2.1 Process Structure in Services

1) Process decisions are strategic in nature.
Answer: TRUE
Reference: Process Structure in Services
Difficulty: Moderate
Keywords: process strategy
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

2) No process can exist without at least one product or service.
Answer: TRUE
Reference: Process Structure in Services
Difficulty: Easy
Keywords: process, product, service
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

3) Supply chain processes are simply business processes that have either external customers or external suppliers.
Answer: TRUE
Reference: Process Structure in Services
Difficulty: Easy
Keywords: supply chain process, business process
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

4) Processes, by their nature, are found only in the operations function of an organization.
Answer: FALSE
Reference: Process Structure in Services
Difficulty: Easy
Keywords: operations function, process
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

5) Customer involvement reflects the ways in which customers become part of the process and the extent of their participation.
Answer: TRUE
Reference: Process Structure in Services
Difficulty: Moderate
Keywords: customer contact, customer participation, customer involvement
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

6) Service providers with a line process tend to move customers, materials, or information in a fixed sequence from one operation to the next.
Answer: TRUE
Reference: Process Structure in Services
Difficulty: Moderate
Keywords: line process, service provider, standard process
Learning Outcome: Describe the main types of operations processes and layouts in manufacturing and in services.
AACSB: Application of Knowledge

7) A moment of truth or service encounter is face-to-face interaction between the customer and a service provider.
Answer: TRUE
Reference: Process Structure in Services
Difficulty: Moderate
Keywords: moment of truth, face-to-face interaction, customer, service provider
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

8) Divergence is the extent to which the process is customized with considerable latitude on how the tasks are performed.
Answer: TRUE
Reference: Process Structure in Services
Difficulty: Easy
Keywords: divergence, customization
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

9) A front office structure features high levels of customer contact where the service provider interacts directly with the internal or external customer.
Answer: TRUE
Reference: Process Structure in Services
Difficulty: Easy
Keywords: front office process structure, customer contact, service provider interaction
Learning Outcome: Describe the main types of operations processes and layouts in manufacturing and in services.
AACSB: Application of Knowledge

10) Back office work is typically routine, with many steps having considerable divergence.
Answer: FALSE
Reference: Process Structure in Services
Difficulty: Easy
Keywords: back office process structure, divergence
Learning Outcome: Describe the main types of operations processes and layouts in manufacturing and in services.
AACSB: Application of Knowledge

11) People processing services require:
A) a high degree of process structure.
B) high capital intensity.
C) physical presence.
D) hybrid low volume—capital intensive operations.
Answer: C
Reference: Process Structure in Services
Difficulty: Moderate
Keywords: people processing services, physical presence
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

12) A politician conducting a town hall meeting is an example of:
A) back office.
B) passive contact.
C) active contact.
D) hybrid office.
Answer: C
Reference: Process Structure in Services
Difficulty: Easy
Keywords: service processes, passive contact
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

13) A yacht maker produces customized yachts for a clientele that wants a one-of-a-kind watercraft. This process can be described as:
A) divergent.
B) complex.
C) specialized.
D) hybrid.
Answer: A
Reference: Process Structure in Services
Difficulty: Moderate
Keywords: service processes, process divergence
Learning Outcome: Describe the main types of operations processes and layouts in manufacturing and in services.
AACSB: Application of Knowledge

14) The process structure that best describes a waiter's position at a restaurant would be classified as:
A) front office.
B) back office.
C) hybrid office.
D) inner office.
Answer: A
Reference: Process Structure in Services
Difficulty: Easy
Keywords: services processes, process structure, front office
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

15) Field service representatives are classified as a:
A) back office.
B) hybrid office.
C) front office.
D) mid office.
Answer: C
Reference: Process Structure in Services
Difficulty: Easy
Keywords: services processes, process structure, front office
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

16) A process that is primarily back office is:
A) a taxi driver.
B) loan officer at a bank.
C) the payroll clerk that calculates your paycheck.
D) the hostess at a restaurant.
Answer: C
Reference: Process Structure in Services
Difficulty: Easy
Keywords: service processes, process structure, back office
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

17) Front offices typically emphasize:
A) low cost operations and on-time delivery.
B) top quality and customization.
C) on-time delivery and standardization.
D) top quality and low cost operations.
Answer: B
Reference: Process Structure in Services
Difficulty: Easy
Keywords: services processes, process structure, front office
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

18) Back offices typically emphasize:
A) low cost operations and on-time delivery.
B) top quality and customization.
C) on-time delivery and customization.
D) top quality and low cost operations.
Answer: A
Reference: Process Structure in Services
Difficulty: Easy
Keywords: service processes, process structure, back office
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

19) A back office operation most closely resembles a:
A) continuous flow process.
B) batch process.
C) job process.
D) line process.
Answer: D
Reference: Process Structure in Services
Difficulty: Moderate
Keywords: back office, line process
Learning Outcome: Describe the main types of operations processes and layouts in manufacturing and in services.
AACSB: Application of Knowledge

20) Customer, materials, or information move in diverse ways in processes that have _____.
Answer: active contact
Reference: Process Structure in Services
Difficulty: Easy
Keywords: active contact, service, customer contact
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

21) What are three principles of process strategy that should govern choices that process designers make? Provide examples of well-conceived process strategy choices to illustrate each of your three principles.
Answer: The three principles discussed in the text are: 1) The key to successful process decisions is to make choices that fit the situation and that make sense together. They should not work at cross-purposes, with one process optimized at the expense of other processes. A more effective process is one that matches key process characteristics and has a close strategic fit. 2) Individual processes are the building blocks that eventually create the firm's whole supply chain. The cumulative effect on customer satisfaction and competitive advantage is huge. 3) Whether processes in the supply chain are performed internally or by outside suppliers and customers, management must pay particular attention to the interfaces between processes. Dealing with these interfaces underscores the need for cross-functional coordination. Examples of process strategy choices will vary.
Reference: Process Structure in Services
Difficulty: Moderate
Keywords: process decisions, process strategy
Learning Outcome: Describe the main types of operations processes and layouts in manufacturing and in services.
AACSB: Application of Knowledge

22) What are the different dimensions of customer contact in service processes? Provide an example of a service that has high levels of customer contact and one that has very low levels of customer contact.
Answer: The dimensions of customer contact are physical presence, what is processed, contact intensity, personal attention, and method of delivery. Examples will vary.
Reference: Process Structure in Services
Difficulty: Moderate
Keywords: customer contact intensity, physical presence, personal attention, delivery method, what processed
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

23) Describe and highlight differences among the three process structures in services.
Answer: The three process structures form a continuum and are front office, hybrid office, and back office. The front office structure is a process with high customer contact in which the service provider interacts directly with the customer. This process is more complex and has considerable divergence. The back office structure is a process with low customer contact in which the service provider interacts little with the customer. The work tends to be standardized and routine, with line flows from one service provider to the next with little variation. The hybrid office is a process with moderate levels of customer contact and standard services with perhaps some options available. Work flow progresses from one station to the next with some dominant paths apparent. Work is reasonably complex and some customization exists in how the process is performed.
Reference: Process Structure in Services
Difficulty: Moderate
Keywords: service process structure, front office, back office, hybrid office
Learning Outcome: Describe the main types of operations processes and layouts in manufacturing and in services.
AACSB: Application of Knowledge

2.2 Process Structure in Manufacturing

1) A continuous flow process is characterized by a high degree of job customization.
Answer: FALSE
Reference: Process Structure in Manufacturing
Difficulty: Moderate
Keywords: continuous flow process, customization
Learning Outcome: Describe the main types of operations processes and layouts in manufacturing and in services.
AACSB: Application of Knowledge

2) A job process has the highest level of customization of the process choices.
Answer: TRUE
Reference: Process Structure in Manufacturing
Difficulty: Moderate
Keywords: job process, customization
Learning Outcome: Describe the main types of operations processes and layouts in manufacturing and in services.
AACSB: Application of Knowledge

3) Job processes generally have higher volumes than batch processes.
Answer: FALSE
Reference: Process Structure in Manufacturing
Difficulty: Moderate
Keywords: job process, batch process, volume
Learning Outcome: Describe the main types of operations processes and layouts in manufacturing and in services.
AACSB: Application of Knowledge

4) In a line process, there is little variability in the products manufactured, and production and material handling equipment are often specialized.
Answer: TRUE
Reference: Process Structure in Manufacturing
Difficulty: Moderate
Keywords: line process, product variability, specialized equipment
Learning Outcome: Describe the main types of operations processes and layouts in manufacturing and in services.
AACSB: Application of Knowledge

5) Petroleum refineries typically use continuous flow processes.
Answer: TRUE
Reference: Process Structure in Manufacturing
Difficulty: Moderate
Keywords: continuous flow process
Learning Outcome: Describe the main types of operations processes and layouts in manufacturing and in services.
AACSB: Application of Knowledge

6) The product-process matrix brings together the elements of volume, process, and quality.
Answer: FALSE
Reference: Process Structure in Manufacturing
Difficulty: Moderate
Keywords: product-process matrix, manufacturing volume, process, quality
Learning Outcome: Describe the main types of operations processes and layouts in manufacturing and in services.
AACSB: Application of Knowledge

7) An off-diagonal position in the product-process matrix is typically more profitable than a position on the diagonal.
Answer: FALSE
Reference: Process Structure in Manufacturing
Difficulty: Moderate
Keywords: product-process matrix, diagonal
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

8) A make-to-stock strategy involves holding items in stock for immediate delivery and is feasible for standardized products with high volumes and reasonably accurate forecasts.
Answer: TRUE
Reference: Process Structure in Manufacturing
Difficulty: Easy
Keywords: make-to-stock strategy, standardized products, volume, product forecasts
Learning Outcome: Describe the main types of operations processes and layouts in manufacturing and in services.
AACSB: Application of Knowledge

9) The degree of process divergence is what keeps a large batch process from being economically produced using a line process.
Answer: TRUE
Reference: Process Structure in Manufacturing
Difficulty: Moderate
Keywords: batch process, line process, divergence
Learning Outcome: Describe the main types of operations processes and layouts in manufacturing and in services.
AACSB: Application of Knowledge

10) Assemble-to-order strategy produces a wide variety of products from relatively few assemblies and components after orders are received.
Answer: TRUE
Reference: Process Structure in Manufacturing
Difficulty: Moderate
Keywords: assemble-to-order strategy
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

11) The principle of postponement is modeled by the worker that has known his assignment for several weeks, but waits until the day before the product is to be delivered to begin production.
Answer: FALSE
Reference: Process Structure in Manufacturing
Difficulty: Easy
Keywords: postponement, procrastination
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

12) Which of the following is sometimes called mass production?
A) batch process and make-to-order strategy
B) line process and make-to-stock strategy
C) continuous flow process and assemble-to-order strategy
D) job process and make-to-order strategy
Answer: B
Reference: Process Structure in Manufacturing
Difficulty: Moderate
Keywords: manufacturing processes, mass production, line, line process
Learning Outcome: Describe the main types of operations processes and layouts in manufacturing and in services.
AACSB: Application of Knowledge

13) A job process should be preferred when:
A) workforce and equipment are specialized.
B) products are made to stock type.
C) customization is high and volume is low.
D) customization is low and volume is high.
Answer: C
Reference: Process Structure in Manufacturing
Difficulty: Moderate
Keywords: manufacturing processes, job process, customization, volume
Learning Outcome: Describe the main types of operations processes and layouts in manufacturing and in services.
AACSB: Application of Knowledge

14) Which of the following statements about process choice is BEST?
A) A batch process typically has a standard sequence of operations through the facility.
B) Automobiles and appliances are examples of products created using a continuous flow process.
C) Continuous flow processes are very capital intensive.
D) A custom cake operation is an example of a batch process.
Answer: C
Reference: Process Structure in Manufacturing
Difficulty: Moderate
Keywords: manufacturing processes, process choice, continuous flow, capital, intensity
Learning Outcome: Describe the main types of operations processes and layouts in manufacturing and in services.
AACSB: Application of Knowledge

15) The product-process matrix used to analyze manufacturing operations brings together the elements of:
A) volume, process, and intensity.
B) process, intensity, and product design.
C) intensity, volume, and process.
D) customization, volume, and process.
Answer: D
Reference: Process Structure in Manufacturing
Difficulty: Moderate
Keywords: manufacturing processes, product-process matrix
Learning Outcome: Describe the main types of operations processes and layouts in manufacturing and in services.
AACSB: Application of Knowledge

16) Which one of the following statements about process management is BEST?
A) When customization must be high, equipment should be general purpose, and employees need to perform a broader range of duties.
B) The traditional relationship between capital intensity and resource flexibility is that if one is high, so is the other.
C) Creating a more capital-intensive process tends to reduce the fixed cost and raise the variable unit cost.
D) Economies of scope mean that a process should be devoted to a single product or service to achieve high volumes.
Answer: A
Reference: Process Structure in Manufacturing
Difficulty: Hard
Keywords: manufacturing processes, process management, customization
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

17) A manufacturer that produces standard products in large volumes is likely to be using a(n):
A) make-to-stock strategy.
B) make-to-order strategy.
C) assemble-to-order strategy.
D) engineer-to-order strategy.
Answer: A
Reference: Process Structure in Manufacturing
Difficulty: Easy
Keywords: production and inventory strategies, make-to-stock
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

18) The principle of postponement is employed by a producer using a(n):
A) make-to-stock strategy.
B) make-to-order strategy.
C) assemble-to-order strategy.
D) engineer-to-order strategy.
Answer: C
Reference: Process Structure in Manufacturing
Difficulty: Easy
Keywords: production and inventory strategies, assemble-to-order
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

19) A(n) _____ process would probably not be used to produce products before a customer has placed a firm order.
Answer: job
Reference: Process Structure in Manufacturing
Difficulty: Easy
Keywords: job process, make-to-order
Learning Outcome: Describe the main types of operations processes and layouts in manufacturing and in services.
AACSB: Application of Knowledge

20) Describe the differences among make-to-order, assemble-to-order, and make-to-stock strategies from the producer's and from the customer's perspective.
Answer: A make-to-order strategy produces to customer specifications in low volumes; typically using highly divergent job or batch processes that are highly flexible. This level of customization requires a great deal of planning and control by the producer; the customer receives exactly what has been requested which may literally be a one-of-a-kind item. The customer must suffer through a lead time period during which the item is being fabricated. The assemble-to-order strategy produces wide variety from relatively few assemblies in a line or batch process. The process does not require as much flexibility and since the subassemblies are standardized, the production planning and supply chain management is easier for the producer. The customer again receives exactly what is ordered (which may be precisely what was desired) and the item could be one-of-a-kind. Again, the customer must wait for the item to be produced, but this wait tends to be shorter than in a make-to-order system. The make-to-stock strategy allows the producer to manufacture standardized items in high volumes based on a forecast. Production planning and control is much simpler and inventory can be used as a buffer for variable demand. The customer's order is filled immediately and the product is far from one-of-a-kind.
Reference: Process Structure in Manufacturing
Difficulty: Moderate
Keywords: process strategy, make-to-order, make-to-stock, assemble-to-order
Learning Outcome: Describe the main types of operations processes and layouts in manufacturing and in services.
AACSB: Application of Knowledge

21) List and briefly define four different basic types of manufacturing basic processes.
Answer: The four basic process types are job process, batch process, line process, and continuous flow process. A job process creates the flexibility needed to produce a variety of products or services in significant quantities. Customization is relatively high, and volume for any one product or service is low. A batch process differs from the job process with respect to volume, variety, and quantity. The primary difference is that volumes are higher because the same or similar products or services are provided repeatedly. A line process lies between the batch and continuous processes on the continuum, volumes are high, and products or services are standardized. The continuous flow process is the extreme end of high-volume, standardized production with rigid line flows.
Reference: Process Structure in Manufacturing
Difficulty: Moderate
Keywords: batch, job, line, continuous flow
Learning Outcome: Describe the main types of operations processes and layouts in manufacturing and in services.
AACSB: Application of Knowledge

22) Sketch and discuss the product-process matrix for manufacturing.
Answer: The product-process matrix brings together the elements of volume, product design, and process. It synchronizes the product to be manufactured with the process. Good manufacturing design depends first on volume, so if high customization is needed, then volume is usually lower and vice versa. The vertical dimension of the product-process matrix deals with divergence and flow. Combinations that are best choices are reflected along the diagonal of the matrix.

