

Supply Chain Management, 6e (Chopra/Meindl)

Chapter 11 Managing Economies of Scale in the Supply Chain: Cycle Inventory

11.1 True/False Questions

1) Cycle inventory exists because producing or purchasing in large lots allows a stage of the supply chain to exploit economies of scale and increase cost.

Answer: FALSE

Diff: 2

Topic: 11.1 The Role of Cycle Inventory in a Supply Chain

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

2) Cycle inventory is the physical inventory in the supply chain due to either production or purchases demanded by the customer.

Answer: TRUE

Diff: 2

Topic: 11.1 The Role of Cycle Inventory in a Supply Chain

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

3) Lot sizes and cycle inventory do not affect the flow time of material within the supply chain.

Answer: FALSE

Diff: 1

Topic: 11.1 The Role of Cycle Inventory in a Supply Chain

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

4) Average flow time resulting from cycle inventory = Cycle Inventory/Demand = $Q/2D$.

Answer: TRUE

Diff: 2

Topic: 11.1 The Role of Cycle Inventory in a Supply Chain

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

5) Cycle inventory is primarily held to take advantage of economies of scale and reduce profit within the supply chain.

Answer: FALSE

Diff: 1

Topic: 11.1 The Role of Cycle Inventory in a Supply Chain

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

6) Cycle inventory exists in a supply chain because different stages exploit economies of scale to lower total cost.

Answer: TRUE

Diff: 1

Topic: 11.1 The Role of Cycle Inventory in a Supply Chain

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

7) The costs considered in lot sizing decisions include material cost, fixed ordering cost, and manufacturing cost.

Answer: FALSE

Diff: 2

Topic: 11.2 Estimating Cycle Inventory-Related Costs in Practice

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

8) A firm is often better served by ordering a convenient lot size close to the economic order quantity rather than the precise EOQ.

Answer: TRUE

Diff: 2

Topic: 11.3 Economies of Scale to Exploit Fixed Costs

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

9) To reduce the optimal lot size by a factor of k , the fixed order cost S must be reduced by a factor of k .

Answer: FALSE

Diff: 2

Topic: 11.3 Economies of Scale to Exploit Fixed Costs

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

10) Aggregating across products, retailers, or suppliers in a single order allows for a reduction in lot size for individual products because fixed ordering and transportation costs are now spread across multiple products, retailers, or suppliers.

Answer: TRUE

Diff: 2

Topic: 11.3 Economies of Scale to Exploit Fixed Costs

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

11) A key to reducing cycle inventory is the reduction of lot size.

Answer: TRUE

Diff: 1

Topic: 11.3 Economies of Scale to Exploit Fixed Costs

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

12) Reduction of fixed cost may be achieved by aggregating lots across multiple products, customers, or suppliers.

Answer: TRUE

Diff: 1

Topic: 11.3 Economies of Scale to Exploit Fixed Costs

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

13) A discount is volume-based if the pricing schedule offers discounts based on the quantity ordered in a single lot.

Answer: FALSE

Diff: 3

Topic: 11.5 Economies of Scale to Exploit Quantity Discounts

AACSB: Analytical thinking

Objective: LO 11.2: Understand the impact of quantity discounts on lot size and cycle inventory.

14) Pricing schedules with all unit quantity discounts encourage retailers to increase the size of their lots, which reduces the average inventory and flow time in a supply chain.

Answer: FALSE

Diff: 2

Topic: 11.5 Economies of Scale to Exploit Quantity Discounts

AACSB: Analytical thinking

Objective: LO 11.3: Devise appropriate discounting schemes for a supply chain.

15) Marginal unit quantity discounts have also been referred to as multi-block tariffs.

Answer: TRUE

Diff: 2

Topic: 11.5 Economies of Scale to Exploit Quantity Discounts

AACSB: Analytical thinking

Objective: LO 11.2: Understand the impact of quantity discounts on lot size and cycle inventory.

16) For commodity products where price is set by the market, manufacturers can use lot size based quantity discounts to achieve coordination in the supply chain and decrease supply chain cost.

Answer: TRUE

Diff: 2

Topic: 11.5 Economies of Scale to Exploit Quantity Discounts

AACSB: Analytical thinking

Objective: LO 11.3: Devise appropriate discounting schemes for a supply chain.

