CHAPTER 9: LAYOUT STRATEGY

TRUE FALSE

1. McDonald's "Made for You" kitchen system represents a strategic layout decision even though an obvious benefit of the system is a dramatic reduction in the inventory of food prepared in advance.
2. The objective of layout strategy is to develop an economic layout that will meet the firm's competitive requirements.
3. The work cell layout, a special arrangement of machinery and equipment to focus on the production of a single product or group of related products, is for manufacturing applications and has no relevance to services.
4. The layout approach that addresses trade-offs between space and material handling is called the fixed position layout.
5. Utilization of the total "cube" is the dominant consideration in office layout.
6. One guideline for a retail layout is to locate high-draw items around the periphery of the store.
7. Category management is the use of computer software to evaluate the profitability of merchandising plans.
8. Servicescape refers to the physical surrounding in which the service is delivered.
9. One guideline for determining the arrangement and space allocation of a retail store is to place high-impulse and high-margin items such as housewares and beauty aids in prominent locations.
10. Cross-docking processes items as they are received, rather than placing them in storage; this helps explain why "warehouses" are now called "distribution centers."
11. The dominant problem associated with the fixed-position layout is that workers are fixed in position, and cannot be reassigned.
12. A process-oriented layout is the traditional way to support a product differentiation strategy.
13. Job lots are groups or batches of parts processed together.
14. Process-oriented layouts typically have low levels of work-in-process inventory.
15. CRAFT is software for balancing assembly lines.
16. The most common tactic to arrange departments in a process-oriented layout is to minimize material handling costs.
17. The work cell improves process layouts by reducing floor space and by reducing direct labor cost.
18. The balancing of work cells uses the same procedures as the balancing of an assembly line.
19. A focused work center is well suited to the production of a large family of products requiring similar processing, even if their demands are not very stable.
20. A fabrication line and an assembly line are both types of repetitive and product-focused layout, but only the fabrication line utilizes workstations.
21. The biggest advantage of a product layout is its flexibility to handle a varied product mix.
22. The minimum number of workstations depends upon the set of task times and the precedence chart, but not the number of units scheduled.
23. A product requires 24 separate tasks, and the sum of those task times is 14 minutes; if the cycle time is 2 minutes, then at least 12 workstations will be needed.
24. If the schedule calls for the production of 120 units per day and 480 minutes of production time are available per day, the cycle time should be 4 minutes.
25. Product-oriented layouts tend to have high levels of work-in-process inventories.
26. One drawback of a product-oriented layout is that work stoppage at any one point ties up the whole operation.
27. Cycle time is the maximum time that the product is allowed at each work station.
28. Heuristics are problem-solving procedures that mathematically optimize the solution.
MULTIPLE CHOICE

29. Which of the following is not one of McDonald’s "five major innovations"?
   a. the Happy Meal
   b. drive-through windows
   c. breakfast menus
   d. play areas
   e. a kitchen system to facilitate mass customization

30. The layout strategy that deals with low-volume, high-variety production is
   a. fixed-position layout
   b. retail layout
   c. warehouse layout
   d. office layout
   e. none of the above

31. "A special arrangement of machinery and equipment to focus on production of a single product or group of related products" describes what layout type?
   a. fixed-position layout
   b. intermittent production
   c. focused factory
   d. work cell
   e. warehouse layout

32. A good layout requires determining
   a. material handling requirements
   b. capacity and space requirements
   c. environment and aesthetics
   d. cost of moving between various work areas
   e. all of the above

33. The fixed-position layout would be most appropriate in which of the following settings?
   a. a fast-food restaurant
   b. a doctor's office
   c. a casual dining restaurant
   d. a cruise ship assembly facility
   e. none of the above

34. For which of the following operations would a fixed-position layout be most appropriate?
   a. assembling automobiles
   b. producing TV sets
   c. constructing a highway tunnel or bridge
   d. refining of crude oil
   e. running an insurance agency
35. Because the fixed-position layout problem is so difficult to solve on-site, operations managers
   a. virtually never employ this layout strategy
   b. utilize this approach only for construction projects such as bridges and office towers
   c. increase the size of the site
   d. often complete as much of the project as possible off-site
   e. utilize this layout only for defense contractors

36. One factor impacting the fixed-position layout strategy is
   a. minimizing difficulties caused by material flow varying with each product
   b. requiring frequent contact close to one another
   c. the provision of low-cost storage with low-cost material handling
   d. the movement of material to the limited storage areas around the site
   e. balancing product flow from one work station to the next

