

Project Management

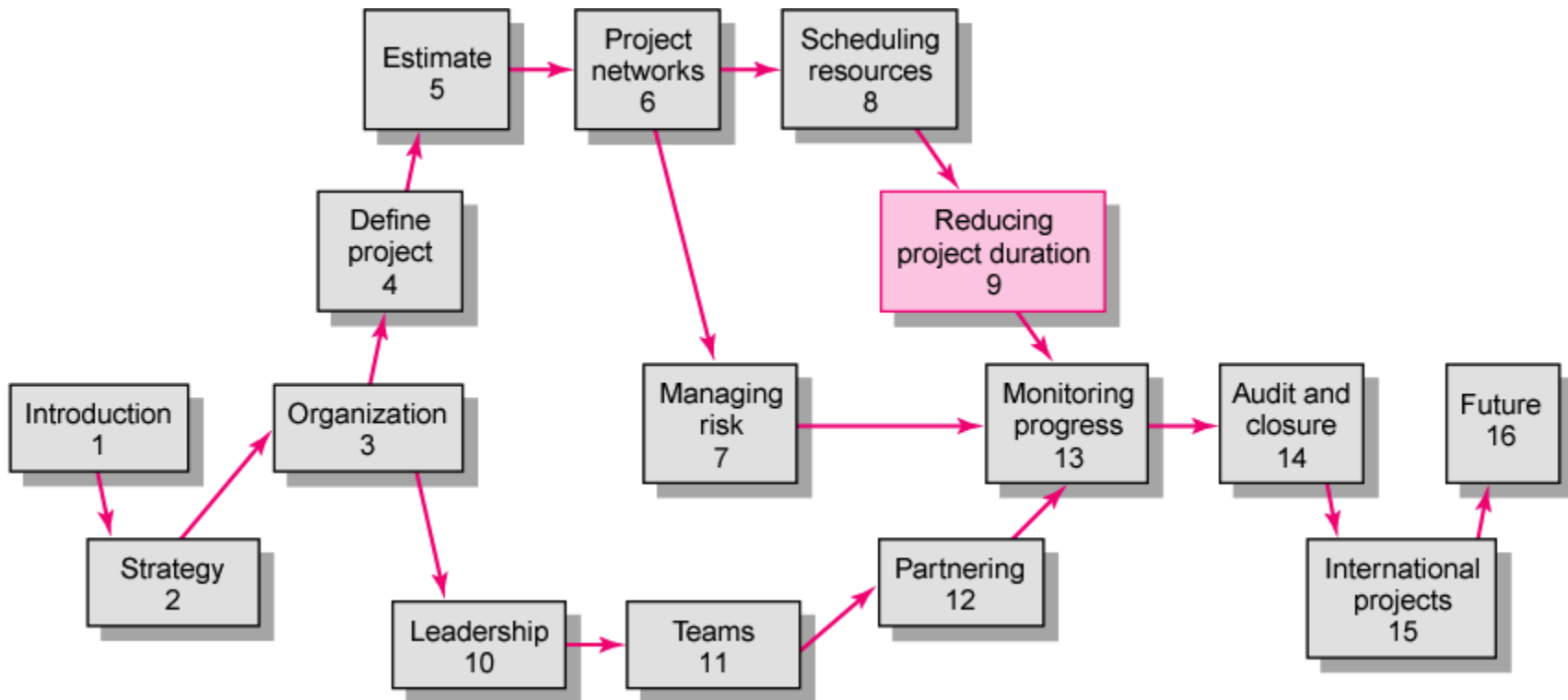
THE MANAGERIAL PROCESS

Clifford F. Gray
Eric W. Larson
Third Edition



Chapter 9

Reducing Project Duration



Rationale for Reducing Project Duration

- Time Is Money: Cost-Time Tradeoffs
 - Reducing the time of a critical activity usually incurs additional direct costs.
 - Cost-time solutions focus on reducing (crashing) activities on the critical path to shorten overall duration of the project.
 - Reasons for imposed project duration dates:
 - Customer requirements and contract commitments
 - Time-to-market pressures
 - Incentive contracts (bonuses for early completion)
 - Unforeseen delays
 - Overhead and goodwill costs
 - Pressure to move resources to other projects

