

## **Chapter 1: Product Line Planning and the Systems Approach**

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### **TRUE/FALSE**

1. Goals and strategies must be congruent and realistic.

ANS: T                      PTS: 1                      REF: 1-Strategic Thinking

2. Operations management is the systematic planning and control of operations.

ANS: T                      PTS: 1                      REF: 1-1b

3. Jobs in the service industries pay better than jobs in manufacturing.

ANS: F                      PTS: 1                      REF: 1-1b

4. The functional field approach is essential for P/OM planning and decision making in a global environment.

ANS: F                      PTS: 1                      REF: 1-1c

5. There are two approaches that P/OM can use: the functional field approach and the systems approach.

ANS: T                      PTS: 1                      REF: 1-2

6. The functional field approach entails having all participants cooperate in solving problems that require mutual involvement.

ANS: F                      PTS: 1                      REF: 1-2

7. The functional field approach leads to better decisions and provides better problem solving for complex situations, enabling those that use it to be more successful.

ANS: F                      PTS: 1                      REF: 1-2b

8. Elements that qualify to be part of a system are those that have a direct or indirect impact on the problem or its solution; on the plan or the decision.

ANS: T                      PTS: 1                      REF: 1-2c

9. The key to understanding the relevant system is to identify all of the main players and elements that interact to create the system in which the real problem resides.

ANS: T                      PTS: 1                      REF: 1-2c

10. The functional field approach requires identification of all the elements related to purposes and goals.

ANS: F                      PTS: 1                      REF: 1-3

11. The system approach requires control of timing.

ANS: T                      PTS: 1                      REF: 1-3

12. The system approach requires teamwork.

ANS: T                    PTS: 1                    REF: 1-3

13. Operations management problems are composed of complex subsystems, which require interfunctional communications to uncover the patterns that relate to the subsystems of the whole system.

ANS: T                    PTS: 1                    REF: 1-3a

14. There are more differences than similarities between P/OM manufacturing and OM service organizations.

ANS: F                    PTS: 1                    REF: 1-4

15. The methodology of P/OM was first developed by and for service, but is has now been extended to manufacturing with great success.

ANS: T                    PTS: 1                    REF: 1-4

16. Service industries employ an increasing percent of the workforce.

ANS: T                    PTS: 1                    REF: 1-4

17. Comparing goods and services, the similarities stop, and significant differences occur, when the operations involve contact between people.

ANS: T                    PTS: 1                    REF: 1-4

18. Care should be taken to avoid stereotyping services as being all too human, and, therefore, difficult to control for quality and productivity.

ANS: T                    PTS: 1                    REF: 1-4

19. Manufacturers do not view customer service as part of product quality.

ANS: F                    PTS: 1                    REF: 1-5

20. The current ratio of service jobs to manufacturing jobs is nearly four to one.

ANS: T                    PTS: 1                    REF: 1-5

21. Growing recognition of the importance of the service function in manufacturing has narrowed the breadth of situations to which the term *operations* is applied.

ANS: F                    PTS: 1                    REF: 1-5a

22. Programming and maintenance (both service functions) have become decreasingly important to manufacturing.

ANS: F                    PTS: 1                    REF: 1-5a

23. The trend for manufacturing is that the labor component (the input of blue-collar workers) has been increasing as a percent of the cost of goods at an accelerating rate for over 50 years.

ANS: F                    PTS: 1                    REF: 1-5a

24. The systems approach does not require communication between functions and the sharing of mutually exclusive databases.

ANS: F                    PTS: 1                    REF: 1-5a

25. The manufacturing transformation of raw materials into finished goods is successful if customers are willing to pay more for the goods than it costs to make them.

ANS: T                    PTS: 1                    REF: 1-6

26. In service, the conversion is successful if customers are willing to pay more for the services than it costs to provide them.

ANS: T                    PTS: 1                    REF: 1-6

27. Cost management is not a key function associated with all aspects of P/OM.

ANS: F                    PTS: 1                    REF: 1-6a

28. In the airline industry, total fixed costs decrease as there are more flights flown and more people flying.

ANS: F                    PTS: 1                    REF: 1-6a

29. Variable costs are also called indirect costs because they cannot be applied directly, without ambiguity, to each unit that is processed.

ANS: F                    PTS: 1                    REF: 1-6a

30. Depreciation is calculated by dividing the cost of the investment by the number of years in the estimated lifetime of the investment.