17) The supply chain profit is higher if each stage of the supply chain independently makes its pricing decisions with the objective of maximizing its own profit.

Answer: FALSE

Diff: 2

Topic: 11.5 Economies of Scale to Exploit Quantity Discounts

AACSB: Analytical thinking

Objective: LO 11.3: Devise appropriate discounting schemes for a supply chain.

18) For products where the firm has market power, two-part tariffs can be used to achieve coordination in the supply chain and maximize supply chain profits.

Answer: TRUE

Diff: 2

Topic: 11.5 Economies of Scale to Exploit Quantity Discounts

AACSB: Application of knowledge

Objective: LO 11.3: Devise appropriate discounting schemes for a supply chain.

19) Price discrimination is the practice where a firm charges differential prices to maximize profits.

Answer: TRUE

Diff: 1

Topic: 11.5 Economies of Scale to Exploit Quantity Discounts

AACSB: Analytical thinking

Objective: LO 11.2: Understand the impact of quantity discounts on lot size and cycle inventory.

20) Although a forward buy is often the retailer's appropriate response and increases their own profits, it usually increases demand variability with a resulting increase in inventory and flow times within the supply chain.

Answer: TRUE

Diff: 2

Topic: 11.6 Short-Term Discounting: Trade Promotions

AACSB: Analytical thinking

Objective: LO 11.4: Understand the impact of trade promotions on lot size and cycle inventory.

11.2 Multiple Choice Questions

1) Cycle inventory exists because producing or purchasing in large lots allows a stage of the supply chain to

- A) exploit economies of scale and raise cost.
- B) exploit economies of scale and lower cost.
- C) exploit customers and lower cost.
- D) exploit customers and raise cost.

Answer: B

Diff: 1

Topic: 11.1 The Role of Cycle Inventory in a Supply Chain

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

2) The quantity of inventory that a stage of the supply chain either produces or purchases at a given time is

- A) an order.
- B) a job.
- C) a shipment.
- D) a lot or batch.

Answer: D

Diff: 1

Topic: 11.1 The Role of Cycle Inventory in a Supply Chain

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

3) The average inventory in the supply chain due to either production or purchases in lot sizes that are larger than those demanded by the customer is

- A) annual inventory.
- B) distribution inventory.
- C) cycle inventory.
- D) physical inventory.

Answer: C

Diff: 2

Topic: 11.1 The Role of Cycle Inventory in a Supply Chain

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

4) A graphical plot depicting the level of inventory over time is

- A) an inventory graph.
- B) a distribution inventory.
- C) an inventory drawing.
- D) an inventory profile.

Answer: D

Diff: 2

Topic: 11.1 The Role of Cycle Inventory in a Supply Chain

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

5) When demand is steady, cycle inventory and lot size are related as

- A) $\text{Cycle Inventory} = \text{Lot Size} \times 2$.
- B) $\text{Cycle Inventory} = Q \times 2$.
- C) $\text{Cycle Inventory} = Q/2$.
- D) $\text{Cycle Inventory} = \text{Lot Size} = Q$.

Answer: C

Diff: 2

Topic: 11.1 The Role of Cycle Inventory in a Supply Chain

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

6) Average flow time resulting from cycle inventory is equal to

- A) $\text{Cycle Inventory}/\text{Demand} = Q/2$.
- B) $\text{Cycle Inventory}/\text{Demand} = Q/2D$.
- C) $\text{Cycle Inventory} = Q/2$.
- D) $\text{Cycle Inventory} = \text{Lot Size} = Q$.

Answer: B

Diff: 2

Topic: 11.1 The Role of Cycle Inventory in a Supply Chain

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

7) Cycle inventory is primarily held to

- A) take advantage of diseconomies of scale and increase cost within the supply chain.
- B) take advantage of diseconomies of scale and reduce cost within the supply chain.
- C) take advantage of economies of scale and increase cost within the supply chain.
- D) take advantage of economies of scale and reduce cost within the supply chain.

Answer: D

Diff: 2

Topic: 11.1 The Role of Cycle Inventory in a Supply Chain

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

- 8) The primary role of cycle inventory is to allow different stages in the supply chain to
- A) purchase product in lot sizes that maximize the sum of the material, ordering, and holding cost.
 - B) purchase product in lot sizes that minimize the sum of the material, ordering, and holding cost.
 - C) sell product in lot sizes that maximize the sum of the material, ordering, and holding cost.
 - D) sell product in lot sizes that minimize the sum of the material, ordering, and holding cost.