Options for Accelerating Project Completion

- Adding Resources
- Outsourcing Project Work
- Scheduling Overtime
- Establishing a Core Project Team
- Do It Twice—Fast and Correctly
- Fast-Tracking
- Critical-Chain
- Reducing Project Scope
- Compromise Quality



Explanation of Project Costs

- Project Indirect Costs

- Costs that cannot be associated with any particular work package or project activity.

- Supervision, administration, consultants, and interest

- Costs that vary (increase) with time.

- Reducing project time directly reduces indirect costs.

- Direct Costs

- Normal costs that can be assigned directly to a specific work package or project activity.

- Labor, materials, equipment, and subcontractors

- Crashing activities increases direct costs.

Reducing Project Duration to Reduce Project Cost

Identifying direct costs to reduce project time

Gather information about direct and indirect costs of specific project durations.

Search critical activities for lowest direct-cost activities to shorten project duration.

Compute total costs for specific durations and compare to benefits of reducing project time.

Project Cost—Duration Graph

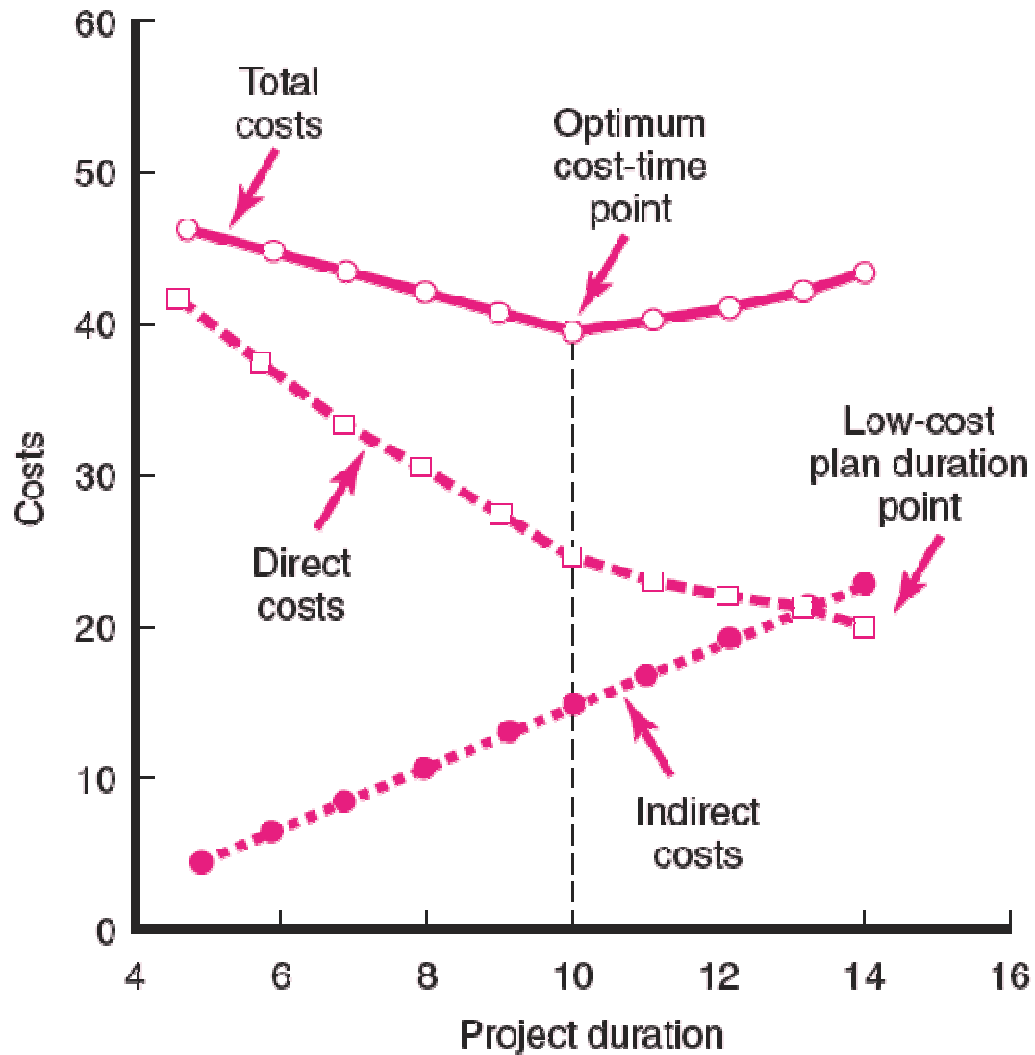


FIGURE 9.1

Constructing a Project Cost—Duration Graph

- Find total direct costs for selected project durations.
- Find total indirect costs for selected project durations.
- Sum direct and indirect costs for these selected project durations.
- Compare additional cost alternatives for benefits.

Constructing a Project Cost—Duration Graph

- Determining Activities to Shorten

- Shorten the activities with the smallest increase in cost per unit of time.

- Assumptions:

- The cost relationship is linear.
 - Normal time assumes low-cost, efficient methods to complete the activity.
 - Crash time represents a limit—the greatest time reduction possible under realistic conditions.
 - Slope represents a constant cost *per unit of time*.
 - All accelerations must occur within the normal and crash times.