ANS: T                    PTS: 1                    REF: 1-6a

31. The manufacturer can measure input in terms of the number of units of each kind of product it produces.

ANS: F                    PTS: 1                    REF: 1-6a

32. The profit model operates differently according to the stage of development of the company's input-output operating system.

ANS: T                    PTS: 1                    REF: 1-8

33. The stage reflects the degree to which a company's activities have been coordinated and carried out.

ANS: T                    PTS: 1                    REF: 1-8

34. It is not necessary to relate the company's stage of development to that of its competitors.

ANS: F                    PTS: 1                    REF: 1-8

35. Each company's input-output model indirectly and directly reflects the impact of the competitors' input-output models.
- ANS: T                      PTS: 1                      REF: 1-8
36. Stage I companies have a high level of basic advantages that are unique to them, whereas Stage IV companies have virtually none.
- ANS: F                      PTS: 1                      REF: 1-8a
37. Long term P/OM planning requires excellence in project management to bring about changes needed to adapt to new environments.
- ANS: T                      PTS: 1                      REF: 1-8a
38. P/OM is at the hub of the business model and requires an understanding of the various functional business partners to achieve successful strategic planning.
- ANS: T                      PTS: 1                      REF: 1-9
39. The director of quality is accountable for controlling the flow of input materials to the line.
- ANS: F                      PTS: 1                      REF: 1-9f
40. The systems point of view requires consideration of P/OM dealing with all business functions, such as marketing and finance.
- ANS: T                      PTS: 1                      REF: 1-The Systems Viewpoint
41. Most production managers will accept being called by the title of operations manager.
- ANS: T                      PTS: 1                      REF: 1-The Systems Viewpoint
42. If the part operations managers play in the overall organization model is to be effective, it should be systems-based.
- ANS: T                      PTS: 1                      REF: 1-The Systems Viewpoint
43. In the systems viewpoint, everything that is important to goal achievement doesn't have to be included in the analysis for the analysis to be effective.
- ANS: F                      PTS: 1                      REF: 1-The Systems Viewpoint
44. Strategies do not have to be changed if goals can't be achieved.
- ANS: F                      PTS: 1                      REF: 1-The Systems Viewpoint
45. The systems viewpoint requires strategic planning.
- ANS: T                      PTS: 1                      REF: 1-Strategic Thinking
46. Understanding global competitors requires an understanding of their strategies within the context of the national character of their operations management system.



2. Operations management uses \_\_\_\_\_ that consists of procedures, rules of thumb, and algorithms for analyzing situations and setting policies.
- a. tactics
  - b. methodology
  - c. services
  - d. product-mix

ANS: B                      PTS: 1                      REF: 1-1b

3. With the \_\_\_\_\_ approach, operations management is expected to perform with minimum reference to other parts of the business. This approach concentrates on the specific tasks that must be done to make the product or deliver the service.
- a. systems
  - b. customer relationship
  - c. functional field
  - d. operations

ANS: C                      PTS: 1                      REF: 1-2

4. The \_\_\_\_\_ approach integrates P/OM decisions with those of all other business functions.
- a. systems
  - b. functional field
  - c. customer relationship
  - d. systematic-constructive

ANS: A                      PTS: 1                      REF: 1-2

5. The systems approach called \_\_\_\_\_ is based on the analytic reduction of systems into their parts, which is characteristic of the sciences.
- a. extraspection
  - b. construction
  - c. introspection
  - d. contemplation

ANS: C                      PTS: 1                      REF: 1-2a

6. The systems approach called \_\_\_\_\_ is characteristic of philosophy and the humanities.
- a. construction
  - b. interspection
  - c. introspection
  - d. extraspection

ANS: D                      PTS: 1                      REF: 1-2a

7. Combine analysis and synthesis to obtain the systems approach called \_\_\_\_\_.
- a. interspection.
  - b. extraspection.
  - c. construction.
  - d. introspection.

