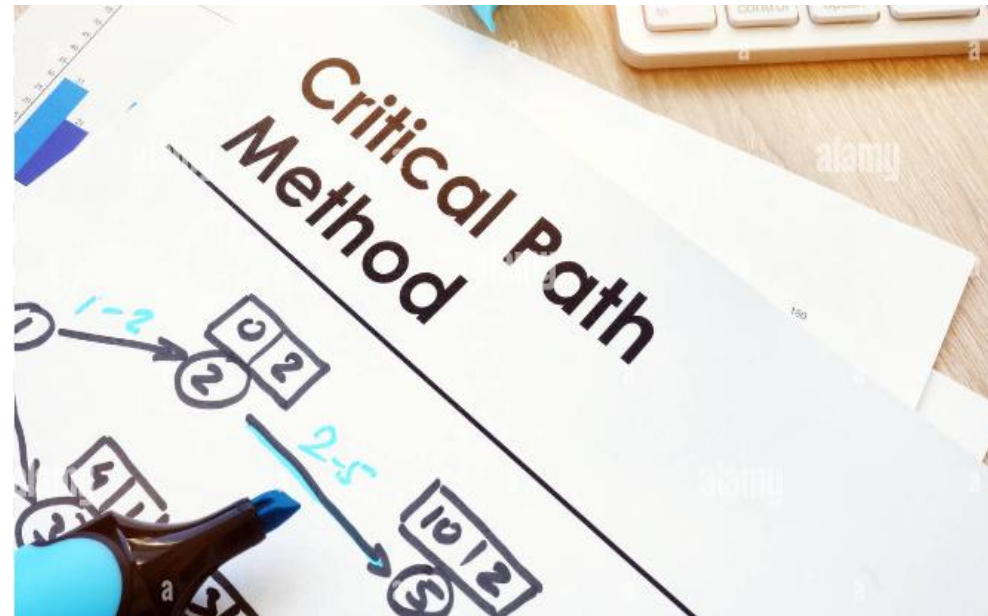
1. Expediting a Project

When **task durations are estimated**, an assumption is made that **task resources are set at “normal” levels**. This is the “standard practice” assumption. Traditionally, **CPM project duration estimates also include a “crash” estimate together with estimates of the crash time and the resources required to shorten the duration of project activities**. By selectively choosing which activities to crash and by how much, **we can determine the minimum cost for all possible project completion times**.



The Critical Path Method

In traditional PERT/CPM, the rules of “standard practice” apply and the normal task duration estimate is made with the normal or standard - practice resource usage. Then a second estimate, referred to as the crash duration, is made based on the resources required to expedite the task.