Activity Graph

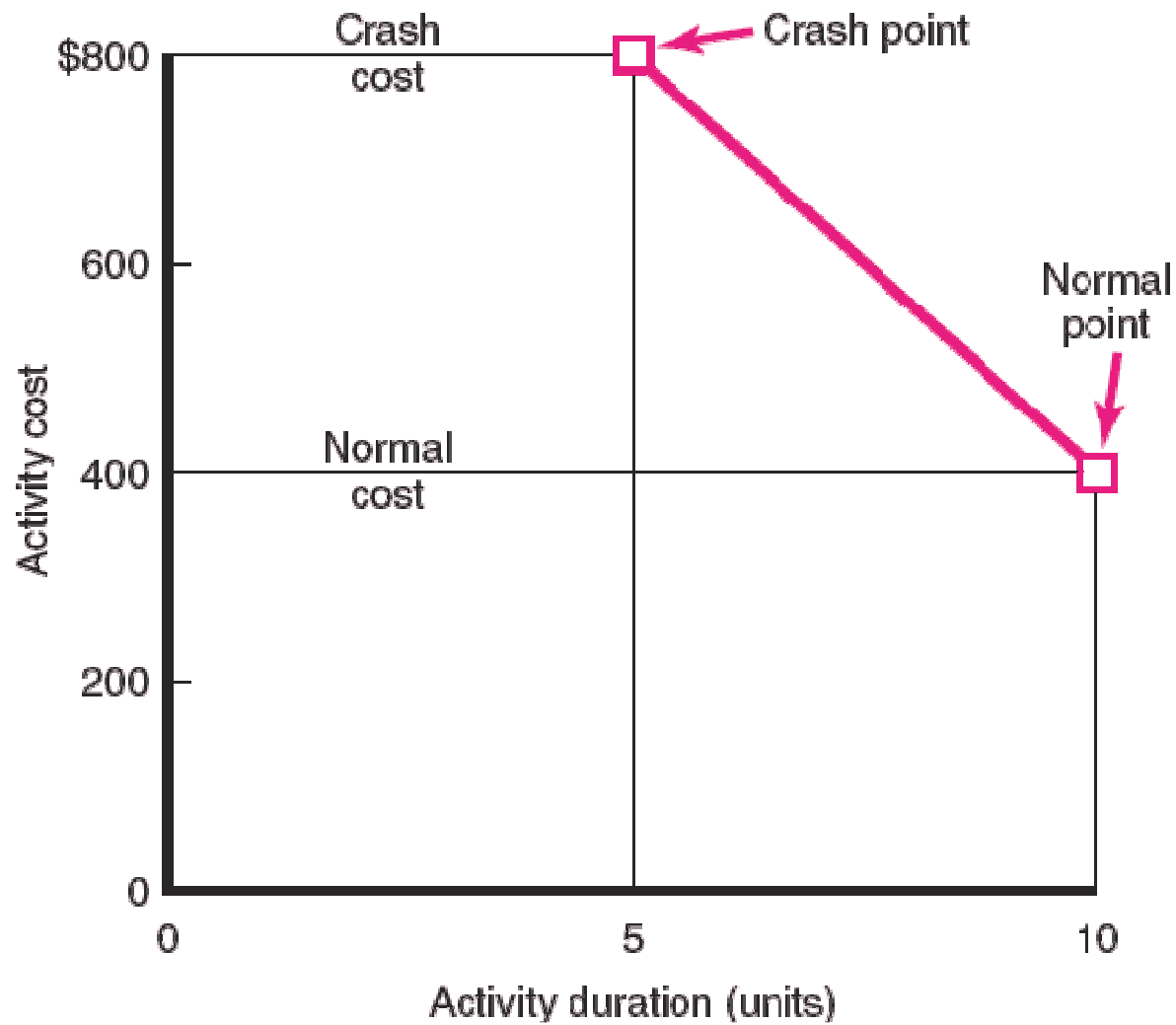


FIGURE 9.2

Cost—Duration Trade-off Example

Activity ID	Immediate Predecessor	Direct Costs				Maximum Crash Time	Slope
		Normal		Crash			
		Time	Cost	Time	Cost		
A	--	3	RM50	2	RM70	1	RM20
B	A	6	80	4	160	2	40
C	A	10	60	9	90	1	30
D	A	11	50	7	150	4	25
E	B	8	100	6	160	2	30
F	C,D	5	40	4	70	1	30
G	E,F	6	70	6	70	0	0
			RM450				

Indirect Activity, Unit Time	26	25	24	23	22	21	20
Indirect Activity Cost, RM	450	400	350	300	250	200	150

Cost—Duration Trade-off Example

Activity ID	Slope	Maximum crash time	Direct costs			
			Normal		Crash	
			Time	Cost	Time	Cost
A	<u>\$20</u>	<u>1</u>	3	\$50	2	\$70
B	<u>40</u>	<u>2</u>	6	80	4	160
C	<u>30</u>	<u>1</u>	10	60	9	90
D	<u>25</u>	<u>4</u>	11	50	7	150
E	<u>30</u>	<u>2</u>	8	100	6	160
F	<u>30</u>	<u>1</u>	5	40	4	70
G	<u>0</u>	<u>0</u>	6	70	6	70

FIGURE 9.3

Cost—Duration Trade-off Example (cont'd)