ANS: C                      PTS: 1                      REF: 1-2a

8. The \_\_\_\_\_ system is everything that affects product line formulation, process planning, capacity decisions, quality standards, inventory levels, and production schedules.
- a. purchasing
  - b. accounting
  - c. P/OM
  - d. distribution

ANS: C                      PTS: 1                      REF: 1-2c

9. Managing a sports team is an excellent example of a purposeful effort that is enhanced by using the \_\_\_\_\_ approach.
- a. systems
  - b. customer relationship
  - c. functional field
  - d. operations

ANS: A                      PTS: 1                      REF: 1-2b

10. Using the systems approach to coordinate the business-unit team is essential to



19. The \_\_\_\_\_ are combined by the process, resulting in the production of units of goods or the creation of types of services after transformation.
- a. outputs
  - b. inputs and outputs
  - c. inputs
  - d. none of the above
- ANS: C                      PTS: 1                      REF: 1-6
20. The \_\_\_\_\_ model depicts work being done.
- a. translation
  - b. transportation
  - c. input-output
  - d. production
- ANS: C                      PTS: 1                      REF: 1-6
21. Transformations are being accomplished when people are
- a. served chili at Wendy's.
  - b. giving blood to the Red Cross.
  - c. visiting Walt Disney World.
  - d. all of the above
- ANS: D                      PTS: 1                      REF: 1-6
22. For the most part, expenses are readily categorized into \_\_\_\_\_ costs.
- a. variable
  - b. fixed and variable
  - c. fixed
  - d. overhead
- ANS: B                      PTS: 1                      REF: 1-6a
23. The input component of the transformation model that applies to the main utility of an airline transportation process would include
- a. fuel.
  - b. food.
  - c. crew.
  - d. all of the above
- ANS: A                      PTS: 1                      REF: 1-6a
24. Indirect costs that are part of overhead costs must be allocated to units of output by some formula. A familiar such cost is
- a. variable cost.
  - b. direct cost.
  - c. total cost.
  - d. depreciation.
- ANS: D                      PTS: 1                      REF: 1-6a
25. Passengers pay the airline for transportation. The number of passengers (units) that are transported (processed) by the airline is a critical measure of the \_\_\_\_\_ of the system.
- a. input
  - b. output
  - c. overhead
  - d. net worth
- ANS: B                      PTS: 1                      REF: 1-6a
26. The \_\_\_\_\_ model assigns the costs and revenues of the traditional equation of profit to the inputs, the outputs, and the transformation process—all based on a specific period of time.
- a. revenue
  - b. I/O profit
  - c. P/OM
  - d. transformation
- ANS: B                      PTS: 1                      REF: 1-7
27. The input-output profit model shows that
- a.  $P = R - TC$ .
  - b.  $TC = FC + vc(V)$ .
  - c. both a and b
  - d. neither a nor b

ANS: C                    PTS: 1                    REF: 1-7

28. \_\_\_\_\_ companies operate on the premise that there is no competitive advantage to be gained by changing the production process.
- a. Stage I
  - b. Stage IV
  - c. Stage II
  - d. Stage V

ANS: A                    PTS: 1                    REF: 1-8

29. \_\_\_\_\_ companies practice continuous improvement, which means they persistently remove waste.
- a. Stage I
  - b. Stage II
  - c. Stage IV
  - d. Stage V

ANS: C                    PTS: 1                    REF: 1-8a

30. A Stage \_\_\_\_\_ company is centered on meeting shipment quotas and providing minimum service when requested.
- a. VI
  - b. III
  - c. I
  - d. II

ANS: C                    PTS: 1                    REF: 1-8a

31. A Stage \_\_\_\_\_ company installs and manages manufacturing and service processes that are equivalent to those used by the leading companies.
- a. I
  - b. II
  - c. III
  - d. V

ANS: C                    PTS: 1                    REF: 1-8a

32. A Stage \_\_\_\_\_ company is a P/OM innovator. It has short and long term planning horizons that are integrated.
- a. IV
  - b. V
  - c. I
  - d. III

ANS: A                    PTS: 1                    REF: 1-8a

33. \_\_\_\_\_ is defined as starting from scratch to redesign a system, and is an appealing way to circumvent bureaucratic arthritis and successfully jump stages.
- a. Redesigning
  - b. Reprocessing
  - c. Reengineering
  - d. Reevaluating

ANS: C                    PTS: 1                    REF: 1-8a

34. \_\_\_\_\_ is the stage at which P/OM development is internally supportive to the company's competitive position.
- a. Stage I
  - b. Stage II
  - c. Stage III
  - d. Stage IV

ANS: C                    PTS: 1                    REF: 1-8a

35. Managers of operations in services and the production manager in a manufacturing plant are in line positions, meaning they are responsible for
- a. providing guidance on quality.
  - b. providing advice on work schedules.
  - c. providing information on cost.
  - d. producing products or services.