Answer: B

Diff: 2

Topic: 11.1 The Role of Cycle Inventory in a Supply Chain

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

- 9) Economies of scale in purchasing and ordering motivate a manager to
- A) increase the lot size and cycle inventory.
 - B) decrease the lot size and cycle inventory.
 - C) eliminate inventory.
 - D) increase the lot size and reduce cycle inventory.

Answer: A

Diff: 2

Topic: 11.1 The Role of Cycle Inventory in a Supply Chain

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

- 10) The price paid per unit is referred to as
- A) the *material cost* and is denoted by C.
 - B) the *fixed ordering cost* and is denoted by S.
 - C) the *holding cost* and is denoted by H.
 - D) the *purchase price* and is denoted by P.

Answer: A

Diff: 2

Topic: 11.1 The Role of Cycle Inventory in a Supply Chain

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

11) All costs that do not vary with the size of the order but are incurred each time an order is placed are referred to as

- A) the *material cost* and are denoted by C.
- B) the *fixed ordering cost* and are denoted by S.
- C) the *holding cost* and are denoted by H.
- D) the *purchase price* and are denoted by P.

Answer: B

Diff: 2

Topic: 11.1 The Role of Cycle Inventory in a Supply Chain

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

12) The cost of carrying one unit in inventory for a specified period of time, usually one year, is referred to as

- A) the *material cost* and is denoted by C.
- B) the *fixed ordering cost* and is denoted by S.
- C) the *holding cost* and is denoted by H.
- D) the *purchase price* and is denoted by P.

Answer: C

Diff: 2

Topic: 11.1 The Role of Cycle Inventory in a Supply Chain

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

13) Ordering costs would include which of the following?

- A) Cost from theft
- B) Transportation cost
- C) Security cost
- D) Damage cost

Answer: B

Diff: 2

Topic: 11.2 Estimating Cycle Inventory-Related Costs in Practice

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

14) Inventory holding costs would include which of the following?

- A) Transportation cost
- B) Buyer time
- C) Obsolescence cost
- D) Receiving cost

Answer: C

Diff: 2

Topic: 11.2 Estimating Cycle Inventory-Related Costs in Practice

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

15) Total ordering and holding costs

- A) are relatively stable.
- B) are relatively stable around the economic order quantity.
- C) are relatively unstable around the economic order quantity.
- D) are unstable.

Answer: B

Diff: 1

Topic: 11.3 Economies of Scale to Exploit Fixed Costs

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

Scenario 11.1 - Bubble and Squeak

The rising popularity of bubble and squeak as a breakfast item on the menu has resulted in a steady demand for peas. Over the course of the past week, 457 patrons have ordered the hearty breakfast and each serving contains a half cup of English peas. It costs two cents to hold a half cup of peas in inventory for a year and \$3 to place an order (remember they come all the way from England!). It takes two weeks to ship a container from England loaded with peas.

16) What is the optimal order quantity?

- A) 2670 cups
- B) 17.8 cups
- C) 1335 cups
- D) 8.9 cups

Answer: C

Diff: 2

Topic: 11.3 Economies of Scale to Exploit Fixed Costs

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

17) What is the average inventory if they order at the optimal order quantity?

- A) 2670 cups
- B) 2000 cups
- C) 1335 cups
- D) 667 cups

Answer: D

Diff: 2

Topic: 11.3 Economies of Scale to Exploit Fixed Costs

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

18) What is the cost of the inventory policy (excluding cost of goods) if the diner orders at the economic order quantity?

- A) \$53.40
- B) \$106.80
- C) \$26.70
- D) \$80.10

Answer: A

Diff: 3

Topic: 11.3 Economies of Scale to Exploit Fixed Costs

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

19) How many orders per year does the diner place if they order at the economic order quantity?

- A) 18
- B) 9
- C) 5
- D) 14

Answer: B

Diff: 3

Topic: 11.3 Economies of Scale to Exploit Fixed Costs

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

20) What is the average flow time of a half cup of peas if the diner orders at the economic order quantity?