		Less customization and higher volume →				
			I. Low volume products, made to customer order	II. Multiple products, low to moderate volumes	III. Few major products, higher volume	IV. High volume, high standardization, commodity products
Less divergence and more line flows ↓		Process Characteristics				
		I. Centralized processes, with flexible and unique sequence of tasks	Job process			
		II. Disconnected line flows, moderately repetitive work		Batch process		
		III. Connected line, highly repetitive work			Line process	
		IV. Continuous flows				Continuous flow process

Reference: Process Structure in Manufacturing
Difficulty: Moderate
Keywords: product- process matrix, manufacturing, volume, customization, divergence, line-flow
Learning Outcome: Describe the main types of operations processes and layouts in manufacturing and in services.
AACSB: Application of Knowledge

2.3 Process Strategy Decisions

1) High customer involvement increases service provider productivity and makes quality measurement easier.
Answer: FALSE
Reference: Process Strategy Decisions
Difficulty: Moderate
Keywords: customer involvement, productivity, quality
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

2) Capital intensive automation is appropriate for high and low volume operations.
Answer: FALSE
Reference: Process Strategy Decisions
Difficulty: Moderate
Keywords: automation, capital intensity
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

3) Fixed automation is appropriate for line and continuous flow operations.
Answer: TRUE
Reference: Process Structure in Manufacturing
Difficulty: Moderate
Keywords: fixed automation, continuous flow
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

4) The ability to reprogram machines is useful for both low-customization and high-customization processes.
Answer: TRUE
Reference: Process Strategy Decisions
Difficulty: Moderate
Keywords: customization, programmable automation
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

5) A toaster is an example of flexible automation.
Answer: FALSE
Reference: Process Strategy Decisions
Difficulty: Moderate
Keywords: flexible automation
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

6) In a service process, capital intensity varies with volume in both front office and back office operations.
Answer: TRUE
Reference: Process Strategy Decisions
Difficulty: Moderate
Keywords: capital intensity, front office service, back office service
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

7) The common denominator for decisions on service processes is primarily customer contact.
Answer: TRUE
Reference: Process Strategy Decisions
Difficulty: Moderate
Keywords: service process, customer contact
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

8) Which of the following statements about customer involvement is BEST?
A) In service industries, customer contact is of minor importance.
B) High task divergence and flexible process flows require more flexibility of the process's employees, facilities and equipment.
C) A firm that produces standardized products often seeks customer specifications.
D) When customer involvement is highly customized, a process is more likely to use a standardized-services process rather than a customized-services process.
Answer: B
Reference: Process Strategy Decisions
Difficulty: Moderate
Keywords: customer involvement
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

9) Active customer contact and personalized attention can lower cost to the customer by:
A) increasing the capital intensity.
B) trading fixed costs for an equivalent variable cost.
C) substituting customer efforts for those of the service provider.
D) lowering the level of technology involved.
Answer: C
Reference: Process Strategy Decisions
Difficulty: Easy
Keywords: customer contact, cost
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

Scenario 2.4
A company is considering two options for the production of a part needed downstream in the manufacturing process. Particulars are as follows:

Specialized automation	Fixed Costs = $9,000 / month	Variable Cost / Unit = $2
General automation:	Fixed Costs = $3,000 / month	Variable Cost / Unit = $5

10) Use Scenario 2.4 to answer this question. What is the monthly break-even quantity for choosing between the two automation approaches?
A) 1,000 units
B) 2,000 units
C) 6,000 units
D) 12,000 units
Answer: B
Reference: Process Strategy Decisions
Difficulty: Easy
Keywords: capital-intensive operations, automation, break even quantity
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Analytical Thinking

11) Use Scenario 2.4 to answer this burning question. For a monthly volume of 3,000 units, which automation approach should be chosen?
A) specialized automation
B) general automation
C) Either approach is acceptable, because costs are the same for either option at 3,000 units.
D) Can't be determined with information given.
Answer: A
Reference: Process Strategy Decisions
Difficulty: Easy
Keywords: automation, total cost, low-cost option
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Analytical Thinking

12) Use Scenario 2.4 to solve this problem. What does the company save each month by selecting this low-cost option (for monthly requirements of 3,000 units)?
A) $1,000
B) $3,000
C) $6,000
D) Can't be determined with information given.
Answer: B
Reference: Process Strategy Decisions
Difficulty: Moderate
Keywords: automation, total cost
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Analytical Thinking

Scenario 2.6
You currently purchase a part used in your production process from an outside supplier, and have decided to begin making this part in-house. You have two equipment options for moving production in-house: special-purpose equipment and general-purpose equipment. Cost information for these two options is as follows:

ALTERNATIVE	FIXED COST	VARIABLE COST
Special-Purpose Equipment	$200,000 per year	$15 per unit
General-Purpose Equipment	$50,000 per year	$20 per unit

13) Use Scenario 2.6 to answer this question. What is the break even quantity between the two options?
A) 30,000 units per year
B) 40,000 units per year
C) 50,000 units per year
D) 60,000 units per year
Answer: A
Reference: Process Strategy Decisions
Difficulty: Easy
Keywords: capital-intensive operations, general-purpose equipment, special-purpose equipment, break even quantity
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Analytical Thinking

14) Use Scenario 2.6 to find the truth. What are total costs under the Special-Purpose Equipment option for an annual quantity of 40,000 units?
A) $400,000
B) $500,000
C) $800,000
D) $850,000
Answer: C
Reference: Process Strategy Decisions
Difficulty: Easy
Keywords: general-purpose equipment, special-purpose equipment, total cost
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Analytical Thinking

15) Use Scenario 2.6 to answer this question. What are total costs under the General-Purpose Equipment option for an annual quantity of 40,000 units?
A) $400,000
B) $450,000
C) $800,000
D) $850,000
Answer: D
Reference: Process Strategy Decisions
Difficulty: Easy
Keywords: general-purpose equipment, special-purpose equipment, total cost
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Analytical Thinking

16) Use Scenario 2.6 to solve this riddle. For what range of output is the General-Purpose Equipment the low-cost option?
A) 0-30,000 units per year
B) 30,000 or more units per year
C) 40,000 or more units per year
D) 0-40,000 units per year
Answer: A
Reference: Process Strategy Decisions
Difficulty: Easy
Keywords: general-purpose equipment, special-purpose equipment, total cost
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Analytical Thinking

17) Use Scenario 2.6 to answer this question. For what range of output is the Special-Purpose Equipment the low-cost option?
A) 30,000 or more units per year
B) 0 - 30,000 units per year
C) 0 - 40,000 units per year
D) 40,000 or more units per year
Answer: A
Reference: Process Strategy Decisions
Difficulty: Easy
Keywords: general-purpose equipment, special-purpose equipment, total cost, low-cost option
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Analytical Thinking

18) Use Scenario 2.6 to solve this mystery. At an annual requirement of 40,000 units, what does the company save per year by selecting the low-cost option?
A) $150,000
B) $300,000
C) $50,000
D) $40,000
Answer: C
Reference: Process Strategy Decisions
Difficulty: Easy
Keywords: general-purpose equipment, special-purpose equipment, total cost, low-cost option
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Analytical Thinking

19) *More* fixed automation typically means:
A) decreased labor productivity.
B) longer cycle time.
C) higher demand volumes.
D) lower sales.
Answer: C
Reference: Process Strategy Decisions
Difficulty: Hard
Keywords: fixed automation, volume
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

20) Which one of the following statements about flexible automation is BEST?
A) Investment cost is lower when a transfer machine handles many operations.
B) Chemical processing plants and oil refineries mainly utilize programmable automation.
C) It is an automatic process that can be reprogrammed to handle various products.
D) It achieves top efficiency; accommodating new products is difficult and costly.
Answer: C
Reference: Process Strategy Decisions
Difficulty: Moderate
Keywords: flexible automation, reprogramming
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

21) With flexible automation, the ability to reprogram instructions can be useful in:
A) line flow, but not flexible flow, operations.
B) flexible flow, but not line flow, operations.
C) either line flow or flexible flow operations.
D) situations in which top efficiency is mandatory, but only if volumes are high.
Answer: C
Reference: Process Strategy Decisions
Difficulty: Moderate
Keywords: flexible automation, reprogramming, line flow
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

22) Higher volume in a process is generally associated with:
A) more resource flexibility.
B) more capital intensity.
C) greater customer involvement.
D) fewer opportunities for standardization.
Answer: B
Reference: Process Strategy Decisions
Difficulty: Moderate
Keywords: volume, process, capital intensity
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

23) Which of the following statements regarding resource flexibility is BEST?
A) Training is a small part of worker flexibility.
B) Specialization of employees is consistent with worker flexibility.
C) Worker flexibility is not a priority if the process is subject to hourly or seasonal peaks in demand.
D) Resource flexibility requires employees to be able to perform a broad range of duties, and equipment usually must be more general purpose.
Answer: D
Reference: Process Strategy Decisions
Difficulty: Moderate
Keywords: resource flexibility, flexible workforce
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

24) Which of the following statements concerning resource flexibility is BEST?
A) Flexible equipment is useful to companies with low production volumes and high customization.
B) Investment in general-purpose equipment is warranted if the firm expects to sell more than the break-even amount.
C) Manufacturing efficiency increases with general-purpose equipment.
D) Resource flexibility is crucial for line-flow processing.
Answer: A
Reference: Process Strategy Decisions
Difficulty: Moderate
Keywords: resource flexibility, volume, customization
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

25) Suppose that competitive priorities call for offering a wide variety of customized services. Which of the following process decisions would be more likely?
A) more capital intensity
B) more resource flexibility
C) more process automation
D) less customer involvement
Answer: B
Reference: Process Strategy Decisions
Difficulty: Hard
Keywords: resource flexibility, customized service
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

26) Which statement about economies of scope is NOT true?
A) Economies of scope are often attained through programmable automation.
B) Economies of scope bring together two competitive priorities–customization and low price.
C) Economies of scope reflect the ability to produce multiple products more cheaply in combination than separately.
D) Economies of scope reflect low capital intensity and high resource flexibility.
Answer: D
Reference: Process Strategy Decisions
Difficulty: Moderate
Keywords: economies of scope, capital intensity, resource flexibility
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

27) Two manufacturing processes are being considered for making a new product. Process #1 is less capital intensive, with fixed costs of $50,000 per year and variable costs of $700 per unit. Process #2 has fixed costs of $400,000 annually, with variable costs of $200 per unit.
a. What is the break-even quantity for the two processes?
b. If annual sales are expected to be 600 units, which process should be selected?
c. If lowest overall costs per year is your overall objective, for what range of annual production quantities should you select the first process? the second process?
d. Operations and Engineering have found a way to reduce the cost of the second process, such that the fixed costs for this process decrease from $400,000 to $300,000 annually. All other costs remain the same (1st process fixed = $50,000 / year, 1st process variable = $700 / unit, 2nd process variable = $200 / unit). What is the new break even quantity between the two processes?
e. Does this change the process selection for the annual sales volume of 600 units? If so, for what range of annual production quantities should you select the first process and the second process?
Answer:

a. $50,000 + $700(Q) = $400,000 + $ 200(Q)
   $500(Q) = $350,000 → **Q = 700 units per year**

b. Process #1: $50,000 + $700(600) = $470,000
   Process #2: $400,000 + $200(600) = $520,000

Process #1 should be selected, since it will save $50,000 compared to Process #2 at an annual volume of 600 units.

c. In part b, we have seen that Process #1 is the better choice at volumes below the break even quantity of 700 units per year. Therefore,

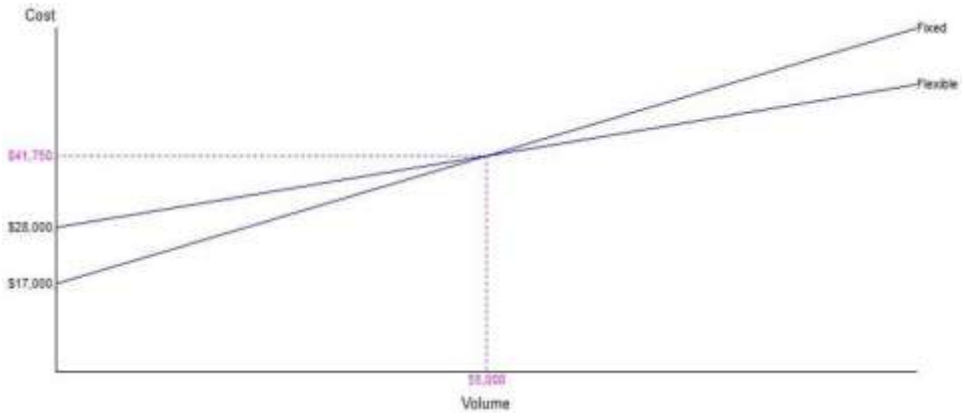
Process #1 should be selected for volumes from 0 - 700 units per year;
Process #2 should be selected for volumes of 700 or more units per year.

d. $50,000 + $700(Q) = $300,000 + $ 200(Q)
   $500(Q) = $250,000 → **Q = 500 units per year**

e. In this case,
   Process #1: $50,000 + $700(600) = $470,000
   Process #2: $300,000 + $200(600) = $420,000

Process #2 should be selected, since it will now save $50,000 compared to Process #1 at an annual volume of 600 units.
Process #1 should be selected for volumes from 0 — 500 units per year;
Process #2 should be selected for volumes of 500 or more units per year.
Reference: Process Strategy Decisions
Difficulty: Hard
Keywords: general-purpose equipment, special-purpose equipment, break even quantity, total cost, low-cost option
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Analytical Thinking

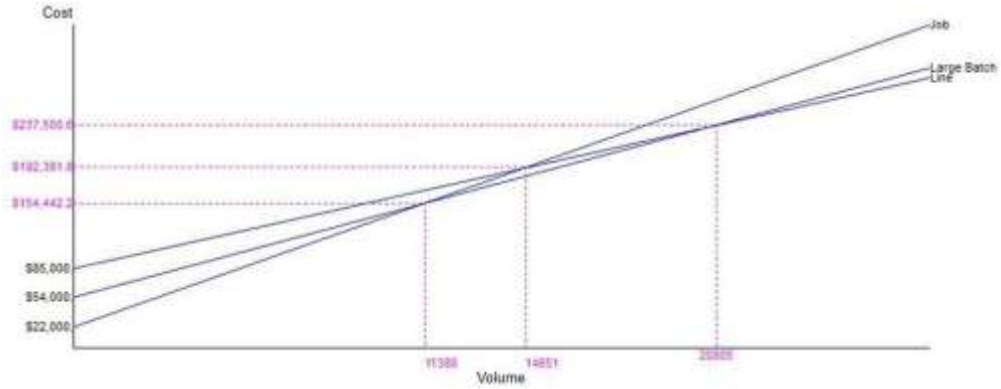
28) The break-even graph shown below represents the cost structure associated with a flexible production process and one that is fixed (less flexible). Using the information displayed in the graph, determine the cost structures associated with the two alternative production methods.