ANS: D                    PTS: 1                    REF: 1-9b

36. The \_\_\_\_\_ is in charge of the various quality activities that are going on in the firm.
- performance improvement manager
  - project manager
  - director of quality
  - inventory manager

ANS: C                    PTS: 1                    REF: 1-9f

37. \_\_\_\_\_ consultants are usually engaged in project management.
- Internal
  - External
  - Internal and external
  - none of the above

ANS: C                    PTS: 1                    REF: 1-9g

38. The traditional textbook publishing process is \_\_\_\_\_. It begins at a certain point and proceeds systematically through a series of steps.
- circular
  - linear
  - disjointed
  - detached

ANS: B                    PTS: 1                    REF: Spotlight 1-2

39. \_\_\_\_\_ allows the state of a production process to be assessed.
- P/OM
  - Marketing
  - Management
  - Finance

ANS: A                    PTS: 1                    REF: 1-1

40. A \_\_\_\_\_ permits P/OM to test the effect of different variables, like  $t$  and  $v$  in the following relationship:  $m = vt$ , where  $m$  is miles driven,  $v$  is velocity, and  $t$  is time in hours.
- model
  - prototype
  - draft
  - mock-up

ANS: A                    PTS: 1                    REF: 1-1a

41. The systems approach
- provides better solutions.
  - is superior to the functional field approach.
  - provides better problem-solving for complex situations.
  - all of the above

ANS: D                    PTS: 1                    REF: 1-2b

42. Elements that qualify to be part of a system are those that have a
- direct impact on the problem.
  - indirect impact on the problem.
  - impact the solution, plan or decision.
  - all of the above

ANS: D                    PTS: 1                    REF: 1-2c

43. Operations management problems are
- composed of complex subsystems.
  - require interfunctional communication.
  - have patterns that relate the subsystems to the whole system.



There are typically no lines connecting people in the other functional areas (finance, marketing, etc.) to people in P/OM. The only connection is at the president's level. Within the P/OM area, there are a limited number of connections and these are typically hierarchically structured. The traditional organizations chart does not reflect the systems approach wherein anyone can talk to anyone else if they are part of the problem or the solution. Teamwork is also difficult within these self-contained functions.

PTS: 1                    REF: 1-2

6. Why is a systems approach to P/OM required?

ANS:

The systems approach is needed because it produces better solutions than other approaches, e.g., this includes the functional field approach. It is similar to the sports team where players are coordinated by communication and training to play a better game. In business, those using the systems approach are the leading companies in every industry.

PTS: 1                    REF: 1-2b

7. Discuss the issue of inventory in both services and manufacturing,

ANS:

Another significant difference between the provision of services and manufacturing occurs because of inventory. It is not possible to stock or inventory services (like a haircut) as it is in manufacturing (like a toaster). For example, when the machine repairperson or hair stylist is idle, there is no way to build up an inventory of hours that can be used later when two machines go down at the same time or when two people want their hair cut at the same time. In most service businesses, this is one of the great waste factors.

PTS: 1                    REF: 1-4

8. What is the difference between production management and operations management?

ANS:

*Production* is an older term used by engineers, economists, entrepreneurs, and managers to describe the physical work both in homes and in factories to produce a material product. *Operations management* is a more recent term associated with services performed by organizations such as banks, insurance companies, fast-food servers, and airlines.

PTS: 1                    REF: 1-5

9. Discuss the role of information systems in services and manufacturing.

ANS:

Information systems provide the necessary data about customer needs so that operations management can supply the required services. Both services and manufacturing are increasingly responsive to—and controlled by—information systems. Therefore, knowledge of computers, computer programming, networking and telecommunications is essential in both the manufacturing and service environment.

PTS: 1                    REF: 1-5a

10. Discuss the type of worker who might prefer to work in a job shop environment.

ANS:

Job shops, with their batch production systems, appeal to people who prefer repetitive assignments within a relatively hectic environment. The job shop generally involves a lot of people interactions and negotiations. The tempo of batch production is related to the number of setups, cleanups, and changeovers.

PTS: 1 REF: 1-9a

## PROBLEM

1. Lee's Manufacturing plant and equipment cost \$100 million and are estimated to have a lifetime of 20 years. Straight-line depreciation is to be used. Additional fixed costs per year are \$7 million. Variable costs are \$2 and the price per unit is \$3. What will annual profit be if the annual volume is 15 million units?