- A) 8.76 weeks
- B) 5.84 weeks
- C) 2.92 weeks
- D) 11.68 weeks

Answer: C

Diff: 3

Topic: 11.3 Economies of Scale to Exploit Fixed Costs

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

21) The diner orders at the economic order quantity but an analysis of dates on the cans of peas revealed that the flow time was actually 5 weeks. A quick check revealed that the computer had automatically adjusted up the economic order quantity as demand had risen during the past few months. What is the new weekly demand for English peas?

- A) 234 half cups
- B) 78 half cups
- C) 312 half cups
- D) 156 half cups

Answer: D

Diff: 3

Topic: 11.3 Economies of Scale to Exploit Fixed Costs

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

22) If demand increases by a factor of k , the optimal lot size increases by a factor of

- A) k .
- B) $k/2$.
- C) k -squared.
- D) the square root of k .

Answer: D

Diff: 3

Topic: 11.3 Economies of Scale to Exploit Fixed Costs

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

Scenario 11.2 - S&H Mercantile

The S&H Mercantile in Luther is the only game in town for a number of items, and tries valiantly to use only the storage space needed to display items since there is no stock room in the back of the store. One popular item, a 16-ounce can of dehydrated water, takes up 20 square inches of shelf space. The shelf space available for this item measures five feet by four feet. The store manager would like to order a quantity that can fill the shelf space without stacking and without needing to store cans elsewhere in the store. The amount ordered should all be on display once the S&H runs out and ideally would arrive just as the last can is purchased.

23) Suppose the annual demand is 8,000 units and the cost per can is \$3 with a holding cost of 10%. What is the required order cost per lot?

- A) 32 cents
- B) \$3.20
- C) \$32
- D) \$1.44

Answer: A

Diff: 3

Topic: 11.3 Economies of Scale to Exploit Fixed Costs

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

24) Drought conditions spike demand during the summer to an annualized rate of 27,000 cans per year and the price rises to \$12 per can with a holding cost of 20%. What is the required order cost per lot?

- A) 9.2 cents
- B) 92 cents
- C) \$9.20
- D) \$92.00

Answer: B

Diff: 3

Topic: 11.3 Economies of Scale to Exploit Fixed Costs

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

25) Drought conditions spike demand during the summer to an annualized rate of 27,000 cans per year and the price rises to \$12 per can. If the ordering cost per lot is 75 cents, what is the holding cost percentage?

- A) 3.1%
- B) 1.81%
- C) 31%
- D) 18.1%

Answer: C

Diff: 3

Topic: 11.3 Economies of Scale to Exploit Fixed Costs

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

26) Aggregating across products, retailers, or suppliers in a single order allows for

- A) an increase in lot size for individual products.
- B) an increase in customer demand.
- C) a reduction in holding cost per unit.
- D) a reduction in lot size for individual products.

Answer: D

Diff: 3

Topic: 11.3 Economies of Scale to Exploit Fixed Costs

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

Scenario 11.3 - Sammy's Sammwiches

Sammy's is the hot new lunch spot among the hipsters, who flock there at noon for their artisanal peanut butter and jelly sandwiches, which sell for \$12.95. The sandwiches are made from two slices of their own artisanal bread, which they bake continuously throughout the day at a rate of seven loaves an hour (each loaf contains twenty slices). The actual cost of a loaf of bread is \$1 and the cost to hold a loaf is 80%, since freshness is important in baking as well as to hipsters. The cost to run a new batch of a dough is \$3 per loaf. Sammy's sells their sandwiches at a rate of fifty per hour.

27) What is the optimal batch size to produce?

- A) 8.36 loaves
- B) 1.8 loaves
- C) 5.56 slices
- D) 8.36 slices

Answer: C

Diff: 3

Topic: 11.3 Economies of Scale to Exploit Fixed Costs

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

28) What is the cost to run Sammy's at the economic production lot size?

- A) \$5.46
- B) \$2.73
- C) \$1.36
- D) \$0.68

Answer: B

Diff: 3

Topic: 11.3 Economies of Scale to Exploit Fixed Costs

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

29) Aggregating across products, retailers, or suppliers in a single order allows for a reduction in lot size for individual products because

- A) fixed ordering and transportation costs are now charged to retailers.
- B) fixed ordering and transportation costs are now charged to suppliers.
- C) fixed ordering and transportation costs are now spread across multiple products, retailers, or suppliers.
- D) holding costs are now charged to retailers or suppliers.