Answer: The Fixed alternative has a fixed cost of $17,000.
The Flexible alternative has a fixed cost of $28,000.
Their point of intersection is at an output volume of 55,000 units, which results in a cost of $41,750.
For the Fixed alternative, $41,750 = $17,000 + 55,000 × VC
VC = ($41,750 - $17,000)/55,000
VC = $0.45

For the Flexible alternative, $41,750 = $28,000 + 55,000 × VC
VC = ($41,750 - $28,000)/55,000
VC = $0.25
Reference: Process Strategy Decisions
Difficulty: Easy
Keywords: general-purpose equipment, special-purpose equipment, break even quantity, total cost, low-cost option
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Analytical Thinking

29) An entrepreneur considers three possibilities for the production of her new product. One alternative, a job process, would have fixed costs of $22,000 and a per unit cost of $11.63. The large batch option would have a fixed cost of $54,000 and a per unit cost of $8.82. The line process would have a fixed cost of $85,000 and a per unit cost of $7.33. Graph the total cost lines and determine over what range of output each production alternative is superior.
Answer: The Line alternative total cost line has the equation 85000 + 7.33x
The Large Batch alternative total cost line equation is 54000 + 8.82x
The Job alternative total cost line equation is 22000 + 11.63x



We know that the alternative with the lowest fixed cost must initially be superior and the alternative with the lowest variable cost must ultimately be the cheapest alternative, so our answer begins at 0 output with Job and ends at infinity (or at least very large output with Line).

At a volume of 11,388 the Job process becomes more expensive than the Large Batch process.
54,000 + 8.82x = 22,000 + 11.63x
32,000 = 2.81x
x = 11,388

At a volume of 20,805 the Line process becomes less expensive than the Large Batch process.
85,000 + 7.33x = 54,000 + 8.82x
31,000 = 1.49x
x = 20,805

The Line and Job processes' point of indifference is immaterial since the Large Batch process cost is lower than both at their intersection point.

The ranges for each alternative are:
Job 0 - 11,388 units
Large Batch 11,388 - 20,805 units
Line 20,805 - infinite demand
Reference: Process Strategy Decisions
Difficulty: Hard
Keywords: break-even quantity, total cost
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Analytical Thinking

30) _____ is the ease with which employees and equipment can handle a wide variety of products, output levels, duties, and functions.
Answer: Resource flexibility
Reference: Process Strategy Decisions
Difficulty: Moderate
Keywords: resource flexibility
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

31) _____ reflects the ways in which customers become part of the process and the extent of their participation.
Answer: Customer involvement
Reference: Process Strategy Decisions
Difficulty: Moderate
Keywords: customer involvement, customer participation
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

32) _____ is the mix of equipment and human skills in a process.
Answer: Capital intensity
Reference: Process Strategy Decisions
Difficulty: Moderate
Keywords: capital intensity, equipment, human skills
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

33) _____ automation produces one type of product or part in a sequence of simple operations.
Answer: Fixed
Reference: Process Strategy Decisions
Difficulty: Moderate
Keywords: fixed automation
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

34) _____ automation can handle various products through programmability.
Answer: Flexible
Reference: Process Strategy Decisions
Difficulty: Moderate
Keywords: flexible automation, programmable automation
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

35) Provide examples of three different processes that rely on the customer for approximately 100% of the process; about 50%; and about 0%. What unique challenges exist for operations and supply chain managers and process designer in each one of these scenarios?
Answer: Examples will vary. Some students might argue that the process designer must be more careful to error-proof the process that relies more heavily on the customer while the manager takes a greater role in a process that does not rely on the customer. The burden for training shifts from an internal to an external focus as the customer becomes a bigger part of the production process. Students should also comment on customer buy-in for the final product and the appropriateness of a limited number and type of processes for customer involvement.
Reference: Process Strategy Decisions
Difficulty: Moderate
Keywords: customer involvement
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

36) Comment on the need for flexibility in both the workforce and capital equipment. What process types and production situations require greater flexibility?
Answer: As the authors indicate, high task divergence and flexible process flows require more flexibility of the process's resources — its employees, facilities, and equipment. Employees need to perform a broad range of duties, and equipment must be general purpose. Otherwise, resource utilization will be too low for economical operations. Highly task divergent operations are required when customers have unique needs; casting these needs in the product-process matrix suggests that job processes and batch processes, both large and small, would benefit from flexibility. In the customer-contact matrix, both front office and hybrid office types would reap the benefits of greater worker and equipment flexibility.
Reference: Process Strategy Decisions
Difficulty: Easy
Keywords: resource flexibility, flexible workforce
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

37) Define economies of scope, and identify how they relate to flexible automation.
Answer: Economies of scope are the ability to produce multiple products more cheaply in combination than separately. Flexible automation provides economies of scope by allowing the producer to use the same productive resource to make intermediate volumes of a range of products, resulting in a shorter payback period for the capital equipment than if it were fixed automation.
Reference: Process Strategy Decisions
Difficulty: Easy
Keywords: economies of scope, flexible automation
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

2.4 Strategic Fit

1) Front offices generally emphasize top quality and customization.
Answer: TRUE
Reference: Strategic Fit
Difficulty: Easy
Keywords: front-office, customer contact, service, internal customer, external customer
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

2) Higher volume processes are more likely to be encountered in the back office.
Answer: FALSE
Reference: Strategic Fit
Difficulty: Moderate
Keywords: back office, line process
Learning Outcome: Describe the main types of operations processes and layouts in manufacturing and in services.
AACSB: Application of Knowledge

3) Which one of the following statements on the concept of focused factories is BEST?
A) emphasizes economies of scale, rather than diseconomies of scale
B) prefers larger facilities producing all of the products or services the company offers
C) reduces the range of demands placed on an operation so management can concentrate on fewer tasks
D) emphasizes flexibility rather than cost
Answer: C
Reference: Strategic Fit
Difficulty: Moderate
Keywords: focused factory
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

4) One method for a factory to gain operational focus is to:
A) build large enough factories to produce all products and services the company offers.
B) hire more specialists and supervisors to control the operations.
C) reorganize existing facilities to the plant-within-plant approach.
D) remodel stores to create the effect of many small boutiques under one roof.
Answer: C
Reference: Strategic Fit
Difficulty: Hard
Keywords: focus, process, plants within plants
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

5) A firm that chooses to compete based on delivery speed and variety would most likely have:
A) a make-to-order production and inventory strategy.
B) an assemble-to-order production and inventory strategy.
C) a make-to-stock production and inventory strategy.
D) an engineer-to-order production and inventory strategy.
Answer: B
Reference: Strategic Fit
Difficulty: Moderate
Keywords: assemble-to-order, delivery speed
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

6) Which one of the following statements on the concept of gaining focus is BEST?
A) Focused factories maximize the amount of customization.
B) Small sizes of many focused factories make it difficult to compete on the basis of shorter lead times.
C) Plants within plants are different operations within a facility that can have individualized competitive priorities and processes.
D) Focused factories are large factories producing all the products that the company offers.
Answer: C
Reference: Strategic Fit
Difficulty: Moderate
Keywords: focus, process, plants within plants
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

7) _____ are different operations within a facility with individualized competitive priorities, processes, and workforces under the same roof.
Answer: Plants within plants
Reference: Strategic Fit
Difficulty: Moderate
Keywords: plants within plants, PWP
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

8) Is an executive MBA program at your school a plant within a plant? Explain your reasoning.
Answer: Answers will vary. The definition offered for plants within plants is different operations within a facility with individualized competitive priorities, processes and workforces under the same roof. Depending on the crossover of faculty and co-location of facilities, this question will merit a different response from university to university.
Reference: Strategic Fit
Difficulty: Moderate
Keywords: plants within plants, PWP
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

2.5 Strategies for Change

1) Reengineering is the fundamental rethinking and radical redesign of processes to improve performance dramatically.
Answer: TRUE
Reference: Strategies for Change
Difficulty: Easy
Keywords: process reengineering, redesign, rethinking
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

2) With a dramatic flourish, the team leader tore the employee orientation guidelines into pieces. He then distributed blank pieces of paper to the team and asked them to envision the perfect orientation process without regard to how it has always been done. This team is probably engaging in process reengineering.
Answer: TRUE
Reference: Strategies for Change
Difficulty: Moderate
Keywords: process reengineering, clean-slate
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

3) More often than not, process improvement takes place whether or not a process is reengineered.
Answer: TRUE
Reference: Strategies for Change
Difficulty: Easy
Keywords: reengineering, process improvement
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

4) Process analysis is the documentation and detailed understanding of how work is performed and how it can be redesigned.
Answer: TRUE
Reference: Process Analysis
Difficulty: Easy
Keywords: process analysis
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

5) Process improvement teams that focus on processes that cut across departmental boundaries have the silo mentality.
Answer: FALSE
Reference: Process Analysis
Difficulty: Easy
Keywords: silo, improvement teams, process analysis
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

6) Which one of the following statements concerning the role of process reengineering is BEST?
A) Reengineering is the fundamental rethinking and radical design of business processes.
B) Reengineering efforts should focus on functional departments.
C) Information technology should be kept separate from reengineering initiatives.
D) Reengineering requires an attitude of incremental improvement.
Answer: B
Reference: Strategies for Change
Difficulty: Moderate
Keywords: reengineering, radical redesign, information technology
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

7) Which of these tools is considered a primary enabler of process reengineering?
A) supply chain partners
B) information technology
C) logistics
D) infrastructure
Answer: B
Reference: Strategies for Change
Difficulty: Moderate
Keywords: process reengineering, information technology
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

8) A team consisting of members from each functional area affected by the process change is referred to as a(n):
A) reengineering team.
B) cross-functional team.
C) process team.
D) improvement team.
Answer: B
Reference: Strategies for Change
Difficulty: Moderate
Keywords: cross-functional team
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

9) A process selected for reengineering should be a:
A) core process.
B) front-office process.
C) hybrid office.
D) back office process.
Answer: A
Reference: Strategies for Change
Difficulty: Moderate
Keywords: reengineering, core process
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

10) Process analysis focuses on:
A) how work is actually done.
B) who is responsible for the customer.
C) the customer's needs.
D) the number of steps in between supplier and customer.
Answer: A
Reference: Process Analysis
Difficulty: Easy
Keywords: process analysis
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

11) A systematic approach to process analysis includes the step:
A) reengineering.
B) integration.
C) order fulfillment.
D) define scope.
Answer: D
Reference: Process Analysis
Difficulty: Easy
Keywords: define scope, process analysis, systematic approach
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

12) An examination of strategic issues such as possible gaps between a process's competitive priorities and current competitive capabilities falls in the:
A) document process phase of process analysis.
B) evaluate performance phase of process analysis.
C) redesign process phase of process analysis.
D) identify opportunities phase of process analysis.
Answer: D
Reference: Process Analysis
Difficulty: Moderate
Keywords: identify opportunities, strategic issues, gap, competitive priorities, competitive capabilities
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

13) If a process under analysis is extensive and cuts across several departmental lines, it may benefit from forming a(n):
A) brainstorming team.
B) benchmarking team.
C) steering team.
D) implementation team.
Answer: C
Reference: Process Analysis
Difficulty: Moderate
Keywords: steering team
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

14) Performance measures such as average response times, repair times, and percent defective are referred to as:
A) benchmarks.
B) metrics.
C) targets.
D) tactics.
Answer: B
Reference: Process Analysis
Difficulty: Moderate
Keywords: metrics, performance measures
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

15) Widespread participation in process analysis is essential not only because of the work involved but also because:
A) employees tend to neglect their regular work duties, thus no one falls too far behind.
B) it builds commitment.
C) no one can analyze a process by himself.
D) a silo mentality should prevail and this requires large numbers of workers.
Answer: B
Reference: Process Analysis
Difficulty: Moderate
Keywords: process analysis, participation, commitment
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

16) _____ is the documentation and detailed understanding of how work is performed and how it can be redesigned.
Answer: Process analysis
Reference: Process Analysis
Difficulty: Easy
Keywords: process analysis
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

17) The first step of the systematic approach to process analysis is _____.
Answer: identify opportunities
Reference: Process Analysis
Difficulty: Moderate
Keywords: identify opportunities, process analysis
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

18) Process _____ is the boundary of the process to be analyzed.
Answer: scope
Reference: Process Analysis
Difficulty: Easy
Keywords: process scope, boundary
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

19) _____ are performance measures that are established for a process and the steps within it.
Answer: Metrics
Reference: Process Analysis
Difficulty: Easy
Keywords: metric
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

20) Gaps between actual and desired performance are called _____.
Answer: disconnects
Reference: Process Analysis
Difficulty: Moderate
Keywords: gap, disconnect
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

21) A(n) _____ means that a department focuses on its own tasks without understanding the role and processes of departments outside its own organizational boundaries.
Answer: silo mentality
Reference: Process Analysis
Difficulty: Easy
Keywords: silo mentality
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

22) The authors list six key elements of reengineering. Pick any three and describe their contribution to the reengineering effort.
Answer: The six elements are:
1. Critical processes - focus on core business processes to reengineer, leave normal processes to incremental improvement.
2. Strong leadership - senior executives must actively support reengineering or the effort will fail
3. Cross-functional teams - the team must be composed of each functional area affected by the change
4. Information technology - a primary enabler; most reengineering projects design processes around information flows
5. Clean slate philosophy - Discard the old way of doing things and consider the way the customer wants to deal with the company.
6. Process analysis - the reengineering team must understand things about the current process, how it performs, and have a grasp on the performance metrics
Reference: Strategies for Change
Difficulty: Moderate
Keywords: process reengineering, redesign, rethinking
Learning Outcome: Discuss operations and operations management as a competitive advantage for the organization.
AACSB: Application of Knowledge