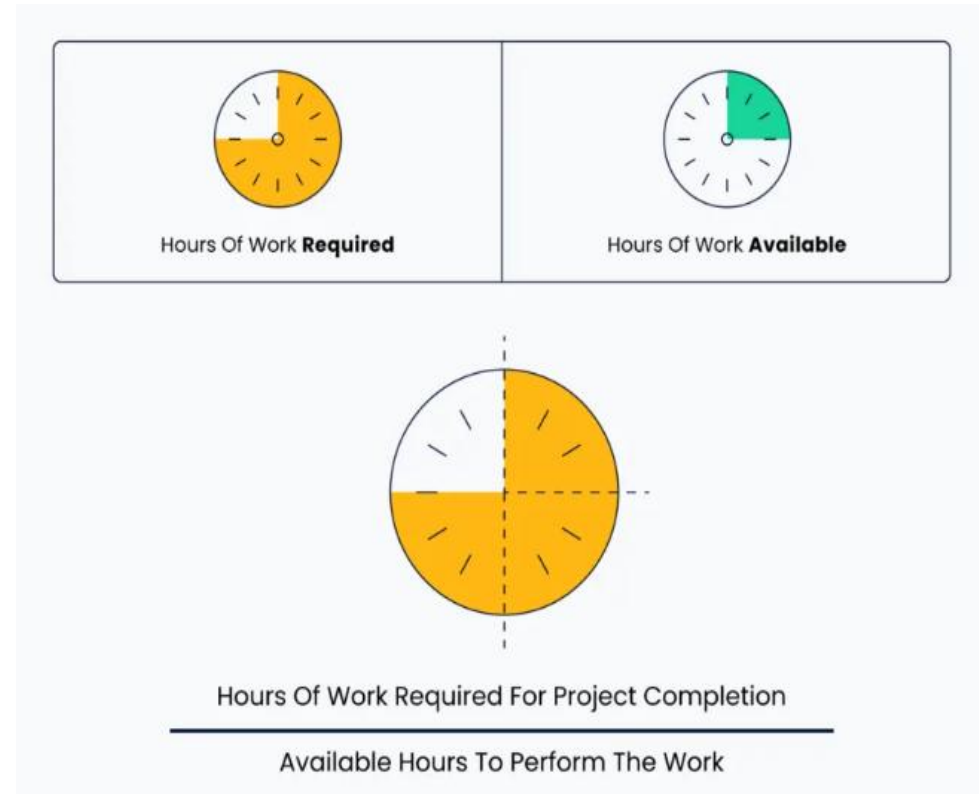
Fast - Tracking a Project

In addition to crashing a project in order to expedite it, تسريع المشروع a project can use **fast-tracking** which involves executing activities at the same time rather than sequentially. This is called performing in **parallel**. Unlike one activity following the other as most projects are done, **fast-tracking** doesn't wait for one activity to end before another begins. Some activities are dependent **on others** and cannot start or stop until another starts or stops. Fast-tracking in project management will only work if all the activities are able to overlap with one another. تتداخل مع بعضها البعض However, if project activities don't overlap then fast-tracking is a viable alternative, as it usually doesn't add any extra costs.



2. Resource Loading

From the first day on the job, the PM is concerned with resource loading . Resource loading refers to the amounts of specific resources that are scheduled for use on specific activities or projects at specific times. It usually takes the form of a list or table.



Resource Loading

Resource loading is usually displayed as **a list** of the amounts of specific resources assigned for use on specific project activities at specific times, or as a **graph showing** the level of a resource's capacity required against the project calendar. To be useful for scheduling, the resource must have a calendar showing the resource's availability.



Resource Loading

The calendar should include hours — and days — worked each week, any holidays on which the resource will not be available, and any other information affecting the availability of the resource.

Resource cost per unit of usage should be included on the calendar, plus any additional cost for overtime or over use.

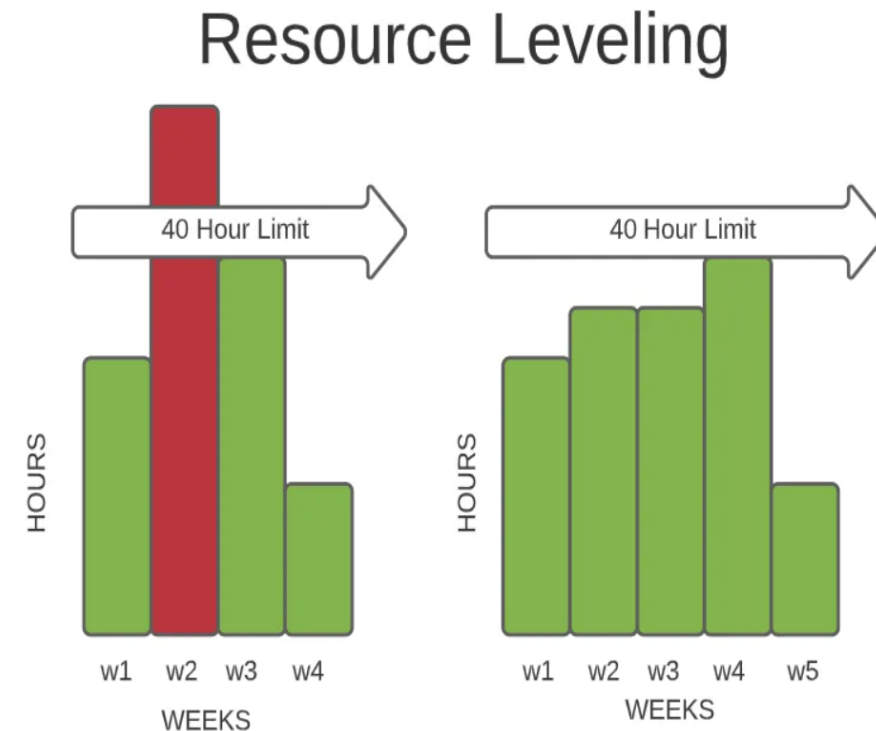
Overscheduling a resource may cause serious problems for the PM.



3. Resource Leveling

A technique in which start and finish dates are adjusted based on resource constraints with the goal of balancing the demand for resources with the available supply. Resource leveling can be used when shared or critically required resources are available only at certain times or in limited quantities, or are over-allocated, such as when a resource has been assigned to two or more activities during the same time, or there is a need to keep resource usage at a constant ثابت level.