Answer: C

Diff: 2

Topic: 11.3 Economies of Scale to Exploit Fixed Costs

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

30) A key to reducing cycle inventory is

- A) the reduction of holding cost.
- B) the reduction of manufacturing cost.
- C) the reduction of lot size.
- D) the reduction of warehouse space.

Answer: C

Diff: 2

Topic: 11.3 Economies of Scale to Exploit Fixed Costs

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

31) A key to reducing lot size without increasing costs is to

- A) reduce the holding cost associated with each lot.
- B) reduce the fixed cost associated with each lot.
- C) reduce the material cost associated with each lot.
- D) reduce the manufacturing cost associated with each lot.

Answer: B

Diff: 2

Topic: 11.3 Economies of Scale to Exploit Fixed Costs

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

32) A price discount where the pricing schedule offers discounts based on the quantity ordered in a single lot is

- A) customer based.
- B) lot size based.
- C) supplier based.
- D) volume based.

Answer: B

Diff: 1

Topic: 11.5 Economies of Scale to Exploit Quantity Discounts

AACSB: Analytical thinking

Objective: LO 11.2: Understand the impact of quantity discounts on lot size and cycle inventory.

33) A price discount where the discount is based on the total quantity purchased over a given period, regardless of the number of lots purchased over that period, is

- A) customer based.
- B) lot size based.
- C) supplier based.
- D) volume based.

Answer: D

Diff: 2

Topic: 11.5 Economies of Scale to Exploit Quantity Discounts

AACSB: Analytical thinking

Objective: LO 11.2: Understand the impact of quantity discounts on lot size and cycle inventory.

34) Pricing schedules with all unit quantity discounts encourage retailers to

- A) decrease the size of their lots.
- B) increase the size of their lots.
- C) decrease the size of their inventory.
- D) increase the price of their products.

Answer: A

Diff: 1

Topic: 11.5 Economies of Scale to Exploit Quantity Discounts

AACSB: Analytical thinking

Objective: LO 11.2: Understand the impact of quantity discounts on lot size and cycle inventory.

35) In the pricing schedule for marginal unit quantity discounts,

- A) the average cost of a unit decreases at a breakpoint.
- B) the average cost of a unit increases at a breakpoint.
- C) the marginal cost of a unit decreases at a breakpoint.
- D) the marginal cost of a unit increases at a breakpoint.

Answer: C

Diff: 2

Topic: 11.5 Economies of Scale to Exploit Quantity Discounts

AACSB: Analytical thinking

Objective: LO 11.2: Understand the impact of quantity discounts on lot size and cycle inventory.

36) Quantity discounts lead to

- A) a significant buildup of cycle inventory in the supply chain.
- B) a slight buildup of cycle inventory in the supply chain.
- C) a decrease in cycle inventory in the supply chain.
- D) minor fluctuations of cycle inventory in the supply chain.

Answer: A

Diff: 2

Topic: 11.5 Economies of Scale to Exploit Quantity Discounts

AACSB: Analytical thinking

Objective: LO 11.3: Devise appropriate discounting schemes for a supply chain.

37) _____ is the practice whereby a firm charges differential prices to maximize profits.

- A) Optimal lot sizing
- B) Fixed pricing
- C) Nonperishable pricing
- D) Price discrimination

Answer: D

Diff: 2

Topic: 11.5 Economies of Scale to Exploit Quantity Discounts

AACSB: Analytical thinking

Objective: LO 11.4: Understand the impact of trade promotions on lot size and cycle inventory.

38) Trade promotions lead to a significant _____ in lot size and cycle inventory because of forward buying by the _____.

- A) decrease, retailer
- B) increase, retailer
- C) decrease, supplier
- D) increase, supplier

Answer: B

Diff: 3

Topic: 11.5 Economies of Scale to Exploit Quantity Discounts

AACSB: Analytical thinking

Objective: LO 11.4: Understand the impact of trade promotions on lot size and cycle inventory.

39) In a supply chain where each stage of the supply chain independently makes its pricing decisions with the objective of maximizing its own profit,

- A) supply chain profit is lower than a coordinated solution.
- B) supply chain profit is higher than a coordinated solution.
- C) supply chain profit is about the same as a coordinated solution.
- D) supply chain profit will be maximized.

Answer: A

Diff: 1

Topic: 11.5 Economies of Scale to Exploit Quantity Discounts

AACSB: Analytical thinking

Objective: LO 11.3: Devise appropriate discounting schemes for a supply chain.