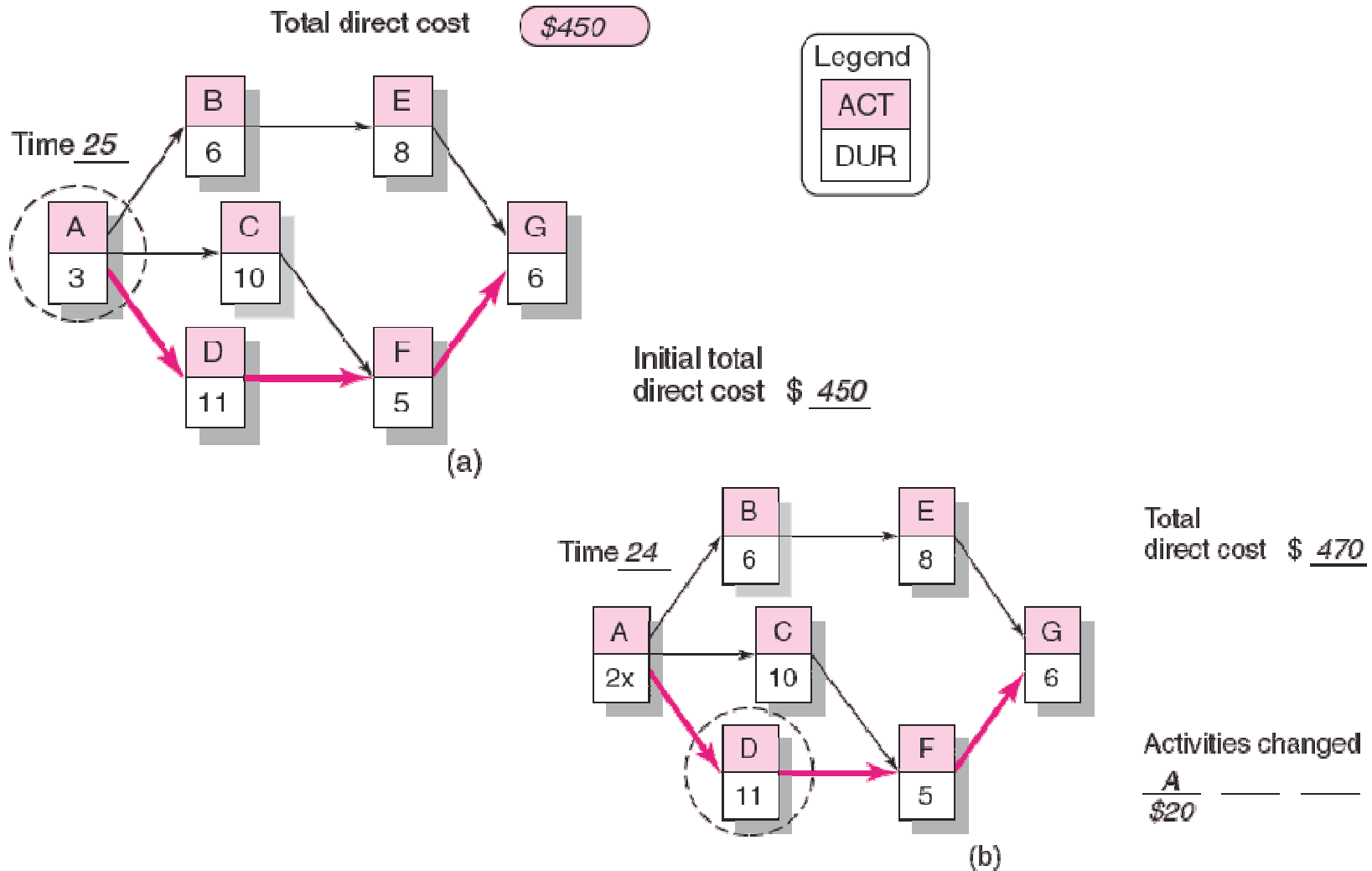