2.6 Documenting and Evaluating the Process

1) Flowcharts, service blueprints, and process charts are effective for documenting and evaluating processes.
Answer: TRUE
Reference: Documenting and Evaluating the Process
Difficulty: Easy
Keywords: flowchart, process documentation
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Application of Knowledge

2) In a swim lane flowchart, the line of visibility is used to separate the process steps in view of the customer from those hidden from view of the customer.
Answer: FALSE
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: swim lane flowchart, service blueprint
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Application of Knowledge

3) A service blueprint is a flowchart of a service process that shows which of its steps has high customer contact.
Answer: TRUE
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: service blueprint, service process, flowchart
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Application of Knowledge

4) Formal work measurement techniques estimate average times for each step in a process by relying on the judgment of skilled observers.
Answer: TRUE
Reference: Documenting and Evaluating the Process
Difficulty: Easy
Keywords: work measurement, labor standard, average process times
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Application of Knowledge

5) Elemental standard time data can help managers develop time standards for new work before production begins.
Answer: TRUE
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: elemental standard data
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Application of Knowledge

6) The predetermined data approach eliminates the need for time studies.
Answer: TRUE
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: predetermined data approach, time studies
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Application of Knowledge

7) A predetermined data approach to time standards can be completed before actual production begins.
Answer: TRUE
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: predetermined data approach
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Application of Knowledge

8) Work sampling can be used to estimate the proportion of time spent by people or machines on activities.
Answer: TRUE
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: work sampling, proportion
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Application of Knowledge

9) When using work sampling, the times of day when the analyst collects the sample data should be selected at random over the length of the study.
Answer: TRUE
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: work sampling, data collection
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Application of Knowledge

10) A learning curve is a line showing the relationship between processing time and the cumulative quantity of a product or service produced.
Answer: TRUE
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: learning curve analysis
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Application of Knowledge

11) The learning curve for a process depends on the rate of learning and the actual or estimated time for the first unit processed.
Answer: TRUE
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: learning curve analysis
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Application of Knowledge

12) The best data analysis tool for recording which gas pump most customers use would be a checklist.
Answer: TRUE
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: data analysis, checklist
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Application of Knowledge

13) The general principle that 80% of a company's revenue is generated by 20% of its customers is known as the Pareto concept.
Answer: TRUE
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: Pareto chart, Pareto principle
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Application of Knowledge

14) A scatter diagram is a graphical technique that shows whether two variables may be related.
Answer: TRUE
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: scatter diagram, variables
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Application of Knowledge

15) A fishbone diagram identifies which category is most frequently observed out of all the categories for which you have data.
Answer: FALSE
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: fishbone diagram, cause-and-effect diagram
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Application of Knowledge

16) A flowchart traces the flow of all EXCEPT the following:
A) information through a process.
B) customers through a process.
C) equipment through a process.
D) safety regulations through a process.
Answer: D
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: flowchart, information, customers, equipment
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Application of Knowledge

17) A flowchart created at the strategic level of an organization should show:
A) core processes and their linkages.
B) details of a process as bracketed by its scope.
C) individual steps that may have been aggregated at a higher level of analysis.
D) areas that are seen and unseen by the customer.
Answer: A
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: flowchart, strategic decision making
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Application of Knowledge

18) Cross-functional coordination is at particular risk where:
A) there is low process divergence.
B) there are handoffs in the process.
C) functional silos exist.
D) it is not possible to create a flowchart.
Answer: B
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: handoff, coordination, cross functional coordination
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Application of Knowledge

19) A swim lane flowchart is an appropriate tool to use when:
A) the process features only intangible outputs.
B) the process involves more than one department.
C) the process scope is difficult to define.
D) the process has a person or group of people at a workstation or with a customer.
Answer: B
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: swim lane flowchart, process documentation tool
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Application of Knowledge

20) An effective tool for showing steps of a service process with a high level of customer contact is a:
A) Pareto chart.
B) flowchart.
C) service blueprint.
D) check sheet.
Answer: C
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: service blueprint, customer contact, process documentation tool
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Application of Knowledge

21) A process chart activity that changes, creates, or adds something is a(n):
A) operation.
B) transportation.
C) inspection.
D) delay.
Answer: A
Reference: Documenting and Evaluating the Process
Difficulty: Easy
Keywords: process chart
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Application of Knowledge

22) A process chart activity that checks or verifies something but does not change it is a(n):
A) operation.
B) transportation.
C) inspection.
D) delay.
Answer: C
Reference: Documenting and Evaluating the Process
Difficulty: Easy
Keywords: process chart
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Application of Knowledge

23) Which one of the following groups of activities is likely to be shown on a process chart?
A) operation, inspection, delay
B) operation, capital intensity, flow strategy
C) transportation, material flow, physical layout
D) storage, delay, personnel involved
Answer: A
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: process chart
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Application of Knowledge

24) The five categories of activities (operation, transportation, inspection, delay, and storage) are used in which of the following methods of process analysis?
A) multiple-activity chart
B) process chart
C) capital budgeting
D) flow diagram
Answer: B
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: process chart
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Application of Knowledge

25) A process chart activity that occurs when something is put away until a later time is a(n):
A) storage.
B) transportation.
C) inspection.
D) delay.
Answer: A
Reference: Documenting and Evaluating the Process
Difficulty: Easy
Keywords: process chart
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Application of Knowledge

26) A professor can grade a quiz in 30 seconds. Over the course of an academic year he has 6 sections of a course with an average of 30 students with 10 quizzes in each section. If he is paid $40 an hour, how much is his annual quiz-grading labor cost to the university?
A) $60
B) $100
C) $600
D) $36,000
Answer: C
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: annual labor cost
Learning Outcome: Explain options for managing bottlenecks and managing capacity in service and manufacturing processes.
AACSB: Analytical Thinking

27) A professor's graduate assistant can grade a quiz in 40 seconds. Over the course of an academic year he assists with 6 sections of a course with an average of 30 students with 10 quizzes in each section. If he is paid $8 an hour, how much is his annual quiz-grading labor cost to the university?
A) $60
B) $160
C) $576
D) $576,000
Answer: B
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: annual labor cost
Learning Outcome: Explain options for managing bottlenecks and managing capacity in service and manufacturing processes.
AACSB: Analytical Thinking

28) A professor can grade a quiz in 2 minutes. Over the course of an academic year he has 6 sections of a course with an average of 25 students with 10 quizzes in each section. If he is paid $40 an hour, how much is his annual quiz-grading labor cost to the university?
A) $250
B) $500
C) $1000
D) $2,000
Answer: D
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: annual labor cost
Learning Outcome: Explain options for managing bottlenecks and managing capacity in service and manufacturing processes.
AACSB: Analytical Thinking

29) Highly customized job processes and processes that are highly divergent require the use of:
A) the time study method.
B) the elemental standard data approach.
C) the predetermined data approach.
D) the work sampling method.
Answer: B
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: elemental standard data
Learning Outcome: Explain options for managing bottlenecks and managing capacity in service and manufacturing processes.
AACSB: Application of Knowledge

Scenario 2.1
Garman observes a worker assembling peanut valves and records the data displayed in the table.

Time (seconds)	Observations
21	15
25	12
30	12

30) Use the information in Scenario 2.1 to answer this question. What is the average time for this job element?
A) 15 seconds
B) 20 seconds
C) 25 seconds
D) 30 seconds
Answer: C
Reference: Documenting and Evaluating the Process
Difficulty: Easy
Keywords: time study, average time
Learning Outcome: Explain options for managing bottlenecks and managing capacity in service and manufacturing processes.
AACSB: Analytical Thinking

31) Use the information in Scenario 2.1. What is the normal time for this job element if the rating factor is 80%?
A) 15 seconds
B) 20 seconds
C) 25 seconds
D) 30 seconds
Answer: B
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: time study, normal time
Learning Outcome: Explain options for managing bottlenecks and managing capacity in service and manufacturing processes.
AACSB: Analytical Thinking

32) Use the information in Scenario 2.1. What is the standard time for this job element if the allowance for the process is 25%?
A) 15 seconds
B) 20 seconds
C) 25 seconds
D) 30 seconds
Answer: C
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: time study, standard time
Learning Outcome: Explain options for managing bottlenecks and managing capacity in service and manufacturing processes.
AACSB: Analytical Thinking

Scenario 2.2
Garman observes a worker assembling peanut valves and records the data displayed in the table.

Time (seconds)	Observations
10	18
15	25
20	17

33) Use the information in Scenario 2.2. What is the average time for this job element?
A) 15.06 seconds
B) 14.92 seconds
C) 13.42 seconds
D) 11.19 seconds
Answer: B
Reference: Documenting and Evaluating the Process
Difficulty: Easy
Keywords: time study, average time
Learning Outcome: Explain options for managing bottlenecks and managing capacity in service and manufacturing processes.
AACSB: Analytical Thinking

34) Use the information in Scenario 2.2. What is the normal time for this job element if the rating factor is 75%?
A) 15.06 seconds
B) 14.92 seconds
C) 13.42 seconds
D) 11.19 seconds
Answer: D
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: time study, normal time
Learning Outcome: Explain options for managing bottlenecks and managing capacity in service and manufacturing processes.
AACSB: Analytical Thinking

35) Use the information in Scenario 2.2. What is the standard time for this job element if the allowance for the process is 20%?
A) 15.06 seconds
B) 14.92 seconds
C) 13.42 seconds
D) 11.19 seconds
Answer: C
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: time study, standard time
Learning Outcome: Explain options for managing bottlenecks and managing capacity in service and manufacturing processes.
AACSB: Analytical Thinking

36) Garman observes a worker assembling peanut valves and records the data displayed in the table. What is the normal time for this job element if the worker is rated at 80%?

Time (seconds)	Observations
20	10
25	15
30	12
35	12

A) less than 23 seconds
B) greater than or equal to 23 seconds but less than 26 seconds
C) greater than or equal to 26 seconds but less than 29 seconds
D) greater than or equal to 29 seconds
Answer: A
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: time study, normal time
Learning Outcome: Explain options for managing bottlenecks and managing capacity in service and manufacturing processes.
AACSB: Analytical Thinking

37) Keith assembles peanut valves and the recorded data is displayed in the table. What is the normal time for this job element if he is rated at 75%?

Time (minutes)	Observations
2.5	15
3.0	23
3.5	27

A) greater than or equal to 3 minutes
B) less than 3 minutes but greater than or equal to 2.6 minutes
C) less than 2.6 minutes but greater than or equal to 2.2 minutes
D) less than 2.2 minutes
Answer: C
Reference: Documenting and Evaluating the Process
Difficulty: Easy
Keywords: time study, normal time
Learning Outcome: Explain options for managing bottlenecks and managing capacity in service and manufacturing processes.
AACSB: Analytical Thinking

Scenario 2.3
A job consists of three elements. Twenty observations for each element were timed, and the resulting data are shown in the following table. A performance rating has also been assigned for each element, as shown in the table. The job has an allowance of 15% of normal time.

Element	Performance Rating (%)	Average Element Time (in minutes)
# 1	70	3.6
# 2	110	2.5
# 3	90	3.1

38) Use the information in Scenario 2.3. What is the normal time for job element #1?
A) greater than or equal to 3 minutes
B) less than 3 minutes but greater than or equal to 2.6 minutes
C) less than 2.6 minutes but greater than or equal to 2.2 minutes
D) less than 2.2 minutes
Answer: C
Reference: Documenting and Evaluating the Process
Difficulty: Easy
Keywords: time study, normal time
Learning Outcome: Explain options for managing bottlenecks and managing capacity in service and manufacturing processes.
AACSB: Analytical Thinking

39) Use the information in Scenario 2.3. What is the normal time for job element #2?
A) greater than or equal to 3 minutes
B) less than 3 minutes but greater than or equal to 2.6 minutes
C) less than 2.6 minutes but greater than or equal to 2.2 minutes
D) less than 2.2 minutes
Answer: B
Reference: Documenting and Evaluating the Process
Difficulty: Easy
Keywords: time study, normal time
Learning Outcome: Explain options for managing bottlenecks and managing capacity in service and manufacturing processes.
AACSB: Analytical Thinking

40) Use the information in Scenario 2.3. What is the normal time for job element #3?
A) greater than or equal to 3 minutes
B) less than 3 minutes but greater than or equal to 2.6 minutes
C) less than 2.6 minutes but greater than or equal to 2.2 minutes
D) less than 2.2 minutes
Answer: B
Reference: Documenting and Evaluating the Process
Difficulty: Easy
Keywords: time study, normal time
Learning Outcome: Explain options for managing bottlenecks and managing capacity in service and manufacturing processes.
AACSB: Analytical Thinking

41) Use the information in Scenario 2.3. What is the normal time for the *entire job*?
A) greater than or equal to 10.0 minutes
B) less than 10.0 minutes but greater than or equal to 8.5 minutes
C) less than 8.5 minutes but greater than or equal to 7.0 minutes
D) less than 7.0 minutes
Answer: C
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: time study, normal time
Learning Outcome: Explain options for managing bottlenecks and managing capacity in service and manufacturing processes.
AACSB: Analytical Thinking

42) Use the information in Scenario 2.3. What is the standard time for the *entire job*?
A) greater than or equal to 10.0 minutes
B) less than 10.0 minutes but greater than or equal to 8.5 minutes
C) less than 8.5 minutes but greater than or equal to 7.0 minutes
D) less than 7.0 minutes
Answer: B
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: time study, standard time
Learning Outcome: Explain options for managing bottlenecks and managing capacity in service and manufacturing processes.
AACSB: Analytical Thinking

Scenario 2.5
A job consists of three distinct work elements that were timed with a highly accurate Swiss watch by a trained industrial engineer wearing a pristine white lab jacket and carrying an official-looking clipboard. Worker ratings were less inflated by the newness of the job elements to the worker than by the overall nervousness of the worker. The engineer recorded ten observations and assigned the performance rating that is recorded in the bottom row of the table under the corresponding work element. All recorded times are in seconds.