37. The type of layout which features departments or other functional groupings in which similar
   activities are performed is
   a. process-oriented
   b. product-oriented
   c. fixed-position
   d. mass production
   e. unit production

38. One of the major advantages of process-oriented layouts is
   a. high equipment utilization
   b. large work-in-process inventories
   c. flexibility in equipment and labor assignment
   d. smooth and continuous flow of work
   e. none of the above

39. The main issue in designing process layouts concerns the relative positioning of
   a. safety devices
   b. departments
   c. raw materials
   d. entrances, loading docks, etc.
   e. manufacturing cells

40. Which of the following is not an information requirement for solving a load-distance problem?
   a. a list of departments or work centers
   b. a projection of work flows between the work centers
   c. the distance between locations
   d. a list of product cycle times
   e. the cost per unit of distance to move loads
41. The major problem addressed by the process-oriented layout strategy is:
   a. the movement of material to the limited storage areas around the site
   b. requiring frequent contact close to one another
   c. the provision of low-cost storage with low-cost material handling
   d. minimizing difficulties caused by material flow varying with each product
   e. balancing product flow from one work station to the next

42. The most common tactic followed in process-layout planning is to arrange departments or work centers so they:
   a. minimize the cost of skilled labor
   b. maximize the machine utilization
   c. allocate the available space equally to all the departments
   d. minimize the costs of material handling
   e. none of the above

43. A process-oriented layout would be most appropriate in which of the following settings?
   a. a commercial aircraft assembly area
   b. a fast-food restaurant
   c. an automobile factory
   d. a gourmet restaurant
   e. a steel mill

44. Which of the following is true for process layouts, but false for product-oriented layouts?
   a. low in-process inventories
   b. flexibility in equipment and labor assignments
   c. low variety of products
   d. high volume of output
   e. often solved by assembly line balancing

45. A big advantage of a process-oriented layout is:
   a. its flexibility
   b. its low cost
   c. the simplified scheduling problem presented by this layout strategy
   d. the ability to employ low-skilled labor
   e. its high equipment utilization

46. One disadvantage of process-oriented layouts arises from:
   a. the use of special purpose equipment
   b. machine maintenance, which tends to seriously degrade the capacity of the entire system
   c. the use of specialized material handling equipment
   d. the need for stable demand
   e. the use of the general purpose machines and equipment
47. The typical goal used when developing a process-oriented layout strategy is to
   a. minimize the distance between adjacent departments
   b. minimize the material handling costs
   c. maximize the number of different tasks which can be performed by an individual machine
   d. minimize the level of operator skill necessary
   e. maximize job specialization

48. Which of the following is true of a focused factory?
   a. It may be focused in ways other than by product or layout.
   b. It may be focused only by processing requirements.
   c. It is much like a product facility within an otherwise process facility.
   d. All of the above are true.
   e. None of the above is true.

49. In the Office Relationship Chart, which rating reflects the highest importance for two departments' closeness to each other?
   a. A
   b. E
   c. I
   d. O
   e. X

50. Which of the statements below best describes office layout?
   a. groups workers, their equipment, and spaces/offices to provide for movement of information
   b. addresses the layout requirements of large, bulky projects such as ships and buildings
   c. seeks the best personnel and machine utilization in repetitive or continuous production
   d. allocates shelf space and responds to customer behavior
   e. deals with low-volume, high-variety production

51. Which of the following constitutes a major trend influencing office layouts?
   a. downsizing
   b. globalization
   c. environmental issues
   d. virtual companies
   e. health issues

52. Which of the following does not support the retail layout objective of maximizing customer exposure to products?
   a. locate high-draw items around the periphery of the store
   b. use prominent locations for high-impulse and high-margin items
   c. maximize exposure to expensive items
   d. use end-aisle locations
   e. convey the store's mission with the careful positioning of the lead-off department
53. Ambient conditions, spatial layout and functionality, and signs, symbols, and artifacts are all
   a. indicators of imbalance on an assembly line
   b. indicators that cross-docking has been successful
   c. elements of customization in a warehouse layout
   d. elements of servicescapes
   e. elements of successful office layouts

54. Balancing low-cost storage with low-cost material handling is important in a(n)
   a. fixed-position layout
   b. process-oriented layout
   c. office layout
   d. repetitive and product-oriented layout
   e. warehouse layout