40) For products where the firm has market power, coordination in the supply chain can be achieved and supply chain profits maximized through the use of

- A) two-part tariffs or volume based quantity discounts.
- B) marginal unit quantity discounts.
- C) all unit quantity discounts.
- D) basic quantity discounts.

Answer: A

Diff: 1

Topic: 11.5 Economies of Scale to Exploit Quantity Discounts

AACSB: Analytical thinking

Objective: LO 11.3: Devise appropriate discounting schemes for a supply chain.

41) The practice where a firm charges differential prices to maximize profits is

- A) lot pricing.
- B) marginal pricing.
- C) price incrimination.
- D) price discrimination.

Answer: D

Diff: 2

Topic: 11.5 Economies of Scale to Exploit Quantity Discounts

AACSB: Analytical thinking

Objective: LO 11.2: Understand the impact of quantity discounts on lot size and cycle inventory.

42) Discounts related to price discrimination will be

- A) volume based.
- B) unit based.
- C) marginally based.
- D) lot size based.

Answer: A

Diff: 3

Topic: 11.5 Economies of Scale to Exploit Quantity Discounts

AACSB: Analytical thinking

Objective: LO 11.2: Understand the impact of quantity discounts on lot size and cycle inventory.

43) The goal of trade promotions is to

- A) influence retailers to act in a way that helps the retailer achieve its objectives.
- B) influence retailers to act in a way that helps the manufacturer achieve its objectives.
- C) influence retailers to act in a way that will maximize supply chain profit.
- D) influence retailers to act in a way minimize supply chain cost.

Answer: B

Diff: 3

Topic: 11.6 Short-Term Discounting: Trade Promotions

AACSB: Analytical thinking

Objective: LO 11.4: Understand the impact of trade promotions on lot size and cycle inventory.

44) The retailer can justify the forward buying when

- A) they have inadvertently built up a lot of excess inventory.
- B) the forward buy allows the manufacturer to smooth demand by shifting it from peak to low-demand periods.
- C) it decreases his total cost.
- D) A and C only

Answer: C

Diff: 3

Topic: 11.6 Short-Term Discounting: Trade Promotions

AACSB: Analytical thinking

Objective: LO 11.4: Understand the impact of trade promotions on lot size and cycle inventory.

45) Replenishment orders in multi-echelon supply chains should be

- A) synchronized to increase cycle inventory and order costs.
- B) synchronized to facilitate supplier evaluation and selection.
- C) synchronized to keep cycle inventory and order costs low.
- D) separated to increase cycle inventory and order costs.

Answer: C

Diff: 3

Topic: 11.7 Managing Multiechelon Cycle Inventory

AACSB: Analytical thinking

Objective: LO 11.5: Identify managerial levers that reduce lot size and cycle inventory in a supply chain without increasing cost.

Scenario 11.4 - Caffeine and Sugar

With a fixed cost of \$100 per order, Nathan decided it was vital to get his money's worth. His monthly demand for energy drinks was 10,000 bottles and holding cost was estimated at 20% of unit cost. The mail order company offered him a couple of possibilities — he could pay \$4.00 per bottle for orders of up to 10,000 bottles. After that threshold, he would pay only \$3.98 per bottle, and if he ordered 20,00 or more bottles in an order, he would pay only \$3.96 per bottle.

46) What is the best order quantity for Nathan to use?

- A) 5,477
- B) 5,505
- C) 10,000
- D) 5,491

Answer: D

Diff: 3

Topic: 11.5 Economies of Scale to Exploit Quantity Discounts

AACSB: Analytical thinking

Objective: LO 11.2: Understand the impact of quantity discounts on lot size and cycle inventory.

47) What is the best total cost that Nathan can incur?

- A) \$488,644
- B) \$492,780
- C) \$493,720
- D) \$484,382

Answer: B

Diff: 3

Topic: 11.5 Economies of Scale to Exploit Quantity Discounts

AACSB: Analytical thinking

Objective: LO 11.2: Understand the impact of quantity discounts on lot size and cycle inventory.

48) Which cost takes into account the return demanded on the firm's equity and the amount the firm must pay on its debt?