Element 1	Element 2	Element 3
15	23	45
17	25	51
16	23	52
13	26	49
15	25	46
14	23	43
16	24	51
14	25	50
15	23	49
16	22	49
110	115	105

43) Use the data in Scenario 2.5 to answer this question. If the allowance factor is 15%, what is the average time for Element 1?
A) 15.1 seconds
B) 16.61 seconds
C) 19.1 seconds
D) 14.44 seconds
Answer: A
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: time study
Learning Outcome: Explain options for managing bottlenecks and managing capacity in service and manufacturing processes.
AACSB: Analytical Thinking

44) Use the data in Scenario 2.5 to answer this question. If the rating factor is 15%, what is the normal time for Element 2?
A) 23.9 seconds
B) 27.5 seconds
C) 28.1 seconds
D) 31.6 seconds
Answer: B
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: time study
Learning Outcome: Explain options for managing bottlenecks and managing capacity in service and manufacturing processes.
AACSB: Analytical Thinking

45) Use the data in Scenario 2.5 to answer this question. If the rating factor is 15%, what is the normal time for Element 3?
A) 44.3 seconds
B) 58.5 seconds
C) 50.9 seconds
D) 48.5 seconds
Answer: C
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: time study
Learning Outcome: Explain options for managing bottlenecks and managing capacity in service and manufacturing processes.
AACSB: Analytical Thinking

46) Use the data in Scenario 2.5 to answer this question. If the rating factor is 15%, what is the normal process time?
A) 109.27 seconds
B) 82.62 seconds
C) 100.63 seconds
D) 95.02 seconds
Answer: C
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: time study
Learning Outcome: Explain options for managing bottlenecks and managing capacity in service and manufacturing processes.
AACSB: Analytical Thinking

47) Use the data in Scenario 2.5 to answer this question. If the rating factor is 10% and the allowance is 15%, what is the standard process time?
A) 110.69 seconds
B) 82.62 seconds
C) 109.27 seconds
D) 95.02 seconds
Answer: A
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: time study
Learning Outcome: Explain options for managing bottlenecks and managing capacity in service and manufacturing processes.
AACSB: Analytical Thinking

48) A time study analyst is attempting to determine the standard time for a work element. She observes a worker performing the work element at a higher-than-average pace. How will this fact be reflected in the time standard that is eventually created?
A) The frequency of the work element per cycle will be increased.
B) The proportion of allowance time will be increased above 1.0.
C) The performance rating factor will be set greater than 1.0.
D) The normal time for the work element will be increased.
Answer: C
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: performance rating factor
Learning Outcome: Explain options for managing bottlenecks and managing capacity in service and manufacturing processes.
AACSB: Application of Knowledge

49) A manager is interested in setting a time standard for a machining operation. Which one of the following is LEAST likely to be of use?
A) time-study method
B) elemental standard data approach
C) predetermined data approach
D) work sampling method
Answer: D
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: work sampling
Learning Outcome: Explain options for managing bottlenecks and managing capacity in service and manufacturing processes.
AACSB: Application of Knowledge

50) Which of the following is NOT an advantage of the predetermined data approach to work measurement?
A) Standards can be set before production begins.
B) New work methods can be compared without conducting a time study.
C) Performance ratings are not needed to derive standards.
D) The approach is particularly applicable to firms with a flexible flow strategy.
Answer: D
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: predetermined data
Learning Outcome: Explain options for managing bottlenecks and managing capacity in service and manufacturing processes.
AACSB: Application of Knowledge

51) Which work measurement technique breaks down tasks into a series of generic micromotions?
A) time study method
B) elemental standard data approach
C) predetermined data approach
D) work-sampling method
Answer: C
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: micro-motion, work measurement, predetermined data
Learning Outcome: Explain options for managing bottlenecks and managing capacity in service and manufacturing processes.
AACSB: Application of Knowledge

52) Work sampling is most often used in situations in which:
A) a time standard is needed for a repetitive job.
B) an estimate of the proportion of the time spent on a particular activity is needed.
C) it is important to keep the sample size down.
D) special training is required for the observer, and stopwatches must be used.
Answer: B
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: work sampling
Learning Outcome: Explain options for managing bottlenecks and managing capacity in service and manufacturing processes.
AACSB: Application of Knowledge

53) A work sampling method is used to determine the proportion of the time a machine is idle. The following information was gathered on a random basis.

Day	No. Times Clerk Idle	Total No. of Observations
Monday	4	12
Tuesday	2	8
Wednesday	4	10
Thursday	2	10

What is the proportion of idle time observed for this machine?
A) less than or equal to 5%
B) greater than 5% but less than or equal to 15%
C) greater than 15% but less than or equal to 25%
D) greater than 25%
Answer: C
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: work sampling
Learning Outcome: Explain options for managing bottlenecks and managing capacity in service and manufacturing processes.
AACSB: Analytical Thinking

54) A work sampling method is used to determine the proportion of the time a worker is idle. The following information was gathered on a random basis.

Time	No. of Times Clerk Idle	Total No. of Observations
8:00 - 10:00 am	2	6
10:00 am - 12:00 pm	3	8
1:00 - 3:00 pm	2	7
3:00 - 5:00 pm	1	9

What is the proportion of idle time observed for this worker?
A) less than or equal to 5%
B) greater than 5% but less than or equal to 10%
C) greater than 10% but less than or equal to 20%
D) greater than 20%
Answer: D
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: work sampling
Learning Outcome: Explain options for managing bottlenecks and managing capacity in service and manufacturing processes.
AACSB: Analytical Thinking

55) A work sampling method is used to determine the proportion of the time a worker is idle. The following information was gathered on a random basis.

Day	No. of Times Clerk Idle	Total No. of Observations
Monday	8	26
Tuesday	8	32
Wednesday	7	28
Thursday	7	34

What is the proportion of idle time observed for this worker?
A) less than or equal to 5%
B) greater than 5% but less than or equal to 10%
C) greater than 10% but less than or equal to 20%
D) greater than 20%
Answer: D
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: work sampling
Learning Outcome: Explain options for managing bottlenecks and managing capacity in service and manufacturing processes.
AACSB: Analytical Thinking

56) The first unit of production takes 12 hours to produce and the learning rate is expected to be 80 percent. How long will it take to produce the fourth unit?
A) less than or equal to 7.0 hours
B) greater than 7.0 hours but less than or equal to 7.5 hours
C) greater than 7.5 but less than or equal to 8.0 hours
D) greater than 8.0 hours
Answer: C
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: learning curve, learning effect, labor
Learning Outcome: Describe learning-curve effects and the strategic implications of learning curves.
AACSB: Analytical Thinking

57) The first unit of production takes 12 hours to produce and the learning rate is expected to be 80 percent. How long will it take to produce the sixth unit?
A) less than or equal to 6.0 hours
B) greater than 6.0 hours but less than or equal to 7.7 hours
C) greater than 7.7 but less than or equal to 9.5 hours
D) greater than 8.0 hours
Answer: B
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: learning curve, learning effect, labor
Learning Outcome: Describe learning-curve effects and the strategic implications of learning curves.
AACSB: Analytical Thinking

58) The first unit of production takes 20 hours to produce and the learning rate is expected to be 90 percent. How long will it take to produce the fourth unit?
A) less than or equal to 12.0 hours
B) greater than 12.0 hours but less than or equal to 15.0 hours
C) greater than 15.0 but less than or equal to 18.0 hours
D) greater than 18.0 hours
Answer: C
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: learning curve, learning effect, labor
Learning Outcome: Describe learning-curve effects and the strategic implications of learning curves.
AACSB: Analytical Thinking

59) The first unit of production takes 20 hours to produce and the learning rate is expected to be 90 percent. How long will it take to produce the eighth unit?
A) less than or equal to 12.0 hours
B) greater than 12.0 hours but less than or equal to 15.0 hours
C) greater than 15.0 but less than or equal to 18.0 hours
D) greater than 18.0 hours
Answer: B
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: learning curve, learning effect, labor
Learning Outcome: Describe learning-curve effects and the strategic implications of learning curves.
AACSB: Analytical Thinking

60) The first unit of production takes 20 hours to produce and the learning rate is expected to be 90 percent. How long will it take to produce the twelfth unit?
A) less than or equal to 11.0 hours
B) greater than 11.0 hours but less than or equal to 13.0 hours
C) greater than 13.0 but less than or equal to 15.0 hours
D) greater than 15.0 hours
Answer: C
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: learning curve, learning effect, labor
Learning Outcome: Describe learning-curve effects and the strategic implications of learning curves.
AACSB: Analytical Thinking

Table 2.15
An analyst notes the time that customer appointments end with a tax preparer that is assigned customers requiring only the 1040EZ form. The times indicated in the table represent the departure times of the first eight clients for one tax preparation specialist.

Customer #	Time
1	12:45 pm
2	1:22 pm
3	1:53 pm
4	2:18 pm
5	2:40 pm
6	3:03 pm
7	3:21 pm
8	3:37 pm

61) Which statement about Table 2.15 is BEST?
A) Learning effects are not present because the time between successive customer departures is not always shorter than the preceding time.
B) Learning effects are present, but the actual percentage reduction cannot be determined.
C) Learning effects are present because in general the time between successive departures drops
D) Learning effects are present here but the actual percentage reduction cannot be determined
Answer: C
Reference: Documenting and Evaluating the Process
Difficulty: Easy
Keywords: learning curve analysis
Learning Outcome: Describe learning-curve effects and the strategic implications of learning curves.
AACSB: Analytical Thinking

62) Based on the data in Table 2.15 which value is closest to the learning rate for the tax preparer?
A) 80%
B) 85%
C) 90%
D) 95%
Answer: B
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: learning curve analysis
Learning Outcome: Describe learning-curve effects and the strategic implications of learning curves.
AACSB: Analytical Thinking

63) Based on Table 2.15, what time of day should the tax preparer complete the 12th return of the day?
A) 4:51 pm
B) 4:34 pm
C) 5:18 pm
D) 5:29 pm
Answer: C
Reference: Documenting and Evaluating the Process
Difficulty: Hard
Keywords: learning curve analysis
Learning Outcome: Describe learning-curve effects and the strategic implications of learning curves.
AACSB: Analytical Thinking

64) The analyst studies Table 2.15 closely, looks at his watch, and then the clock on the wall. He realizes that his watch has been running fast during the day, in fact since he returned from lunch at noon it has actually gained an hour. Hence, it's not really 3:37 pm right now, it's only 2:37 pm. He decides to make the assumption that the watch gained time at a constant rate over the last two hours and thirty-seven minutes. What is the actual learning rate that was observed?
A) 86.6%
B) 89.1%
C) 82.4%
D) 84.1%
Answer: A
Reference: Documenting and Evaluating the Process
Difficulty: Hard
Keywords: learning curve analysis
Learning Outcome: Describe learning-curve effects and the strategic implications of learning curves.
AACSB: Analytical Thinking

65) The analyst studies Table 2.15 closely, looks at his watch, and then the clock on the wall. He realizes that his watch has been running fast during the day, in fact since he returned from lunch at noon it has actually gained an hour. Hence, it's not really 3:37 pm right now, it's only 2:37 pm. He decides to make the assumption that the watch gained time at a constant rate over the last two hours and thirty-seven minutes. What time of day will the twelfth return be completed?
A) about 3:30 pm
B) about 3:45 pm
C) about 3:15 pm
D) about 4:00 pm
Answer: A
Reference: Documenting and Evaluating the Process
Difficulty: Hard
Keywords: learning curve analysis
Learning Outcome: Describe learning-curve effects and the strategic implications of learning curves.
AACSB: Analytical Thinking

66) A process troubleshooter has to decide which problem to address first with his or her cause-and-effect diagram. The data analysis tool that will help him decide which problem to tackle first is a:
A) scatter diagram.
B) check sheet.
C) flowchart.
D) Pareto chart.
Answer: D
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: Pareto chart, relative problem frequency
AACSB: Application of Knowledge

67) A manager of a fiberglass molding operation suspects that the number of process failures is related to the number of total units produced of a particular product. A tool most useful in this analysis would be a:
A) checklist.
B) cause-and-effect diagram.
C) Pareto chart.
D) scatter diagram.
Answer: D
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: scatter diagram
AACSB: Application of Knowledge

68) Which one of the following techniques will help management trace customer complaints directly to the process involved?
A) cause-and-effect diagram
B) quality circles
C) quality engineering
D) specification management
Answer: A
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: cause-and-effect diagram
AACSB: Application of Knowledge

69) A restaurant manager tracks complaints from the diner satisfaction cards that are turned in at each table. The data collected from the past week's diners appear in the following table.

Complaint	**Frequency**
Food taste	27
Food temperature	9
Order mistake	5
Slow service	19
Table/utensils dirty	47
Too expensive	9

Using a classic Pareto analysis, what categories comprise 80% of the total complaints?
A) Table/utensils dirty
B) Table/utensils dirty, Food taste, Slow service
C) Food taste, Food temperature, Order mistake, Slow service, Table/utensils dirty
D) Food taste, Food temperature, Order mistake, Slow service, Too expensive
Answer: B
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: Pareto analysis
AACSB: Analytical Thinking

70) A restaurant manager tracks complaints from the diner satisfaction cards that are turned in at each table. The data collected from the past week's diners appear in the following table.

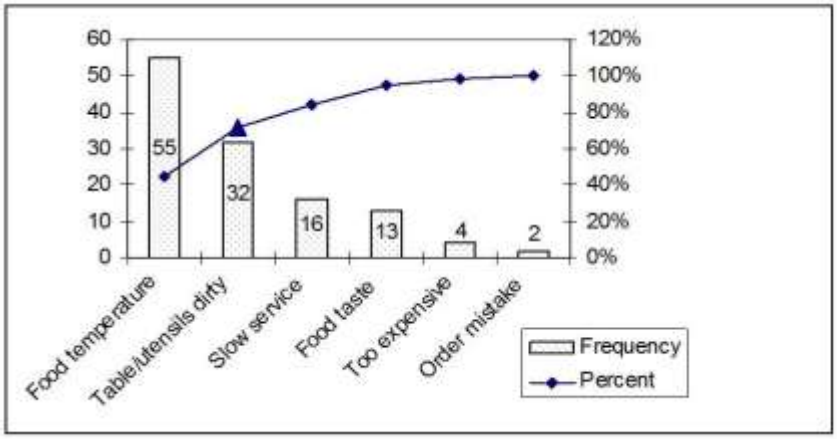
Complaint	**Frequency**
Food taste	80
Food temperature	9
Order mistake	2
Slow service	16
Table/utensils dirty	47
Too expensive	4

Using a classic Pareto analysis, what categories comprise about 20% of the total complaints?
A) Order mistake, Too expensive, Food temperature, Slow service
B) Slow service, Order mistake
C) Food taste, Food temperature, Slow service
D) Food taste, Table/utensils dirty
Answer: A
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: Pareto analysis
AACSB: Analytical Thinking

71) A farmer that has been well-trained in the scientific method divides his acreage into several plots and plants the same variety of hay in each. He varies the amount of fertilizer applied to each plot and carefully records the yield, in bales per acre, for each of the plots. Which of these tools would be the best to help him analyze the effect of fertilizer application on hay yield?
A) cause and effect diagram
B) scatter diagram
C) Pareto chart
D) flow chart
Answer: B
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: scatter diagram
AACSB: Analytical Thinking

72) Which of the following analyses is BEST suited for a scatter diagram?
A) A professor plots a student's exam score against the number of homework problems the student completed prior to the exam.
B) A professor determines a student's letter grade based on their final course average.
C) A professor determines the curve on the most recent exam by categorizing students into groups called A, B, C, etc.
D) A professor studies his student evaluations and classifies complaints into broad categories such as Assign More Homework and Make Exams More Challenging.
Answer: A
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: scatter diagram
AACSB: Application of Knowledge

73) A restaurant manager tracks complaints from the diner satisfaction cards that are turned in at each table. The data collected from the past week's diners have been plotted and appear in the following graph. The number of complaints for each category is with each bar.



