

production management مدیریت عملیات

Project Management

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Projects

	JAN	FEB	MAR	APR	MAY	JUN
Build A	▲	▼				
A Done		●				
Build B		●	◆			
B Done			◆			
Build C			◆	◆		
C Done				■		
Build D				■	■	
Ship						★ (On time!)

Unique, one-time operations designed to accomplish a specific set of objectives in a limited time frame.

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Project Manager

Responsible for:

✓ Work	✓ Quality
✓ Human Resources	✓ Time
✓ Communications	✓ Costs



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Project Management Skills

- Ability to motivate and direct team members.
- Make trade-off decisions.
- Expedite the work when necessary.
- Put out fires.
- Monitor time, budget, and technical details.
- Strong leadership skills.
- Function in an environment that is beset with uncertainties.
- Persuasion and cooperation of others to realize project goals.
- Maintain ethical behavior.
- Work with *project champions*, people, usually within the company, who promote and support the project.

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Ethical Issues

- Temptation to understate costs
- Withhold information
- Alter or mislead status reports
- Falsify records
- Compromise workers' safety
- Approve substandard work

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Project Life Cycle

Concept

Feasibility

Planning

Execution

Termination

Management

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Project Risk

- Risk: occurrence of events that have undesirable consequences
 - Delays
 - Increased costs
 - Inability to meet specifications
 - Project termination

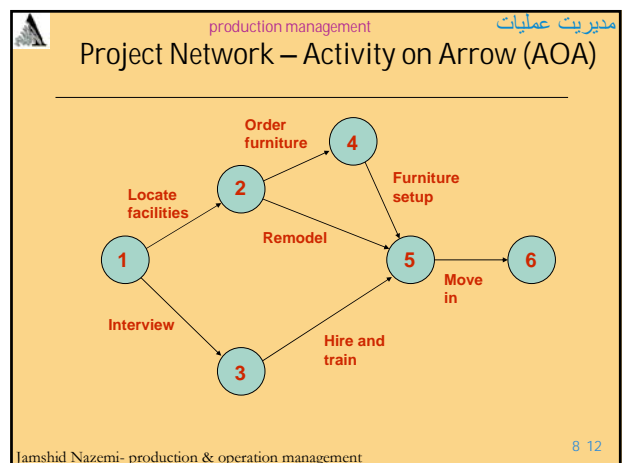
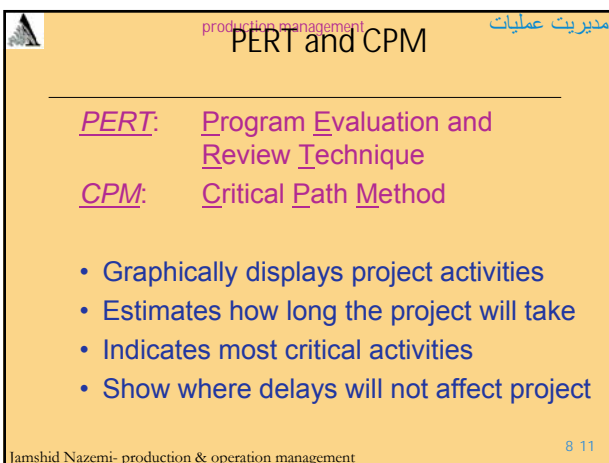
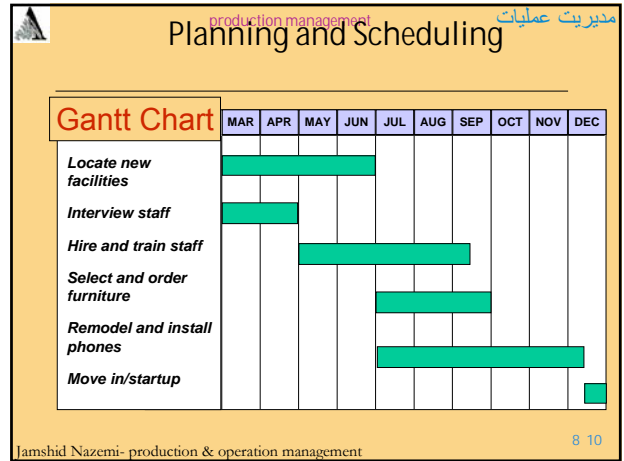
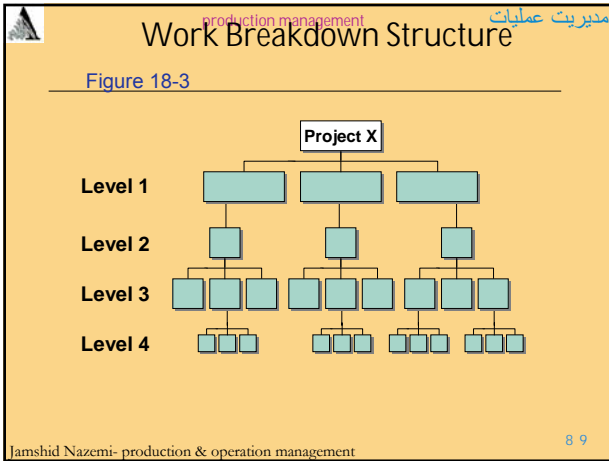
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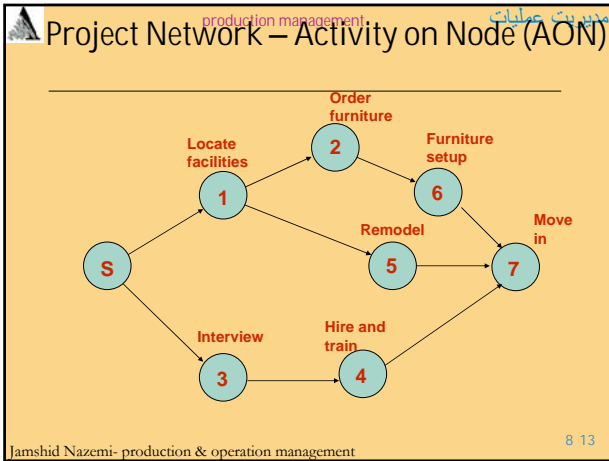
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Risk Management