PMBOK 6.5.2.3

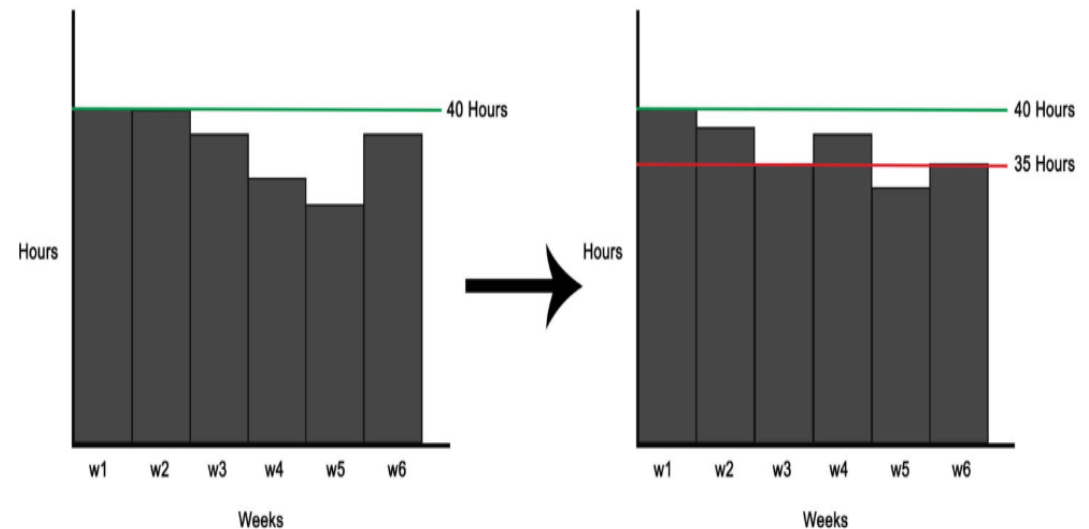


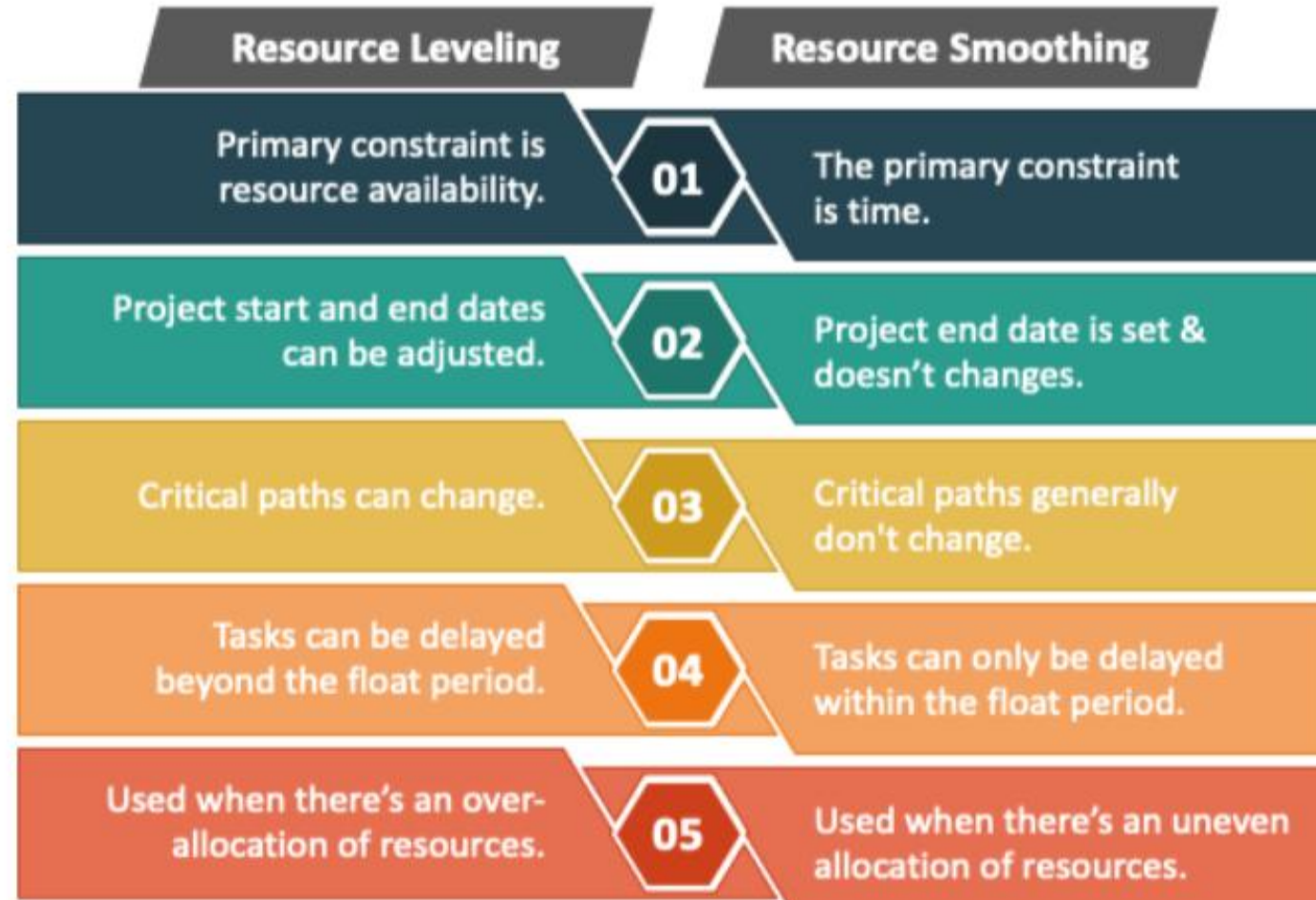
Resource Leveling

These techniques keep resources from being **overstretched** **ارهاق** while ensuring that projects have everything they need to succeed. **This strategy helps the team maintain a healthy work-life balance.**

Here are a few reasons why resource optimization **المستوى الأمثل** can help your project and team.

- To make the most out of your resources.
- To keep deficits to a minimum.
- To avoid task overloads among team members.
- To ascertain **يتيقن** that project out is of high-quality.





4. Allocating Scarce Resources to Projects

Most solutions start with the **PERT/CPM schedule**. Given this initial solution, **each activity is examined period by period and resource by resource**. If the demand for a resource exceeds its supply, the software considers the tasks one by one and assigns resources to the tasks according to some priority rule chosen by the PM. Tasks that receive resources under this rule proceed as originally scheduled.



Allocating Scarce Resources to Projects

Tasks that do not get resources are delayed until ongoing tasks are completed and the required resources are freed - up for use. No matter what priority rule is used, the project's technology always takes precedence.



Some Comments about Constrained Resources

Every time a project falls behind schedule, the PM is apt to plead for more resources. In spite of the PM ' s complaints about the scarcity of resources, serious cases of resource scarcity rarely apply to resources in general, but rather to one or two very specific resources.



Some Comments about Constrained Resources

As soon as possible — This is the standard rule in scheduling. Activities are scheduled to start on their **ESTs**, earliest start times and resources are made available with that in mind.