ANS:

Annual depreciation =  $\$100/20$  years = \$5 million per year

Fixed costs = \$7,000,000

Total  $FC = \$5,000,000 + \$7,000,000 = \$12,000,000$

$p = \$3$  and  $vc = \$2$ , so  $(p - vc) = (\$3 - \$2) = \$1$ .

Profit  $P = \$1 (V) - \$12,000,000$ .

For  $V = 15,000,000$ ,  $p = 1(15,000,000) - 12,000,000 = \$3,000,000$

PTS: 1 REF: 1-7

2. Daisy's Dog Beds plant and equipment cost \$20,000 and are estimated to have a lifetime of 10 years. Straight-line depreciation is to be used. Additional fixed costs per year are \$15,000. Variable costs are \$8 and the price per bed is \$25. What will annual profit be if the annual volume is 25,000 units?

ANS:

Annual depreciation =  $\$20,000/10$  years = \$2,000 per year

Fixed costs = \$15,000

Total  $FC = \$2,000 + \$15,000 = \$17,000$

$p = \$25$  and  $vc = 8$ , so  $(p - vc) = (\$25 - \$8) = \$17$ .

Profit  $P = \$17 (V) - \$17,000$ .

For  $V = 25,000$ ,  $p = 17(25,000) - 17,000 = \$408,000$

PTS: 1 REF: 1-7

3. A local carpet manufacturer's plant and equipment cost \$285,000 and are estimated to have a lifetime of 20 years. Straight-line depreciation is to be used. Additional fixed costs per year are \$130,000. Variable costs are \$200 per roll of carpet and the price per roll is \$3,000. What will annual profit be if the annual volume is 15,000 rolls?

ANS:

Annual depreciation =  $\$285,000/20$  years = \$14,250 per year

Fixed costs = \$130,000

Total  $FC = \$14,250 + \$130,000 = \$144,250$

$p = \$3,000$  and  $vc = \$200$ , so  $(p - vc) = (\$3,000 - \$200) = \$2,800$ .

Profit  $P = \$2,800 (V) - \$144,250$ .

For  $V = 15,000$ ,  $p = 2,800(15,000) - 144,250 = \$41,855,750$

PTS: 1 REF: 1-7

4. A Chinese manufacturer of ladies blouses has plant and equipment costing the equivalent of \$100,000 and are estimated to have a lifetime of 20 years. Straight-line depreciation is to be used. Additional fixed costs per year are \$70,000. Variable costs are \$2.50 and the price per unit is \$3.75. What will annual profit be if the annual volume is 95,000 blouses?

ANS:

Annual depreciation =  $\$100,000/20$  years = \$5,000 per year

Fixed costs = \$70,000

Total  $FC = \$5,000 + \$70,000 = \$75,000$  $p = \$3.75$  and  $vc = \$2.50$ , so  $(p - vc) = (\$3.75 - \$2.50) = \$1.25$ Profit  $P = \$1.25(V) - \$75,000$ .For  $V = 95,000$ ,  $p = 1.25(95,000) - 75,000 = \$43,750$ 

PTS: 1 REF: 1-7

5. A local pest control company has equipment cost \$150,000 and it is estimated to have a lifetime of 7.5 years using a straight line depreciation. Additional fixed costs per year are \$100,000. Variable costs per pest control service are \$40 and the price per unit averages \$125. What will annual profit be if the company services 475 customers annually? How many customers are needed to break even?

ANS:

Annual depreciation =  $\$150,000/7.5$  years = \$20,000 per year

Fixed costs = \$100,000

Total  $FC = \$20,000 + \$100,000 = \$120,000$  $p = \$125$  and  $vc = \$40$ , so  $(p - vc) = (\$125 - \$40) = \$85$ .Profit  $P = \$85(V) - \$120,000$ .For  $V = 475$ ,  $p = 85(475) - 120,000 =$  net loss of  $-\$79,625$ 

Break even occurs when revenue = costs, so  $85(V) = 120,000$ . Solve for  $V$  or volume and we find the break even number of customers to serve is 1,411.8 or 1,412. After serving 1,412 customers, the company will have covered total costs and then be profitable. Assuming a systems perspective, working with marketing and finance can help to increase the customer base and control costs to achieve the desired profitability.

PTS: 1 REF: 1-7