- Identify potential risks
- Analyze and assess risks
- Work to minimize occurrence of risk
- Establish contingency plans

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- ### Project Network
- **Path:** A sequence of activities that leads from the starting node to the ending node.
 - **Critical path:** The path with the longest activity time.
 - **Slack:** The difference between the length of a given path and the length of the critical path.
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- ### Project Network Time Estimation
- **Network activities**
 - ES: early start
 - EF: early finish
 - LS: late start
 - LF: late finish
 - **Used to determine**
 - Expected project duration
 - Slack time
 - Critical path
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- ### Project Network Time Estimation
- **ES and EF Computation:**
 - $EF = ES + t$
 - ES for activities leaving nodes with multiple entering arrows is equal to the largest EF of the entering arrow.
 - **LS and LF Computation:**
 - $LS = LF - t$
 - For nodes with multiple leaving arrows, LF for arrows entering that node is equal to the smallest LS of the leaving arrow.
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Project Network Slack Time

- The slack time can be computed in either of two ways:

$$\text{Slack} = \text{LS} - \text{ES} \text{ or } \text{LF} - \text{EF}$$

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Example 1

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Example 1: Path Length, CP, Slack Time

Critical Path

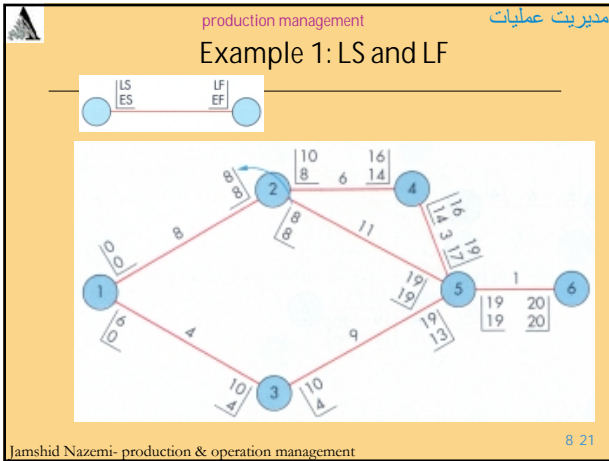
Path	Length (weeks)	Slack
1-2-4-5-6	18	2
1-2-5-6	20	0
1-3-5-6	14	6