- A) Cost of capital
- B) Obsolescence (spoilage) cost
- C) Handling cost
- D) Occupancy cost

Answer: A

Diff: 1

Topic: 11.7 Managing Multiechelon Cycle Inventory

AACSB: Analytical thinking

Objective: LO 11.5: Identify managerial levers that reduce lot size and cycle inventory in a supply chain without increasing cost.

49) Which cost should only include receiving and storage costs that vary with the quantity of product received?

- A) Cost of capital
- B) Obsolescence (spoilage) cost
- C) Handling cost
- D) Occupancy cost

Answer: C

Diff: 2

Topic: 11.7 Managing Multiechelon Cycle Inventory

AACSB: Analytical thinking

Objective: LO 11.5: Identify managerial levers that reduce lot size and cycle inventory in a supply chain without increasing cost.

50) Which cost should reflect the incremental change in space cost due to changing cycle inventory?

- A) Cost of capital
- B) Obsolescence (spoilage) cost
- C) Handling cost
- D) Occupancy cost

Answer: D

Diff: 2

Topic: 11.7 Managing Multiechelon Cycle Inventory

AACSB: Analytical thinking

Objective: LO 11.5: Identify managerial levers that reduce lot size and cycle inventory in a supply chain without increasing cost.

11.3 Essay Questions

1) Discuss the role of cycle inventory in the supply chain.

Answer: The primary role of cycle inventory is to allow different stages in the supply chain to purchase product in lot sizes that minimize the sum of the material, ordering, and holding cost. If a manager were considering the holding cost alone, he or she would reduce the lot size and cycle inventory. Economies of scale in purchasing and ordering, however, motivate a manager to increase the lot size and cycle inventory. A manager must make the trade-off that minimizes the total cost when making the lot sizing decision. Ideally, cycle inventory decisions should be made considering the total cost across the entire supply chain. In practice, however, each stage often makes its cycle inventory decisions independently. As we discuss later in the chapter, this practice increases the level of cycle inventory as well as the total cost in the supply chain. Any stage of the supply chain exploits economies of scale in its replenishment decisions in the following three typical situations:

1. A fixed cost is incurred each time an order is placed or produced.
2. The supplier offers price discounts based on the quantity purchased per lot.
3. The supplier offers short-term discounts or holds trade promotions.

Cycle inventory exists in a supply chain because different stages exploit economies of scale to lower total cost. The costs considered include material cost, fixed ordering cost, and holding cost. The supply chain operation phase operates on a weekly or daily time horizon and deals with decisions concerning individual customer orders.

Diff: 3

Topic: 11.1 The Role of Cycle Inventory in a Supply Chain

AACSB: Reflective thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

2) Describe the impact of trade promotions on cycle inventory.

Answer: Manufacturers use *trade promotions* to offer a discounted price and a time period over which the discount is effective. The goal of trade promotions is to influence retailers to act in a way that helps the manufacturer achieve its objectives. A few of the key goals (from the manufacturer's perspective) of a trade promotion are as follows:

1. Induce retailers to use price discounts, displays, or advertising to spur sales.
2. Shift inventory from the manufacturer to the retailer and the customer.
3. Defend a brand against competition.

In response to a trade promotion, the retailer has the following options:

1. Pass through some or all of the promotion to customers to spur sales.
2. Pass through very little of the promotion to customers but purchase in greater quantity during the promotion period to exploit the temporary reduction in price.

The first action lowers the price of the product for the end customer, leading to increased purchases and thus increased sales for the entire supply chain. The second action does not increase purchases by the customer but increases the amount of inventory held at the retailer. As a result, the cycle inventory and flow time within the supply chain increase.

Trade promotions lead to a significant increase in lot size and cycle inventory because of forward buying by the retailer. This generally results in reduced supply chain profits unless the trade promotion reduces demand fluctuations.

The retailer can justify the forward buying because it decreases his total cost. In contrast, the manufacturer can justify this action only if they have either inadvertently built up a lot of excess inventory or the forward buy allows the manufacturer to smooth demand by shifting it from peak to low-demand periods. In practice, manufacturers often build up inventory in anticipation of planned promotions. During the trade promotion, this inventory shifts to the retailer, primarily as a forward buy. If the forward buy during trade promotions is a significant fraction of total sales, manufacturers end up reducing the revenues they earn from sales because most of the product is sold at a discount. The increase in inventory and the decrease in revenues often leads to a reduction in manufacturer profits as a result of trade promotions. Total supply chain profits also decrease because of an increase in inventory.