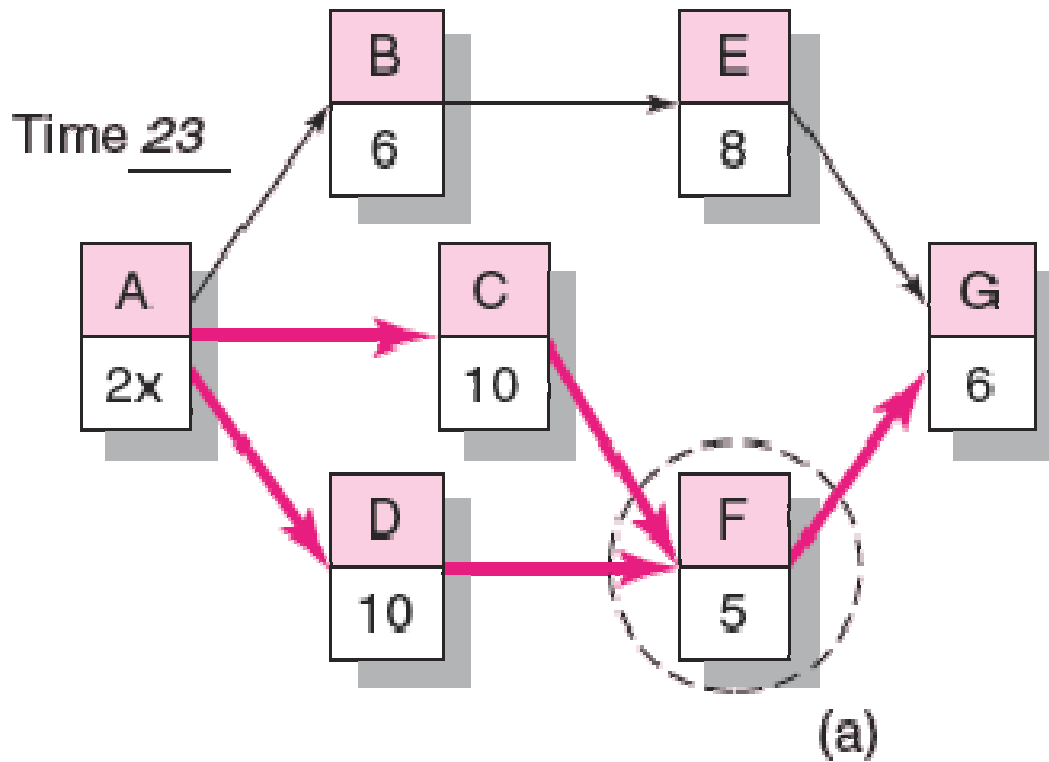