How was the value for the point represented by the triangle calculated?
A) $\frac{3}{55+32}$
B) $\frac{55+32}{55+32}$
C) $\frac{32}{55+32+16+13+4+2}$
D) $\frac{55+32}{55+32+16+13+4+2}$
Answer: D
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: Pareto analysis
AACSB: Analytical Thinking

74) _____ is represented in a process flow chart when an outgoing arrow from one step splits into two or more arrows that lead to different boxes.
Answer: Divergence
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: decision point, divergence, flow chart
AACSB: Application of Knowledge

75) A(n) _____ shows processing steps grouped according to which company department is responsible for performing them.
Answer: swim lane flowchart
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: swim lane flowchart, flow chart
AACSB: Application of Knowledge

76) The _____ in a service blueprint separates which steps are in view of the customer from those that aren't.
Answer: line of visibility
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: line of visibility, service blueprint
AACSB: Application of Knowledge

77) _____ is the process of creating labor standards based on the judgment of skilled observers.
Answer: Work measurement
Reference: Documenting and Evaluating the Process
Difficulty: Easy
Keywords: work measurement
AACSB: Application of Knowledge

78) The time added to adjust for factors such as fatigue or equipment malfunction is called _____.
Answer: allowance, allowance time
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: allowance, allowance time
AACSB: Application of Knowledge

79) _____ involves estimating the proportion of time spent by people and machines on activities, based on a large number of observations.
Answer: Work sampling
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: work sampling
AACSB: Application of Knowledge

80) The _____ can be represented by a line called a learning curve.
Answer: learning effect
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: learning effect, learning curve
Learning Outcome: Describe learning-curve effects and the strategic implications of learning curves.
AACSB: Application of Knowledge

81) An eighty percent learning curve means that for each doubling of output, the time required to complete the last task is _____ percent less than before.
Answer: twenty
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: learning effect, learning curve
Learning Outcome: Describe learning-curve effects and the strategic implications of learning curves.
AACSB: Application of Knowledge

82) A(n) _____ is a form used to record the frequency of occurrence of certain product or service characteristics related to quality.
Answer: checklist
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: checklist
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Application of Knowledge

83) A(n) _____ is a bar chart on which the factors are plotted in decreasing order of frequency along the horizontal axis.
Answer: Pareto chart
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: Pareto chart
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Application of Knowledge

84) A(n) _____ would be a useful tool to determine the effect that the number of practice problems solved correctly has on the midterm score.
Answer: scatter diagram
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: scatter diagram
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Application of Knowledge

85) A(n) _____ is a diagram that relates a key quality problem to its potential causes.
Answer: cause-and-effect diagram
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: cause-and-effect, fishbone, Ishikawa
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Application of Knowledge

86) How can flowcharts and process charts be used to study and improve operations? Include descriptions of these two tools, the types of questions that can be addressed with them, and the extent to which teams can be used.
Answer: Flowcharts trace the flow of information, customers, employees, equipment, or material through a process. Process charts record all the activities performed by a person or a machine, at a workstation, with a customer, or on materials. Answers will vary.
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: flowchart, information flow, customer flow, employee flow, material flow
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Application of Knowledge

87) The sales team has just finished creating a process chart of the sales-call process. After fifteen minutes of high-fiving, they decide to tape the flowchart to the conference room wall and stand back a safe distance admiring the many symbols on the chart. You join them, and while you don't know much about sales calls, your expertise in process analysis and improvement is well-respected. What would you look for in the chart that would let you know whether their sales-call process was well-conceived?
Answer: Flowcharts trace the flow of information, customers, employees, equipment, or material through a process. At a glance, you might count the number of symbols representing transportation, inspection, and delays, since these process steps are typically not value-adding. You might also check for loops in the process and determine why there is a need to recirculate the information, customers, material, or workers through some of the process steps. Were these loops added because process steps are not always performed correctly the first time? Another general flow chart element to examine is the degree of branching. Are decision points clearly indicated and is there an unambiguous method for the worker or customer to realize which branch is the most appropriate one to take as they move forward through the process? Finally, you should realize that the flowchart was constructed by a group that is probably not accustomed to flowcharting (after all, they are in sales) so you might confirm that the process that has been charted is truly an "as-is" representation of the process and not a "hoped for" or "according to policy" representation.
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: flowchart, customer flow, employee flow, process improvement
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Application of Knowledge

88) You have been hired as an external consultant to improve processes at a business. You are unfamiliar with exactly how the work is currently done but are intimately familiar with charting techniques and data analysis tools. What is a general sequence for use of these tools and why should you use them in the sequence you specify?
Answer: Because you are unfamiliar with the process, you should first use a flowchart, service blueprint, or process chart. This diagram will give you a big-picture view of what is currently happening. Once you are more familiar with the organization and the departmental responsibilities, it might be helpful to re-cast this flowchart in the form of a swim lane flowchart to identify handoffs in the process flow. Flow charts in general will also provide some insight into key data collection points where workers might use checklists to collect some data. After data has been collected, elementary data analysis may be performed using a histogram, Pareto chart, and scatter diagram as appropriate. The tallest/leftmost bar on a Pareto chart can be the head of the first fishbone diagram (if the bars represent problems). Once the largest problem is solved, more data can be collected to verify that improvements in the process have taken place.
Reference: Documenting and Evaluating the Process
Difficulty: Hard
Keywords: checklist, histogram, Pareto chart, fishbone, cause-and-effect, flowchart, service blueprint
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Application of Knowledge

89) Consider the four steps in a time study. If an analyst were to make a mistake, during which step would the impact on the standard time be the greatest? Explain your reasoning.
Answer: The four steps are selecting work elements, timing the elements, determining the sample size, and setting the standard. Answers will vary as to the step that has the greatest impact on the standard time determination. If the work elements are not selected properly, then the analyst may include too many process steps, thereby inflating the standard time or too few, which would result in a standard time that is too low. A stopwatch error can also be too high or too low and might have the same impact. If the task is a 40-yard dash and the organization is an NFL team, those consequences can be disastrous. A sample size that is too small might result in some measurement error that could fall either way, but a sample that is too large would simply result in more time and effort expended collecting data than necessary. This large sample would yield a more accurate estimate than is absolutely necessary. Setting the standard improperly can again overestimate or underestimate the true standard time depending on the nature of the mathematical error.
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: time study
Learning Outcome: Explain options for managing bottlenecks and managing capacity in service and manufacturing processes.
AACSB: Application of Knowledge

90) Explain why a sampling schedule is important in a work sampling study.
Answer: A sampling schedule should determine when the workers are to be observed because the observations are just snapshots of time. In addition, the observation times should be randomized to avoid biases in worker performance.
Reference: Documenting and Evaluating the Process
Difficulty: Easy
Keywords: work sampling, schedule
Learning Outcome: Explain options for managing bottlenecks and managing capacity in service and manufacturing processes.
AACSB: Application of Knowledge

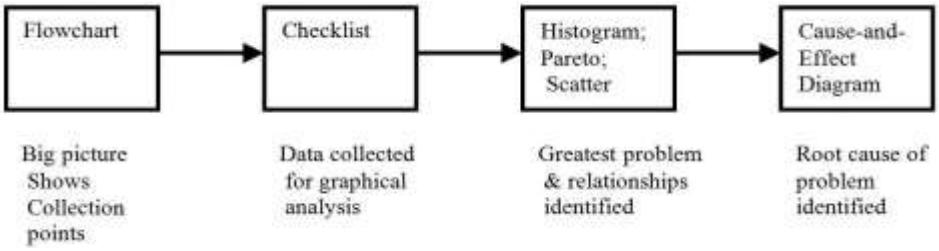
91) Compare and contrast the method of time study to the method of work sampling. What are the strengths and limitations of each, and for which applications are they best suited?
Answer: Both are direct observation methods. However, a time study observes several cycles of work elements to determine a time standard, whereas work sampling takes "snapshots" of the facility to determine the percentage of time engaged in an activity. Time studies require experienced analysts, should not be used for tasks that vary each time, and are many times found to be objectionable to workers. Work sampling does not require special training and is generally accepted by workers because it tends to examine activities of the group rather than of the individual. In addition, many work sampling studies can be conducted simultaneously.
Reference: Documenting and Evaluating the Process
Difficulty: Hard
Keywords: time study method, work sampling method
Learning Outcome: Explain options for managing bottlenecks and managing capacity in service and manufacturing processes.
AACSB: Application of Knowledge

92) A manager of a company producing computer chips knows that in the early stages of production for a new product, the expenditures exceed receipts, whereas in the latter stages, the reverse is true. Give an explanation for this phenomenon.
Answer: The learning curve theory states that the direct labor costs will exceed the average in the early stages of production, whereas the reverse is true in the latter stages. Pricing is often predicted on average costs.
Reference: Documenting and Evaluating the Process
Difficulty: Hard
Keywords: learning curves, direct labor
Learning Outcome: Describe learning-curve effects and the strategic implications of learning curves.
AACSB: Application of Knowledge

93) An industrial engineer observes a brand new process and develops time standards for several of the manual components of the production line. What are the implications of learning effects on the time standards and the line balance? What could be done to address this situation?
Answer: The learning curve theory states that the labor requirement will be greater in the early stages of production and lower as workers enjoy several repetitions of their jobs. A line balance that is performed using inflated times will have increased idle time and decreased efficiency as learning effects occur. The industrial engineer can compensate for learning effects by applying a smaller performance rating factor (or allowance factor if downtime is an issue). If the industrial engineer is unsure of the workers' learning rate, the line can be balanced, and then a second study performed to rebalance it.
Reference: Documenting and Evaluating the Process
Difficulty: Hard
Keywords: learning curves, labor, output rate, time standard, line balance
Learning Outcome: Describe learning-curve effects and the strategic implications of learning curves.
AACSB: Application of Knowledge

94) How could a fishbone chart be used to design a new process?
Answer: Also called a cause-and-effect diagram, the classic fishbone chart relates a key quality problem to its potential causes. Instead of placing a problem at the head of the fish, instead the process designers might place the desired process outcome at the head of the fish, e.g., "100% accuracy in order fulfillment" and then fill out the skeletal structure with elements that can help achieve this desired process outcome.
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: fishbone diagram, cause-and-effect diagram
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Application of Knowledge

95) Create a flowchart that displays the proper sequential use of the major graphical tools in Chapter 4, "Process Analysis." Include a note next to each tool that explains how the output of one tool is used as the input for the following tool.
Answer: A flowchart shows a big picture view of the process. The output from this step is a view that shows appropriate points for data collection using a checklist. Once the checklist has been deployed, the data that has been collected can be analyzed by a histogram or a Pareto chart (if data can be categorized) or a scatter diagram (if coordinate data fall more naturally into continuous distributions). Finally, the tallest bar in the Pareto chart serves as the input to a fishbone (or cause-and-effect) diagram as the fishbone's head.



Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: flowchart, checklist, histogram, Pareto, scatter, fishbone, cause-and-effect
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Analytical Thinking

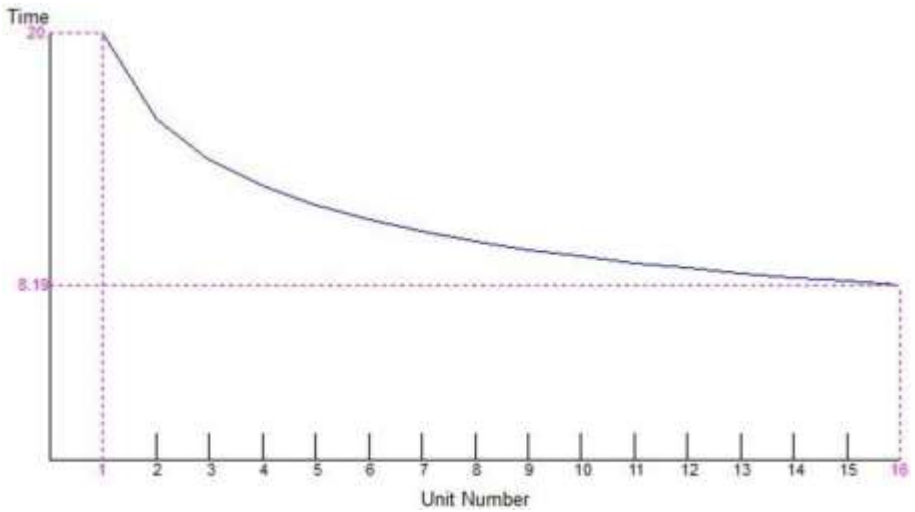
96) An existing insurance application process requires manual keying of three different forms by a team of data entry operators. The three forms' input times appear in the following table along with the numbers of each type of form anticipated for the coming year. A proposed refinement in the process would reduce the number of forms but make each slightly longer. This would be combined with a search of public records on the World Wide Web as necessary. These times and quantities appear in the lower half of the table. If the labor rate for the data entry operators is the same, which method is preferable?

Form	Time to Input (minutes)	Quantity (forms/year)
Part A — Existing Method	3	1,200,000
Part B — Existing Method	3	1,200,000
Part C — Existing Method	4	1,100,000
P art A — Proposed Method	4	1,200,000
Part B — Proposed Method	4	1,200,000
Web Search — Proposed Method	2	650,000

Answer: Annual Labor Cost = (Time to Perform Process) × (Number of Times Performed/Year)
Existing Method
Part A 3 minutes × 1,200,000 = 3,600,000
Part B 3 minutes × 1,200,00 0 = 3,600,000
Part C 4 minutes × 1,100,000 = 4,400,000

Proposed Method
Part A 4 minutes × 1,200,000 = 4,800,000
Part B 4 minutes × 1,200,000 = 4,800,000
Part C (web) 2 minutes × 650,000 = 1,300,000
Total Proposed Process: 10,900,000 minutes - A savings of 700,000 minutes/year
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: annual labor cost
AACSB: Analytical Thinking

97) The labor time for successive units produced is plotted in the graph shown below. What is the learning percentage reflected by this graph?