Diff: 3

Topic: 11.6 Short-Term Discounting: Trade Promotions

AACSB: Reflective thinking

Objective: LO 11.4: Understand the impact of trade promotions on lot size and cycle inventory.

3) Discuss the characteristics of a successful multi-echelon supply chain.

Answer: For such a multi-echelon distribution supply chain, a good replenishment policy has the following characteristics:

- All parties within a stage are divided into groups such that all parties within a group order simultaneously from the same supplier.
- When a party receives a replenishment order, the receipt should be synchronized with the shipment of a replenishment order to at least one of its customers. In other words, a portion of any replenishment order at a stage should be cross-docked onto the next stage.
- If a customer replenishes less frequently than its supplier, the supplier replenishment frequency should be an integer multiple of the customer replenishment frequency and replenishment at both stages should be synchronized to facilitate cross-docking. In other words, a supplier should cross-dock all orders from customers who reorder less frequently than the supplier himself.
- If a customer replenishes more frequently than its supplier, the customer's replenishment frequency should be an integer multiple of the supplier's replenishment frequency and replenishment at both stages should be synchronized to facilitate cross-docking. In other words, a supplier should cross-dock one out of every k shipments to a customer who orders more frequently than himself, where k is an integer.

The relative frequency of reordering will depend upon the setup cost, holding cost, and demand at different parties.

Replenishment orders in multi-echelon supply chains should be synchronized to keep cycle inventory and order costs low. In general, each stage should attempt to coordinate orders from customers who order less frequently and cross-dock all such orders. Some of the orders from customers that order more frequently should also be cross-docked.

Diff: 3

Topic: 11.7 Managing Multiechelon Cycle Inventory

AACSB: Reflective thinking

Objective: LO 11.5: Identify managerial levers that reduce lot size and cycle inventory in a supply chain without increasing cost.

4) The XYZ Company has an assembly plant in Cincinnati and its parts plant in Indianapolis. Parts are transported from Indianapolis to Cincinnati using trucks. Each shipment costs \$100. The Cincinnati plant assembles and sells 300 finished products each day and operates 50 weeks a year. Part #456 costs \$50 and XYZ Company incurs a holding cost of 20 percent per year. How many of part #456 should XYZ Company put in each shipment? What is the cycle inventory of part #456 at XYZ Company?

Answer:

$$\begin{aligned} Q^* &= \sqrt{2DS/hC} \\ &= \sqrt{(2(300 \times 50 \times 5)\$100)/(.2 \times \$50)} \\ &= 1224.745 \approx 1225 \end{aligned}$$

$$\begin{aligned} \text{Average cycle inventory} &= Q^*/2 \\ &= 1225/2 \\ &= 612.5 \end{aligned}$$

Diff: 2

Topic: 11.3 Economies of Scale to Exploit Fixed Costs

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.

5) Tastee Mart sells Frostee Flakes. Demand for Frostee Flakes is 500 boxes per week. Tastee Mart has a holding cost of 30 percent and incurs a fixed cost of \$100 for each replenishment order it places for Frostee Flakes. Given that cost is \$2 per box of Frostee Flakes, how much should Tastee Mart order in each replenishment lot? If a trade promotion lowers the price of Frostee Flakes to \$1.80 for a month, how much should Tastee Mart order given the short-term price reduction?

Answer:

$$\begin{aligned} Q^* &= \sqrt{2DS/hC} \\ &= \sqrt{(2(500 \times 52 \times 5)\$100)/(.3 \times 2)} \\ &= 2943.92 \approx 2944 \end{aligned}$$

$$\begin{aligned} Qd &= (dD)/(C - d)h + CQ^*/(C - d) \\ &= (.2 \times 26,000)/(2 - .2).3 + (2 \times 2944)/(2 - .2) \\ &= 12,900.74 \approx 12,901 \end{aligned}$$

$$\begin{aligned} \text{Forward buy} &= Qd - Q^* \\ &= 12,901 - 2944 \\ &= 9,957 \end{aligned}$$

Diff: 2

Topic: 11.3 Economies of Scale to Exploit Fixed Costs

AACSB: Analytical thinking

Objective: LO 11.1: Balance the appropriate costs to choose the optimal lot size and cycle inventory in a supply chain.