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Example 1: ES and EF

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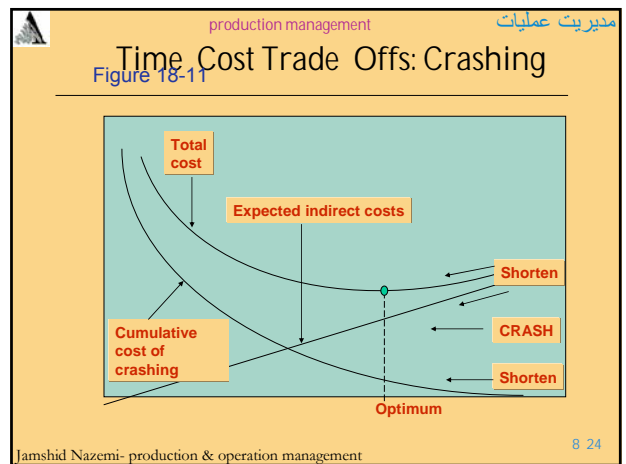
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Example 1: Activity Slack Time

Activity	LS	ES	(LE-ES)	Slack
1-2	0	0		0
1-3	6	0		6
2-4	10	8		2
2-5	8	8		0
3-5	10	4		6
4-5	16	14		2
5-6	19	19		0

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- ### Time Cost Trade Offs: Crashing
- To avoid late penalties,
 - To take advantage of monetary incentives for timely or early completion of a project,
 - To free resources for use on other projects,
 - To beat the competition to the market, or
 - To reduce the indirect costs associated with running the project.
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Example 2: Project Network

```

    graph LR
      N1(( )) -- a (6) --> N2(( ))
      N2 -- b (10) --> N4(( ))
      N1 -- c (5) --> N3(( ))
      N3 -- d (4) --> N4
      N3 -- e (9) --> N5(( ))
      N4 -- f (2) --> N5
  
```

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Example 2: Crashing Cost

Activity	Normal Time	Crash Time	Cost per Day to Crash
a	6	6	—
b	10	8	\$500
c	5	4	300
d	4	1	700
e	9	7	600
f	2	1	800

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Example 2: Path Length and CP

a. Determine which activities are on the critical path, its length, and the length of the other path:

Path	Length
a-b-f	18
c-d-e-f	20 (critical path)

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Example 2: CP Activity Slacks

b. Rank the critical path activities in order of lowest crashing cost, and determine the number of days each can be crashed.

Activity	Cost per Day to Crash	Available Days
c	\$300	1
e	600	2
d	700	3
f	800	1

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Example 2: Crashing

Path	LENGTH AFTER CRASHING <i>n</i> DAYS:			
	<i>n</i> = 0	1	2	3
a-b-f	18	18	18	17
c-d-e-f	20	19	18	17
Activity crashed		c	e	f
Cost		\$300	\$600	\$800

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Advantages of PERT

- Forces managers to organize
- Provides graphic display of activities
- Identifies
 - Critical activities
 - Slack activities

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Limitations of PERT

- Important activities may be omitted
- Precedence relationships may not be correct
- Estimates may include a fudge factor

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Advantages of PM Software

- Imposes a methodology
- Provides logical planning structure
- Enhances team communication
- Flag constraint violations
- Automatic report formats
- Multiple levels of reports
- Enables what-if scenarios
- Generates various chart types

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PM Software Technology

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- Computer aided design (CAD)
- Groupware (Lotus Notes)
- Project management software
 - CA Super Project
 - Harvard Total Manager
 - MS Project
 - Sure Track Project Manager
 - Time Line