FIGURE 9.3 (cont'd)

Cost—Duration Trade-off Example (cont'd)

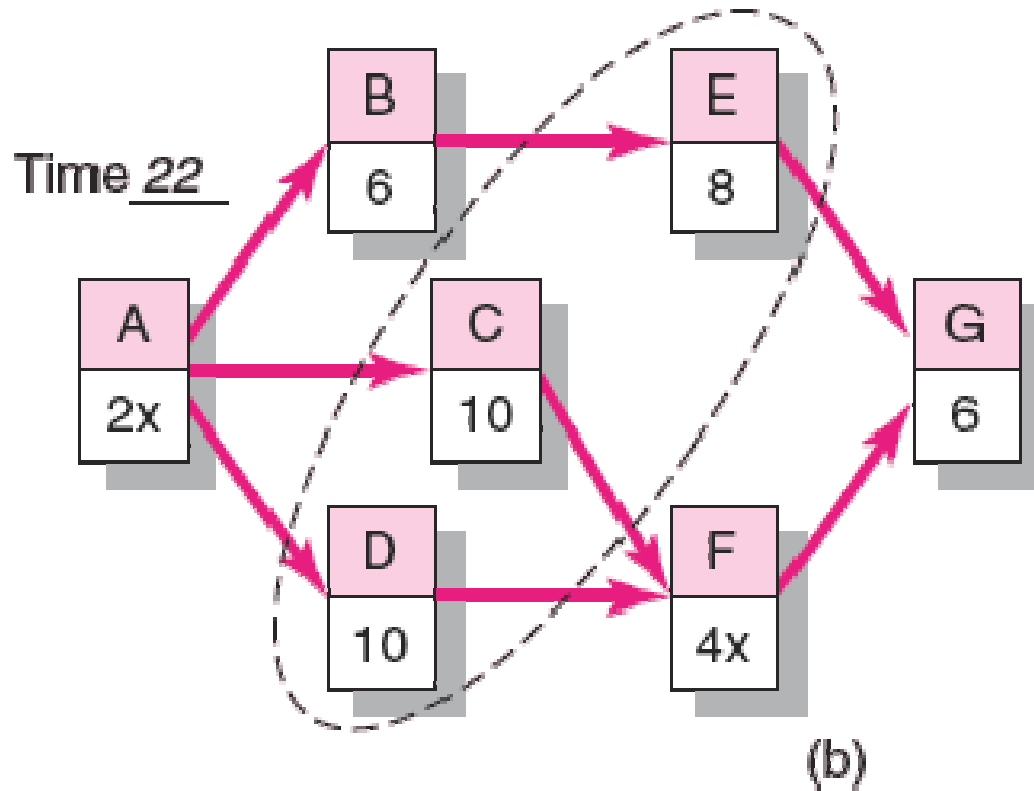


Total
direct cost \$ 495

Activities changed
D — — —
\$25

FIGURE 9.4 (cont'd)

Cost—Duration Trade-off Example (cont'd)

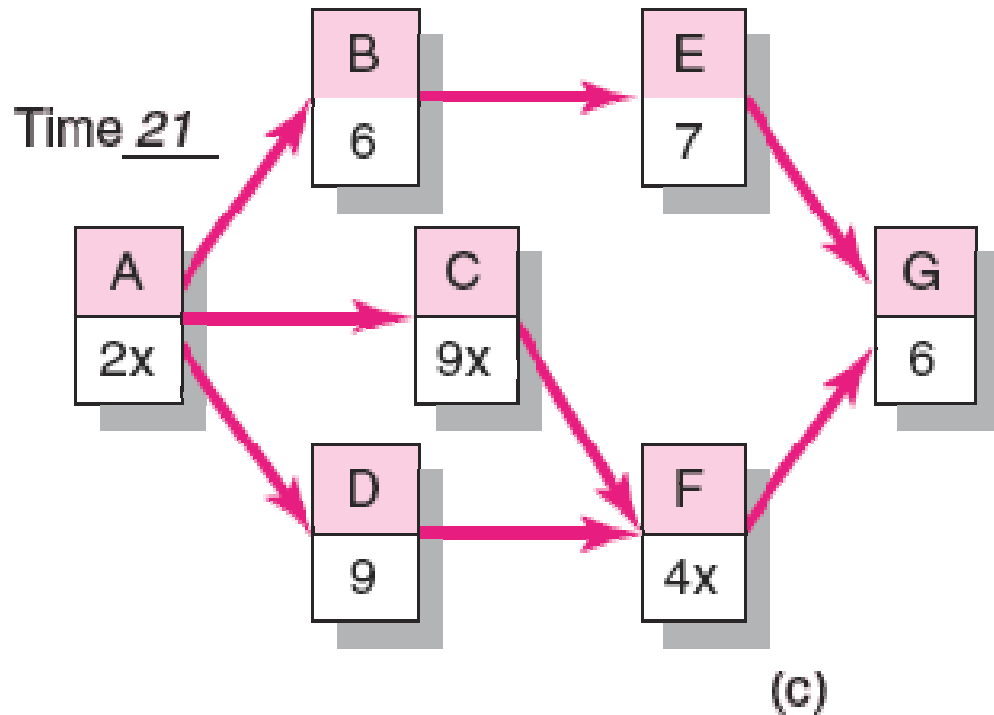


Total
direct cost \$ 525

Activities changed
F — — —
\$30

FIGURE 9.4 (cont'd)

Cost—Duration Trade-off Example (cont'd)



Total
direct cost \$ 610

Activities changed

<u>C</u>	<u>D</u>	<u>E</u>
\$30	\$25	\$30

FIGURE 9.4 (cont'd)

Summary Costs by Duration

Project duration	Direct costs	+	Indirect costs	=	Total costs
25	450		400		\$850
24	470		350		820
23	495		300		795
22	525		250		775
21	610		200		810