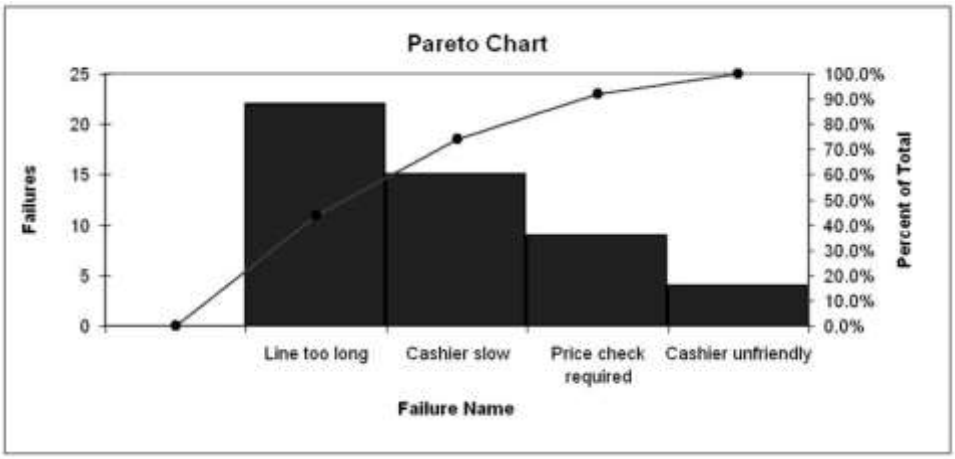


Answer: The first unit takes 20 units of time and the 16th unit takes 8.19 of the same time units. From the first to the 16th unit there are four doublings of output, each with an identical reduction in percentage of time needed for the last unit. In the absence of the classic learning curve formula, a student might set up a goal seek in Excel to find the appropriate learning curve percentage or use a trial and error approach with POM for Windows.
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: learning curve
Learning Outcome: Describe learning-curve effects and the strategic implications of learning curves.
AACSB: Analytical Thinking

98) A discount store is experiencing an unacceptable number of dissatisfied customers leaving from the checkout process. Information from customer complaints about the checkout process was collected and is found in the following table. Construct a Pareto chart to identify the significant problems.

Problem Type	**Total Problems**
Cashier slow	15
Price check required	9
Line too long	22
Cashier unfriendly	4

Answer:



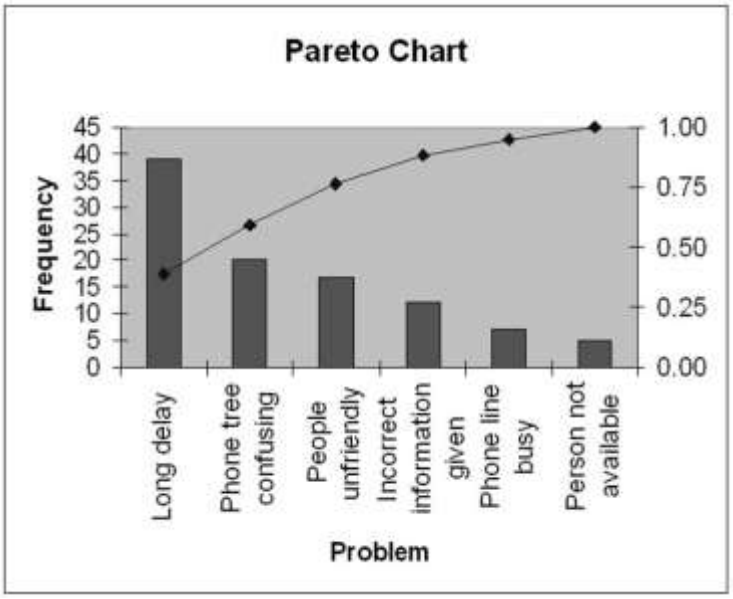
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: Pareto chart
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Analytical Thinking

99) Develop a fishbone diagram from the perspective of a pizza restaurateur to troubleshoot the pizza delivery process to determine why weekend pizza deliveries are usually late. Make sure your diagram includes at least four bones and ten ribs.
Answer: Answers will vary, but the head of the fishbone diagram should show "late pizza delivery on the weekend" as the problem to be studied. Major bones might include materials, manpower, machinery, methods, procedures, other, policies, among others. Specific statements for ribs will provide the greatest variety but might include a lack of ingredients, mislabeled ingredients, poor handwriting, computer glitch, ovens of insufficient capacity, poorly trained employees, low staffing levels, poor delivery vehicles, and directionally-challenged drivers, among others.
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: fishbone diagram
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Analytical Thinking

100) Because a telephone customer service center has experienced several problems, it has begun to analyze the data from customer complaints. The first step was to construct the following table. Use this data to build a Pareto chart to help identify the "vital few" problems.

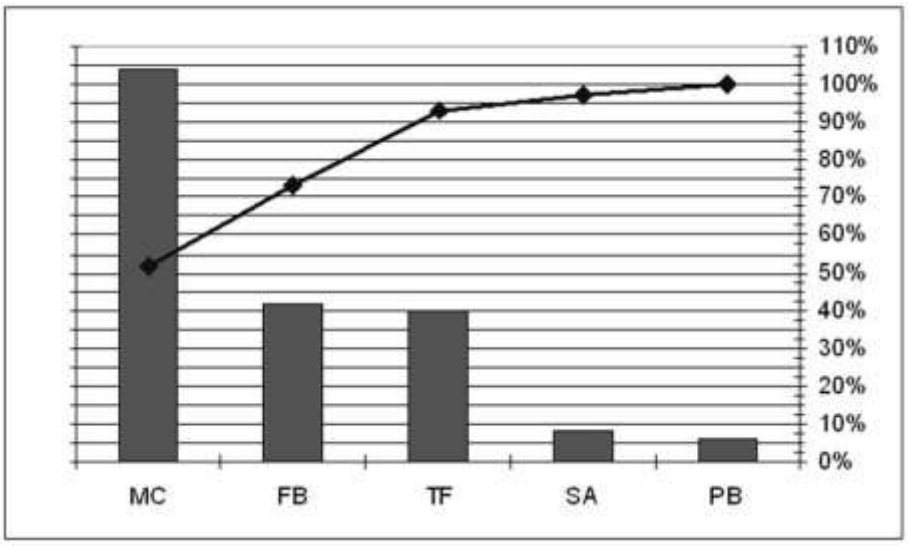
Process Failure	Total Failures
Person not available	5
Incorrect information given	12
Phone line busy	7
Long delay	39
Phone tree confusing	20
People unfriendly	17

Answer:



Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: Pareto chart
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Analytical Thinking

101) The semester project came back from the copy store and to her horror, the project leader has just noticed that the left side y-axis of a key Pareto chart was cut off due to a printing error. The bar chart component uses the missing left side y-axis and the cumulative percentage line on the Pareto chart uses the right side y-axis. The project leader is pretty sure that the total number of observations in all combined categories is 200. Can you help her develop estimates of the counts for each of the five categories?

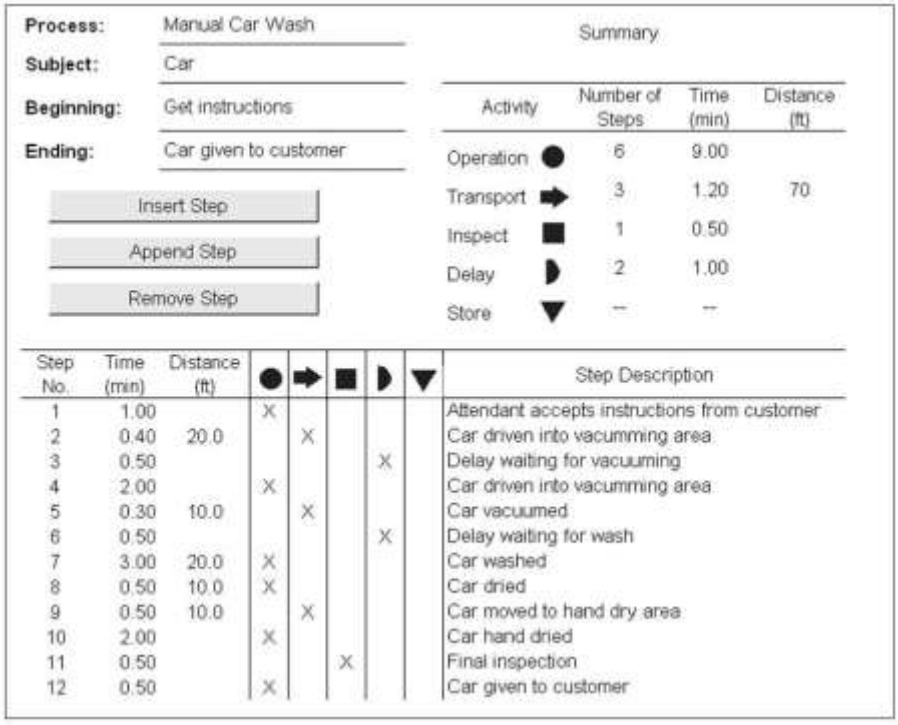


Answer: The actual counts for the five categories are:

Category	Count
MC	104
FB	42
TF	40
SA	8
PB	6

Some allowance should be made for alignment in reading the graph's right hand y-axis and matching up the location of the cumulative percentage markers for each category. Because the total number of observations equals 200, the percentages on the right side y-axis can be multiplied by 200 to yield estimates of the count values. Based on a rough reading:
MC = 200 × 52.5 = 105
FB = 200 × (72.5 - 52.5) = 40
TF = 200 × (92.5 - 72.5) = 40
SA = 200 × (97.5 - 92.5) = 10
PB = 200 × (100 - 97.5) = 5
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: Pareto chart
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Analytical Thinking

102) Develop a process chart for a manual car wash.
Answer: Answers will vary, but a typical answer might look like the following process chart:



Process: Manual Car Wash
Subject: Car
Beginning: Get instructions
Ending: Car given to customer

Insert Step
Append Step
Remove Step

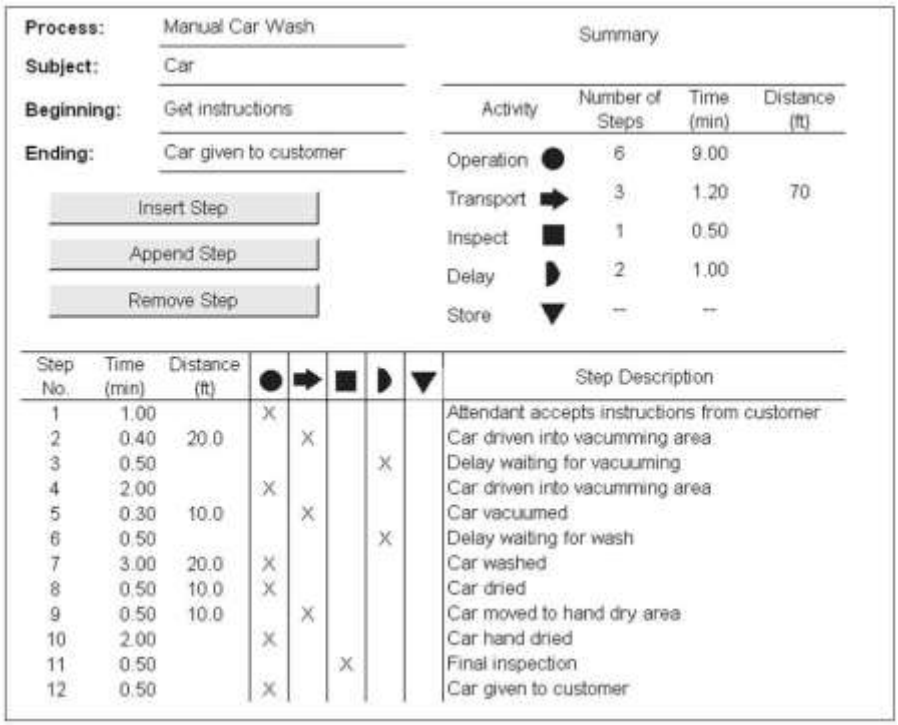
Summary

Activity	Number of Steps	Time (min)	Distance (ft)
Operation ●	6	9.00	
Transport ➡	3	1.20	70
Inspect ■	1	0.50	
Delay ◗	2	1.00	
Store ▼	--	--	

Step No.	Time (min)	Distance (ft)	●	➡	■	◗	▼	Step Description
1	1.00		X					Attendant accepts instructions from customer
2	0.40	20.0		X				Car driven into vacumming area
3	0.50					X		Delay waiting for vacuuming
4	2.00		X					Car driven into vacumming area
5	0.30	10.0		X				Car vacuumed
6	0.50					X		Delay waiting for wash
7	3.00	20.0	X					Car washed
8	0.50	10.0	X					Car dried
9	0.50	10.0		X				Car moved to hand dry area
10	2.00		X					Car hand dried
11	0.50				X			Final inspection
12	0.50		X					Car given to customer

Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: process chart
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Analytical Thinking

103) Develop a process chart for one of the following:
1) Researching and writing a paper for your Operations Management class
2) Managing, developing and completing a team project for a Finance (or other) class
3) Planning for your job interview process as you approach graduation (including resume preparation, developing interview skills, researching company backgrounds, etc.)
4) Studying and developing a process improvement plan for a business or other process you are familiar with (e.g., fast food restaurant, obtaining tickets to a university-sponsored event, dry cleaners, book purchases for next term, and the like)
Answer: Answers will vary, but should follow the approach used to develop the following process chart for a manual car wash. The process chart should include all value adding and non-value adding steps, and a summary of the steps and times that recap the process.



Process: Manual Car Wash
Subject: Car
Beginning: Get instructions
Ending: Car given to customer

Insert Step
Append Step
Remove Step

Summary

Activity	Number of Steps	Time (min)	Distance (ft)
Operation ●	6	9.00	
Transport ➡	3	1.20	70
Inspect ■	1	0.50	
Delay ◗	2	1.00	
Store ▼	--	--	

Step No.	Time (min)	Distance (ft)	●	➡	■	◗	▼	Step Description
1	1.00		X					Attendant accepts instructions from customer
2	0.40	20.0		X				Car driven into vacumming area
3	0.50					X		Delay waiting for vacuuming
4	2.00		X					Car driven into vacumming area
5	0.30	10.0		X				Car vacuumed
6	0.50					X		Delay waiting for wash
7	3.00	20.0	X					Car washed
8	0.50	10.0	X					Car dried
9	0.50	10.0		X				Car moved to hand dry area
10	2.00		X					Car hand dried
11	0.50				X			Final inspection
12	0.50		X					Car given to customer

Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: process chart
Learning Outcome: Discuss the total cost of quality and compare the common methods of managing quality
AACSB: Analytical Thinking

104) A pilot work study has been conducted on a new operation with four work elements. The following times, in seconds, were obtained using a time study.

	Observations					
Element	1	2	3	4	5	RF
1	11	15	10	14	15	1.10
2	26	30	25	29	30	1.05
3	11	8	7	13	11	0.85

a. What is the normal time for this operation?
b. If an allowance of 20 percent is used, what is the standard time for this task?
Answer:

Work Element	**Rating Factor**	**Average Time**	**Normal Times**
1	1.10	13.0	14.3
2	1.05	28.0	29.4
3	0.85	10.0	8.5

a. Normal time = 14.3 + 29.4 + 8.5 = 52.2 seconds
b. Standard time = (52.2)(1.20) = 62.64 seconds
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: time study, normal time, standard time
Learning Outcome: Explain options for managing bottlenecks and managing capacity in service and manufacturing processes.
AACSB: Analytical Thinking

105) An undergraduate business student studies diligently in the library late in the term in anticipation of an outstanding performance on her final exams. She asks a friend to spy on her at random intervals to determine what percentage of time she is actually studying. Over the course of three days, her friend records the following observations:

Observation Period	Times Studying	Times Not Studying	Observations
Monday	19	4	23
Tuesday	22	4	26
Wednesday	9	2	11

Based on this work sample, what percentage of time was the student actually studying?
Answer: Total observations = 60
Number of observations student was studying = 50
% of time studying = 50 / 60 = 83.3%
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: work sampling study, work sample
Learning Outcome: Explain options for managing bottlenecks and managing capacity in service and manufacturing processes.
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Scenario 2.5
A job consists of three distinct work elements that were timed with a highly accurate Swiss watch by a trained industrial engineer wearing a pristine white lab jacket and carrying an official-looking clipboard. Worker ratings were less inflated by the newness of the job elements to the worker than by the overall nervousness of the worker. The engineer recorded ten observations and assigned the performance rating that is recorded in the bottom row of the table under the corresponding work element. All recorded times are in seconds.