As late as possible — With this rule, resources are made available so that activities start on their **LSTs** latest start time. whenever possible without increasing the project ' s duration. This may seem irrational, but it preserves the firm ' s resources and delays cash outflows as long as possible. يوفر التدفقات النقدية الخارجة لأطول فترة ممكنة



Some Comments about Constrained Resources

Shortest task duration first

Shorter tasks are given priority over longer tasks. This rule maximizes the number of tasks that can be completed by a system in a given time period.

Minimum slack first

When two or more tasks compete with each other, one should choose the task with minimum total slack. This rule usually minimizes the number of late activities.



Some Comments about Constrained Resources

Most critical followers

The number of successors on the critical path(s) for each activity is counted. **Activities with a higher number of critical successors take precedence.** The rationale here is that such activities would cause the greatest damage to the desired project schedule if they are late.

Most successors

The same as the previous rule except that all successors are counted. This rule has the same rationale as the preceding rule.



Some Comments about Constrained Resources

Most resources first

The greater the use of a specific resource on a task, the higher the task's priority for the resource. This rule is based on the assumption that **more important activities have a greater demand for scarce resources.**



5. Allocating Scarce Resources to Several Projects

Pseudo activities, الأنشطة الزائفة

- Used to link several project together
- Have **duration** but do not require any resources.

This approach allows a set of projects to be dealt with as though it were a single project.

