Project Planning & Control

Time-Cost Trade-off (Crashing)

Week 5

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Lesson 1
Fast-Tracking vs. Crashing, Relationship between Activity Direct Cost & Activity Duration - Assumptions

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Learning Objectives

• Fast-tracking vs Crashing

• Relationship between activity direct cost & activity duration – Assumptions

• Procedure for finding minimum direct cost for crashed project durations

• Influence of indirect cost and relationship between total cost and project duration
Consider the ABCD Project

Current duration : 14 days

Expected duration : 10 days

How can it be done ?

<table>
<thead>
<tr>
<th>Activity</th>
<th>Duration</th>
<th>Predecessor</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td>B</td>
<td>4</td>
<td>A</td>
</tr>
<tr>
<td>C</td>
<td>6</td>
<td>A</td>
</tr>
<tr>
<td>D</td>
<td>3</td>
<td>B, C</td>
</tr>
</tbody>
</table>
Reducing Project Duration

• **Fast-Tracking**
  – Preforming *activities in parallel* in order to reduce project duration

• **Crashing**
  – *Reducing duration* of activities in order to reduce project duration

Change of execution sequence or duration will have cost implication.

*Time-Cost Trade-Off analysis is used to find the minimum overall project cost for a specified project duration*

Focus is on Crashing
Terminology

CRASHING
Reducing activity time by expending additional resources

Normal Duration
Normal activity duration

Crash Duration
Minimum duration

Normal Cost
Cost of completing activity in normal duration

Crash Cost
Cost of completing activity in minimum duration
Activity Duration Reduction

• Construction Method Selection

• Alternate Construction Materials

• Working Multiple Shifts

• Overtime work (Late hours or Weekends)

• Bringing in Higher Capacity Equipment

• Additional Workers or Equipment

Reducing duration will require additional expenditure
Activity: Time vs Cost - Relationship

Cost Slope = \frac{\text{cost}}{\text{time}} = \frac{(\text{Crash cost} - \text{Normal cost})}{(\text{Normal time} - \text{Crash time})}

- Linear - Assumption
- Piecewise Linear - Assumption
- Actual Relationship