Element 1	Element 2	Element 3
15	23	45
17	25	51
16	23	52
13	26	49
15	25	46
14	23	43
16	24	51
14	25	50
15	23	49
16	22	49
110	115	105

106) The allowance factor assigned is 20% for the data recorded. The rating factor for Element 1 is 10%, for Element 2 is 15%, and for Element 3 is 5%. What is the standard time for the three-element job?
Answer: The average for Element 1 is 15.1 seconds; the average for Element 2 is 23.9 seconds; the average for Element 3 is 48.5 seconds.
The normal time for Element 1 is 16.61 seconds; the normal time for Element 2 is 27.49 seconds; the normal time for Element 3 is 50.93 seconds.
Add 'em all up to get 95.02 seconds and multiply by 1.20 to get a standard time for the job of 114.02 seconds.
Reference: Documenting and Evaluating the Process
Difficulty: Moderate
Keywords: time study
Learning Outcome: Explain options for managing bottlenecks and managing capacity in service and manufacturing processes.
AACSB: Analytical Thinking

2.7 Redesigning and Managing Process Improvements

1) A group of people, who are knowledgeable about the process and its disconnects, meets to propose ideas for change in a rapid-fire manner. Such a session is called a brainstorming session.
Answer: TRUE
Reference: Redesigning and Managing Process Improvements
Difficulty: Easy
Keywords: brainstorming, process ideas
AACSB: Application of Knowledge

2) Brainstorming sessions can be effectively conducted on the Internet using software that allows one person to see another's ideas and build on them.
Answer: TRUE
Reference: Redesigning and Managing Process Improvements
Difficulty: Easy
Keywords: brainstorming, Internet software
AACSB: Application of Knowledge

3) The bursar's office at a large state school sends a team to the bookstore on campus to see how they handle customers and process payments. This is an example of functional benchmarking.
Answer: FALSE
Reference: Redesigning and Managing Process Improvements
Difficulty: Hard
Keywords: functional benchmarking, internal benchmarking
AACSB: Application of Knowledge

4) All forms of benchmarking are best applied in situations where long-term continuous improvement is desired.
Answer: TRUE
Reference: Redesigning and Managing Process Improvements
Difficulty: Moderate
Keywords: benchmarking
AACSB: Application of Knowledge

5) Benchmarking is a continuous, systematic procedure that measures a firm's products, services, and processes against those of industry leaders.
Answer: TRUE
Reference: Redesigning and Managing Process Improvements
Difficulty: Moderate
Keywords: benchmarking, measure, industry leader
AACSB: Application of Knowledge

6) Which of these questions is not one of the initial round questions typically used to uncover opportunities during a process redesign?
A) What is being done?
B) When is it being done?
C) Who is doing it?
D) Why are we doing it?
Answer: D
Reference: Redesigning and Managing Process Improvements
Difficulty: Moderate
Keywords: process redesign, questioning, brainstorming
AACSB: Application of Knowledge

7) Brainstorming sessions must have:
A) all participants together in the same room.
B) a mechanism for evaluation of the ideas as they are surfaced.
C) a means of implementing ideas as they are surfaced.
D) a way for all participants to communicate.
Answer: D
Reference: Redesigning and Managing Process Improvements
Difficulty: Easy
Keywords: brainstorming
AACSB: Application of Knowledge

8) Benchmarking involves four basic steps, which are:
A) plan, do, check, and act.
B) planning, analysis, integration, and action.
C) search, check, systematize, and act.
D) find, do, change, and calibrate.
Answer: B
Reference: Redesigning and Managing Process Improvements
Difficulty: Moderate
Keywords: benchmarking steps
AACSB: Application of Knowledge

9) Xerox benchmarked its distribution system against that of L. L. Bean's. This is an example of:
A) competitive benchmarking.
B) internal benchmarking.
C) functional benchmarking.
D) disaggregate benchmarking.
Answer: C
Reference: Redesigning and Managing Process Improvements
Difficulty: Moderate
Keywords: benchmarking, functional
AACSB: Application of Knowledge

10) Benchmarking studies must have:
A) a direct competitor for comparison.
B) a team composed of at least one member from each department in the organization.
C) a team composed of at least one member from each department in the organization plus one customer of each process output.
D) quantitative goals.
Answer: D
Reference: Redesigning and Managing Process Improvements
Difficulty: Moderate
Keywords: benchmarking, data, quantitative goals
AACSB: Application of Knowledge

11) An accounting firm realizes it is woefully inadequate at cultivating new clients. It is allowed to observe a rival firm perform the new-client cultivation process in hopes of gleaning improved methods it can adopt. This is an example of:
A) competitive benchmarking.
B) functional benchmarking.
C) internal benchmarking.
D) generic benchmarking.
Answer: A
Reference: Redesigning and Managing Process Improvements
Difficulty: Moderate
Keywords: benchmarking, competitive
AACSB: Application of Knowledge

12) An accounting professor realizes she is woefully inadequate at performing research. She discusses the art of research with a colleague and gains important insights that permit her to establish a research agenda. This is an example of:
A) competitive benchmarking.
B) functional benchmarking.
C) internal benchmarking.
D) generic benchmarking.
Answer: C
Reference: Redesigning and Managing Process Improvements
Difficulty: Moderate
Keywords: benchmarking, internal
AACSB: Application of Knowledge

13) An accounting firm realizes it is woefully inadequate at cultivating new clients. It is allowed to observe a law firm perform the new-client cultivation process in hopes of gleaning improved methods it can adopt. This is an example of:
A) competitive benchmarking.
B) functional benchmarking.
C) internal benchmarking.
D) generic benchmarking.
Answer: B
Reference: Redesigning and Managing Process Improvements
Difficulty: Moderate
Keywords: benchmarking, functional
AACSB: Application of Knowledge

14) A benchmarking team meets for the first time and decides to try to improve its order delivery time and selects another firm as a benchmarking partner. This phase of the benchmarking process is called:
A) planning.
B) selection.
C) integration.
D) action.
Answer: A
Reference: Redesigning and Managing Process Improvements
Difficulty: Moderate
Keywords: benchmarking, planning
AACSB: Application of Knowledge

15) A benchmarking team establishes goals and obtains support from the management team that agrees to provide resources for accomplishing the goals. This phase of the benchmarking process is called:
A) goal setting.
B) analysis.
C) integration.
D) action.
Answer: C
Reference: Redesigning and Managing Process Improvements
Difficulty: Moderate
Keywords: benchmarking, integration
AACSB: Application of Knowledge

16) A benchmarking team develops improvement plans and team assignments. Once the plans are implemented it monitors progress and recalibrates benchmarks as improvements are made. This phase of the benchmarking process is called:
A) implementation.
B) analysis.
C) integration.
D) action.
Answer: D
Reference: Redesigning and Managing Process Improvements
Difficulty: Moderate
Keywords: benchmarking, action
AACSB: Application of Knowledge

17) Which of these benchmarking metrics is NOT suitable for a support process?
A) average employee turnover rate
B) total cost of payroll processes per $1,000 revenue
C) the impression that applicants have as they submit applications
D) number of accepted jobs as a percent of job offers
Answer: C
Reference: Redesigning and Managing Process Improvements
Difficulty: Easy
Keywords: benchmarking metrics
AACSB: Application of Knowledge

18) When managing processes, it is vital that:
A) attention is paid to competitive priorities and strategic fit.
B) design teams are allowed to function creatively and set their own charter.
C) design teams are not held accountable since their involvement ends once the new process rolls out.
D) the organization is not satisfied unless fundamental reengineering changes are made.
Answer: A
Reference: Redesigning and Managing Process Improvements
Difficulty: Moderate
Keywords: managing processes, competitive priorities, strategic fit
AACSB: Application of Knowledge

19) When managing processes, it is vital that:
A) design teams are allowed to function creatively and set their own charter.
B) the organization is not satisfied unless fundamental reengineering changes are made.
C) sound project management practices are used to implement the redesigned process.
D) people are redesigned at the same time the process is redesigned.
Answer: C
Reference: Redesigning and Managing Process Improvements
Difficulty: Moderate
Keywords: managing processes, project implementation
AACSB: Application of Knowledge

20) Good process management should include:
A) a mechanism for identifying what goes wrong and who is responsible.
B) a method for creating self-directed work teams.
C) at least half time dedicated to each employee's self-actualization.
D) an infrastructure for continuous improvement.
Answer: D
Reference: Redesigning and Managing Process Improvements
Difficulty: Moderate
Keywords: managing processes, continuous improvement
AACSB: Application of Knowledge

21) A(n) _____ is a method where a group of people, knowledgeable about the process and its disconnects, propose ideas for change in a rapid-fire manner.
Answer: brainstorming session
Reference: Redesigning and Managing Process Improvements
Difficulty: Moderate
Keywords: brainstorming
AACSB: Application of Knowledge

22) _____ is a continuous, systematic procedure that measures a firm's products, services, and processes against those of industry leaders.
Answer: Benchmarking
Reference: Redesigning and Managing Process Improvements
Difficulty: Moderate
Keywords: benchmarking
AACSB: Application of Knowledge

23) Once the benchmarking team has collected the data, the _____ phase of the benchmarking study can begin.
Answer: analysis
Reference: Redesigning and Managing Process Improvements
Difficulty: Moderate
Keywords: benchmarking, analysis
AACSB: Application of Knowledge

24) The bursar's office at your university decides to benchmark the collections department of a credit agency to improve their own collection rate. This is an example of _____.
Answer: functional benchmarking
Reference: Redesigning and Managing Process Improvements
Difficulty: Moderate
Keywords: benchmarking, functional benchmarking
AACSB: Application of Knowledge

25) _____ is based on comparison of processes with a direct adversary in industry.
Answer: Competitive benchmarking
Reference: Redesigning and Managing Process Improvements
Difficulty: Moderate
Keywords: benchmarking, competitive benchmarking
AACSB: Application of Knowledge

26) _____ data is probably the easiest to obtain compared to other types of benchmarking data.
Answer: Internal benchmarking
Reference: Redesigning and Managing Process Improvements
Difficulty: Moderate
Keywords: internal, internal benchmarking
AACSB: Application of Knowledge

27) _____ involves using an organizational unit with superior performance as the ideal for other departments.
Answer: Internal benchmarking
Reference: Redesigning and Managing Process Improvements
Difficulty: Moderate
Keywords: benchmarking, internal
AACSB: Application of Knowledge

28) What are the generic steps in any benchmarking study and what are examples of the three types of benchmarking?
Answer: The steps in any benchmarking study are planning, analysis, integration, and action. The planning step requires the benchmarking team to identify the process, service, or product to be benchmarked, the firms to be used for comparison, and the collection of data. In the analysis step, the team determines the gap between its employer and the benchmarking partner. The integration step features the establishment of goals for the new process and secures management support for changes. The action phase is when plans are developed and implemented and the benchmarks are recalibrated as improvements are realized. Examples will vary but the three types are competitive, functional, and internal. Competitive benchmarking is comparison with a direct competitor; functional benchmarking is a comparison with similar functions outside the firm but not of a direct competitor; and internal benchmarking is a comparison with another department or function in the same company.
Reference: Redesigning and Managing Process Improvements
Difficulty: Hard
Keywords: benchmarking, competitive, internal, functional
AACSB: Application of Knowledge

29) The authors discuss seven mistakes when managing processes, arguing that failure to manage processes is ultimately a failure to manage the business. What are any four of those mistakes?
Answer: Answers will vary depending on which four mistakes are chosen. The full list of seven mistakes are:
1. *Not Connecting with Strategic Issues*. Is particular attention being paid to core processes, competitive priorities, impact of customer contact and volume, and strategic fit during process analysis?
2. *Not Involving the Right People in the Right Way*. Does process analysis closely involve the people performing the process, or those closely connected to it as internal customers and suppliers?
3. *Not Giving the Design Teams and Process Analysts a Clear Charter, and then Holding Them Accountable*. Does management set expectations for change and maintain pressure for results? Does it allow paralysis in process improvement efforts by requiring excessive analysis?
4. *Not Being Satisfied Unless Fundamental "Reengineering" Changes are Made*. Is the radical change from process reengineering the expectation? If so, the cumulative effect of many small improvements that could be made incrementally could be lost. Process management efforts should not be limited to downsizing or to reorganization only, even though jobs may be eliminated or the structure changed. It should not be limited to big technological innovation projects, even though technological change occurs often.
5. *Not Considering the Impact on People*. Are the changes aligned with the attitudes and skills of the people who must implement the redesigned process? It is crucial to understand and deal with the people side of process changes.
6. *Not Giving Attention to Implementation*. Are processes redesigned, but never implemented? A great job of flowcharting and benchmarking is of only academic interest if the proposed changes are not implemented. Sound project management practices are required.
7. *Not Creating an Infrastructure for Continuous Process Improvement*. Is a measurement system in place to monitor key metrics over time? Is anyone checking to see whether anticipated benefits of a redesigned process are actually being realized?
Reference: Redesigning and Managing Process Improvements
Difficulty: Hard
Keywords: processes, managing processes
AACSB: Application of Knowledge

30) Suppose you have owned and operated your own package delivery business for a year. You would like to engage in competitive benchmarking to make sure your business is run as smoothly as possible. What firms and processes would you consider for benchmarking? Defend your choices of these firms and processes. What specific metrics would you focus on and why? How could the data be reliably collected at your own business?
Answer: Answers will vary, but processes that might be considered are the pick up and delivery processes, sorting, billing, customer service, and many others. The student might identify some processes as being more crucial to customer satisfaction or more tightly coupled with their own corporate strategy, or perhaps processes that they feel are the most difficult to master. Metrics include the percent of on-time delivery, fraction of correct bills, profit per package, number of days delivery, fill rate of delivery vehicles, and many others. The data may be collected via information technology in the field or automatically collected as packages pass delivery checkpoints. Customer satisfaction data can be collected by comment cards or by customer service representatives staffing a calling center.
Reference: Redesigning and Managing Process Improvements
Difficulty: Moderate
Keywords: benchmarking, competitive benchmarking
AACSB: Application of Knowledge