FIGURE 9.5

Project Cost—Duration Graph

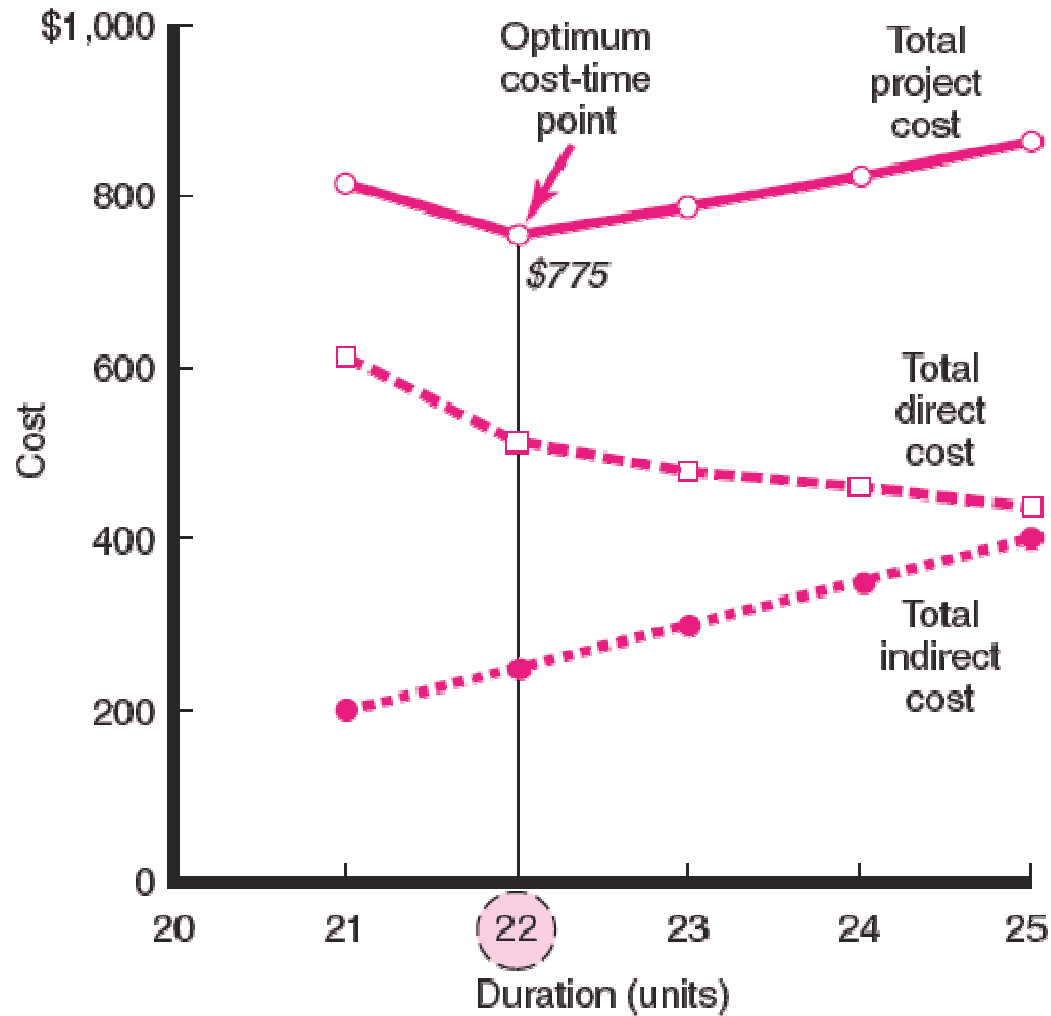


FIGURE 9.6

Practical Considerations

- Using the Project Cost—Duration Graph
- Crash Times
- Linearity Assumption
- Choice of Activities to Crash Revisited
- Time Reduction Decisions and Sensitivity

What if Cost, Not Time is the Issue?

- Commonly Used Options for Cutting Costs
 - Reduce project scope
 - Have owner take on more responsibility
 - Outsourcing project activities or even the entire project
 - Brainstorming cost savings options

Key Terms

Crash point

Crash time

Direct costs

Fast-tracking

Indirect costs

Outsourcing

Phase project delivery

Project cost–duration graph