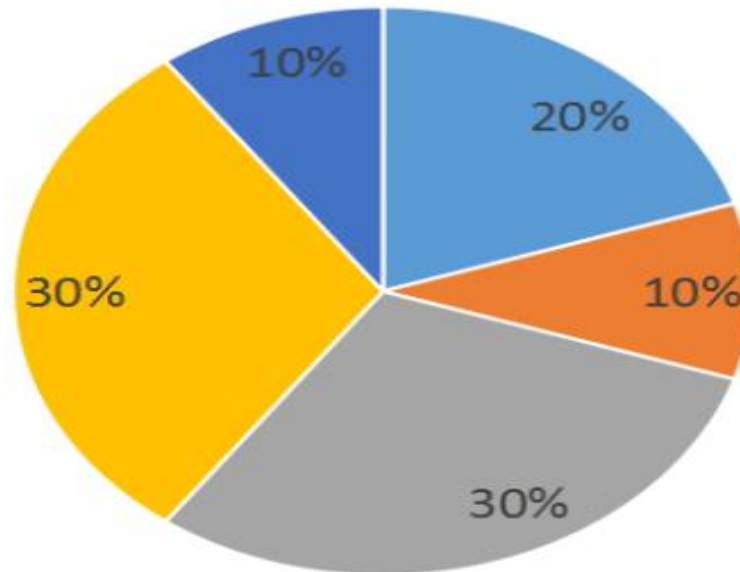
Allocating scarce resources among multiple projects is more complicated than the single project case, but is not different in its basic logic. The several projects are linked with pseudoactivities and treated as if they were the individual activities of a single project..



Resource Allocation and the Project Life Cycle

- Once the most urgent cases (as measured by the priority rule) have been given resources, the next most urgent cases receive their resources. The process continues until there are no more activities.
- The less urgent activities become more urgent as period after period passes until they rise far enough up the priority rank list and receive their resources.

Resource Allocation



Goldratt's Critical Chain

To begin our discussion of Goldratt's approach, imagine for the moment that you are sitting in a room full of people with extensive experience as both project team members and project managers. Now imagine the responses you would hear if the group were asked the question: "What are the things annoyed you most about the projects you have been involved with?" Typical of the responses that we have gotten to that question are:



Goldratt's Critical Chain

- Project due dates are too often unrealistic.
- There are too many changes made in the project's scope.
- Key resources and data are often unavailable when needed.
- The budget is frequently unrealistic and therefore often exceeded.
- It seems like my project is always in competition for resources with other projects.



Goldratt's Critical Chain

The critical chain concept identifies the facts that activity times are unknown and independent, that workers will inflate their time estimates to protect themselves, early completion tasks will not be reported, the work will expand to fill the time, tasks will not be started until the last minute, multitasking will be misapplied, resource demands will be uneven متفاوتة and result in task delays, and more projects and tasks will be undertaken to increase resource utilization.



Goldratt's Critical Chain

All these contribute to project delays and inefficiencies. To correct these problems, a project buffer مخزن المؤقت is added at the end of a project, the release of projects and tasks is based on the availability of bottleneck resources, من موارد عنق الزجاجة, and time buffers are added to resources that feed bottleneck resources.



Critical Chain Method Vs Critical Path Method in Project Management

The terms 'Critical chain method' and 'Critical path method' are often used interchangeably. However, they are different and imply distinct meanings.

Critical path method	Critical chain method
• Determine the sequence of tasks that would take the most time to be completed. • Keep a check on whether tasks are completed within the set timeline to determine project health.	• Keep buffers مخازن مؤقتة for both task dependencies and resource requirements. • Integrate project, resource, and feeding buffers in the project workflow. • Keep a check on how quickly the different buffers are being utilized to determine project health.

Benefits of Critical Chain Project Management

- Deliver projects faster
- Utilize resources optimally
- Tackle inefficiencies head-on
- Prevent mismanagement of floats
- Stay within defined project scope and budget
- Increase team productivity



7 Steps to Implement Critical Chain Method in Project Management

1. Identify the Critical Path

This step forms the foundation of your critical chain project management process. In this, you identify the sequence of tasks that will take the longest to complete.

2. Identify Resource Constraints

Once you have listed down the tasks, next you must start allocating resources. While allocating resources, consider any restraints that may come to mind.



3. Set up Task Due Dates of a Later Date

This practice will help you create a schedule that gives adequate time to each task. This way, you can ensure that each task is given sufficient time, eliminating haphazard and rushed task execution.

4. Insert Buffers

Inserting buffers is one of the most crucial steps. The right placement of these buffers in the critical chain can make or break the entire project.



5. Create a Detailed Project Model

Creating a detailed project model is the next step for a sure-shot project execution plan.

A project model includes task time estimates, its description, the assigned resources, and the due dates.

6. Eliminate Multitasking

Multi-tasking is often glorified to dictate better outcomes in less time. However, it is not always reliable and productive.

7. Oversee and Evaluate the Project

Merely setting up the project workflow is not enough, it is imperative to keep a close eye on how the tasks are moving forward, step by step.





Thank You