55. Which of the following is strongly associated with "cross-docking"?
   a. non-value-adding activities such as receiving and storing
   b. multi-modal transportation facilities at seaports
   c. processing items as soon as they are received into a distribution center
   d. use of manual product identification systems
   e. all of the above

56. The major problem addressed by the warehouse layout strategy is
   a. the movement of material to the limited storage areas around the site
   b. minimizing difficulties caused by material flow varying with each product
   c. requiring frequent contact close to one another
   d. addressing trade-offs between space and material handling
   e. balancing product flow from one work station to the next

57. The concept of customizing in a warehouse layout
   a. is possible, but causes serious loss of oversight of the quality function
   b. cannot be considered seriously in today's high efficiency factories
   c. is theoretically sound, but several years away in practice
   d. is a new trend in value-added activities in warehouses
   e. none of the above

58. Which one of the following is not common to repetitive and product-oriented layouts?
   a. a high rate of output
   b. specialization of labor
   c. ability to adjust to changes in demand
   d. low unit costs
   e. All are common to product-oriented layouts.

59. Which of the following is not an advantage of work cells?
   a. reduced direct labor cost
   b. decreased use of equipment and machinery
   c. heightened sense of employee participation
   d. reduced raw material and finished goods inventory
   e. reduced investment in machinery and equipment
60. Balancing a work cell is done  
   a. before the work cell equipment is sequenced  
   b. as part of the process of building an efficient work cell  
   c. before takt time is calculated  
   d. so that each assembly line workstation has exactly the same amount of work  
   e. to minimize the total movement in a process layout  

61. **Takt time** is  
   a. the total work time available divided by units required by the consumer  
   b. the units required divided by workers required  
   c. a fictional time increment similar to a therblig  
   d. the same thing as cycle time in a process layout  
   e. an important consideration in balancing an assembly line  

62. A process layout problem consists of 4 departments, each of which can be assigned to one of four rooms. The number of different solutions to this problem is _____, although not all of them may have different material handling costs.  
   a. 1  
   b. 4  
   c. 16  
   d. 24  
   e. unknown  

63. Solving a load-distance problem for a process-oriented layout requires that  
   a. the difficulty of movement be the same for all possible paths  
   b. pickup and setdown costs vary from department to department  
   c. the cost to move a load be the same for all possible paths  
   d. takt time be less than 1  
   e. CRAFT software examine all possible department configurations  

64. Which of the following layouts generally has the best machine utilization?  
   a. fixed-position layout  
   b. repetitive and product-oriented layout  
   c. process-oriented layout  
   d. office layout  
   e. warehouse layout  

65. A **product-oriented** layout would be most appropriate in which of the following cases?  
   a. constructing a Boeing 787 aircraft  
   b. a doctor's office  
   c. a gourmet restaurant  
   d. a fast-food restaurant  
   e. a grocery store
66. The assumption of stability of demand is important for justifying which of the following layout types?
   a. fixed-position layout
   b. product-oriented layout
   c. process-oriented layout
   d. all of the above
   e. none of the above

67. Which layout type assumes an adequate volume for high equipment utilization?
   a. product-oriented layout
   b. process-oriented layout
   c. fixed-position layout
   d. retail layout
   e. warehouse layout

68. A product-oriented layout would be most appropriate for which one of the following businesses?
   a. fast food
   b. steel-making
   c. insurance sales
   d. clothing alterations
   e. a grocery store

69. The assumptions necessary for a successful product layout include all of the following except
   a. adequate volume for high equipment utilization
   b. standardized product
   c. volatile product demand
   d. All of the above are appropriate assumptions.
   e. None of the above is an appropriate assumption.

70. Which of these layouts is most suitable for processing sugar from sugar beets or sugar cane?
   a. process-oriented layout
   b. fixed-position layout
   c. focused factory
   d. product-oriented layout
   e. work cell layout

71. Which of the following is true regarding fabrication lines?
   a. They are the same thing as assembly lines.
   b. They are the same thing as focused factories.
   c. They are a special type of process-oriented layout.
   d. Balancing their assembly line is more technological than worker oriented.
   e. None of the above is true.
72. The central problem in product-oriented layout planning is
   a. minimizing material handling within workstations
   b. minimizing labor movement between workstations
   c. equalizing the space allocated to the different workstations
   d. maximizing equipment utilization
   e. minimizing the imbalance in the work loads among workstations

73. A disadvantage of product-oriented layout is that
   a. there is a lack of flexibility in handling a variety of products or production rates
   b. high volume is required because of the large investment needed to set up the process
   c. work stoppage at any one point ties up the whole operation
   d. All of the above are disadvantages of product-oriented layouts.
   e. None of the above is a disadvantage of product-oriented layouts.

74. The main advantage of a product-oriented layout is typically
   a. low raw material cost
   b. employability of highly skilled labor
   c. high flexibility
   d. low capital cost
   e. low variable cost per unit

75. In a product-oriented layout, the process of deciding how to assign tasks to workstations is referred to as
   a. station balancing
   b. process balancing
   c. task allocation
   d. line balancing
   e. work allocation

76. In assembly line balancing, the minimum number of workstations is
   a. the ratio of the sum of all task times to cycle time
   b. always rounded upward to the next larger integer value
   c. the ratio of demand multiplied by the sum of task times to production time per day
   d. all of the above
   e. none of the above

77. In assembly line balancing, cycle time (the ratio of available production time to scheduled production) is the
   a. minimum time that a product is allowed at each workstation
   b. maximum time that a product is allowed at each workstation
   c. optimum time that a product is allowed at each workstation
   d. desired cycle time that a product is allowed at each workstation
   e. all of the above
78. A production line is to be designed to make 500 El-More dolls per day. Each doll requires 11 activities totaling 16 minutes of work. The factory operates 750 minutes per day. The cycle time for this assembly line is
a. one-half minute
b. one and one-half minutes
c. two minutes
d. 5,500 minutes
e. cannot be determined from the information given

79. A production line is to be designed for a job with four tasks. The task times are 2.4 minutes, 1.4 minutes, 0.9 minutes, and 1.7 minutes. The maximum cycle time is ______ and the minimum cycle time is _____ minutes.
a. 1.8; 1.4
b. 1.6; 0.9
c. 6.4; 2.4
d. 2.4; 0.9
e. none of these

80. Cycle time is computed as
a. desired output divided by the daily operating time
b. daily operating time divided by the product of desired output and the sum of job times
c. the product of desired output and the sum of job times divided by daily operating time
d. daily operating time divided by the scheduled output
e. 1.00 minus station time

81. Daily capacity of a product layout is determined by
a. operating time divided by cycle time
b. cycle time divided by operating time
c. operating time divided by total task time
d. total task time divided by cycle time
e. cycle time divided by total task time

82. Four hundred and eighty minutes of production time are available per day. Scheduled production is 120 units per day. What is the cycle time?
a. 4 minutes
b. 5 minutes
c. 6 minutes
d. 7 minutes
e. 8 minutes
83. A production line is to be designed for a product whose completion requires 21 minutes of work. The factory works 400 minutes per day. Can an assembly line with five workstations make 100 units per day?
   a. yes, with exactly 100 minutes to spare
   b. no, but four workstations would be sufficient
   c. no, it will fall short even with a perfectly balanced line
   d. yes, but the line's efficiency is very low
   e. cannot be determined from the information given

84. Four hundred and eighty minutes of production time are available per day. The schedule calls for the production of 80 units per day. Each unit of the product requires 30 minutes of work. What is the theoretical minimum number of workstations?
   a. 2
   b. 3
   c. 4
   d. 5
   e. 6

85. Which of the following is not a heuristic rule for assigning tasks to workstations in a product layout?
   a. longest tasks first
   b. in order of most number of following tasks
   c. median tasks first
   d. in order of most number of preceding tasks
   e. in accordance with positional weight

86. If a layout problem is solved by use of "heuristics," this means that
   a. there was no other way to solve the problem
   b. no computer software was available
   c. the problem has only a few alternatives to evaluate
   d. no optimum solution exists
   e. a "satisfactory" solution is acceptable

87. Which of the following is a common heuristic for assembly line balancing?
   a. debits near the windows, credits near the door
   b. manufacturers locate near materials, retailers locate near customers
   c. earliest due date first
   d. ranked positional weight
   e. none of the above

88. An assembly line consists of 21 tasks grouped into 5 workstations. The sum of the 21 task times is 85 minutes. Cycle time for the line is 20 minutes. The efficiency of this line is
   a. 4.2 percent
   b. 17 percent
   c. 85 percent
   d. 100 percent
   e. none of the above
An assembly line consists of 158 tasks grouped into 32 workstations. The sum of all task times is 105 minutes. Cycle time for the line is 4 minutes. The efficiency of this line is approximately

a. 8 percent
b. 21 percent
c. 82 percent
d. 100 percent
e. none of the above