PRINCIPLES OF SUPPLY CHAIN MANAGEMENT: A BALANCED APPROACH, 5th Ed.

Answers to Questions/Problems

Chapter One

Discussion Questions

1. Define the term supply chain management in your own words, and list its most important activities.

Ans.: The Supply-Chain Council's definition of supply chain management is *"[m]anaging supply and demand, sourcing raw materials and parts, manufacturing and assembly, warehousing and inventory tracking, order entry and order management, distribution across all channels, and delivery to the customer.*
These are also the most important activities, however integration of key supply chain processes might also be included in there.

2. Can a small business like a local sandwich or bicycle shop benefit from practicing supply chain management? What would they most likely concentrate on?

Ans.: Yes, any organization can implement at least some of the important concepts. A good place to start is the rationalization or reduction of the supply base. Small businesses might also want to concentrate on customers as a starting point.

3. Describe and draw a supply chain for a bicycle repair shop and list the important supply chain members.

Ans.: This will vary from student to student, but should include for instance parts suppliers, bicycle suppliers and other suppliers (ie, helmet suppliers) and services (ie, repair services) as 1st-tier suppliers and bicycle owners as 1st-tier customers.

4. Can a bicycle repair shop have more than one supply chain? Explain.

Ans.: Yes. Every repair item the firm stocks has potentially a different supply chain associated with it.

5. What roles do "collaboration" and "trust" play in the practice of supply chain management?

Ans.: This is essential for process integration. Sharing information and determining joint strategies is part of the integration/collaboration process, and to do this, trust must be present between the customer/focal firm/supplier.

6. Why don't firms just become more vertically integrated (eg. buy out suppliers and customers), instead of trying to manage their supply chains?

   Ans.: This could cause a loss of focus and keep managers/employees from doing their core competencies, resulting in loss of performance.

7. What types of organizations would benefit the most from practicing supply chain management? What sorts of improvements could be expected?

Ans.: Firms with many suppliers, many complex products, large inventories and many customers (in other words, firms with many supply chains). Gains would be lower purchasing costs, lower carrying costs, better product quality, and better customer service.

8. What are the benefits of supply chain management?

Ans.: Reduction of the bullwhip effect, better buyer/supplier relationships, better quality, lower costs, better customer service, higher demand, more profits.

9. Can nonprofit, educational, or government organizations benefit from supply chain management? How?

Ans.: Yes. All services and organizations can benefit in terms of at least better customer service, better inventory management, and cheaper purchase prices.

10. What does the term, "third-tier supplier" mean? What about "third-tier customer"? What about the "focal firm"? Provide examples.

Ans.: First-tier suppliers are the focal firm's direct suppliers. 2nd-tier suppliers are the focal firm's suppliers' direct suppliers. 3rd-tier suppliers are the focal firm's suppliers' suppliers' suppliers. Company A sells wood to Company B. Company B sells furniture to Company C. Company C sells the furniture to Wal-Mart. Company A is Wal-Mart's 3rd-tier supplier. Similarly, the focal firm's customers' customers' customers are their 3rd-tier customers. The focal firm just refers to the firm in question, or in the topic of discussion.

11. What is the bullwhip effect and what causes it? How would you try to reduce the bullwhip effect?

Ans.: The magnification of safety stock and erratic buying behavior as customers along the supply chain forecast demand and add safety stock to their forecasts and production schedules causes the bullwhip effect. As we move further back up the supply chain then, more and more of the output is in the form of safety stocks. Reducing the need to forecast (by agreeing on a future purchase quantity or using CPFR) is one way to reduce the bullwhip effect.

12. When did the idea and term, supply chain management, first begin to be thought about and discussed? Which two operations management practices became the origin of

supply chain management?

Ans.: The general idea of supply chain management had been discussed for many years prior to the chain of events shown in Figure 1.1. Back in 1915, Arch W. Shaw of the Harvard Business School wrote the textbook, *Some Problems in Market Distribution*, considered by many to be the first on the topic of what we now refer to as supply chain management. The text included discussions of how best to purchase raw materials, transport products, locate facilities, and analyze productivity and waste. According to C. John Langley, Jr., professor of supply chain management at the Georgia Institute of Technology, "The idea that companies ought to work together and coordinate activities has always been around, but ask people today what one of the biggest problems with supply chains are today, and they say companies don't work very well together."

The 1980s were the breakout years for supply chain management. One of the first widely recorded uses of the term *supply chain management* came about in a paper published in 1982. Intense global competition beginning in the 1980s (and continuing today) provided an incentive for U.S. manufacturers to offer lower-cost, higher-quality products along with higher levels of customer service. Manufacturers utilized just-in-time (JIT) and total quality management (TQM) strategies to improve quality, manufacturing efficiency, and delivery times. In a JIT manufacturing environment with little inventory to cushion scheduling and/or production problems, firms began to realize the potential benefits and importance of strategic and cooperative supplier-buyer-customer relationships. The concept of these partnerships or alliances emerged as manufacturers experimented with JIT and TQM. These were the origins of SCM.

13. Do you think supply chain management is simply the latest trend in management thinking and will die out in a few years? Why or why not?

Ans.: This answer will vary because it was not specifically discussed, however, considering that the ideas of SCM have been around for many, many years makes one think that the practice is here to stay.

14. How has technology impacted supply chain management?

Ans.: SCM software and e-commerce has aided supply chain integration and aided in the evolution and adoption of supply chain management. Sharing information with supply chain partners through the internet has enabled firms to integrate stocking, logistics, materials acquisition, shipping, and other functions to create a more proactive and effective style of business management and customer responsiveness

15. What are the four foundation elements of supply chain management? Describe some activities within each element.

Ans.: The four elements are supply (supply base reduction, supplier alliances, SRM, global sourcing, ethical and sustainable sourcing), operations (demand management, CPFR, inventory management, MRP, ERP, lean systems, Six Sigma quality), logistics (logistics

management, CRM, network design, RFID, global supply chains, sustainability, service response logistics), and integration (barriers to integration, risk and security management, performance measurement, green supply chains).

16. Is the use of a large number of suppliers a good idea? Why?

Ans.: This somewhat depends. Certainly SCM suggests fewer suppliers and longer-term relationships, however there can always be exceptions to this rule. Purchasing a widely available common product like soap or tissue paper might be better done with a large number of suppliers competing for this business. But this works against ever creating trusting and lasting supply chain partnerships. In most cases though, use of a few key suppliers for an item is considered a good idea, since it means larger supply quantities, leading to lower prices and better service.

17. Do you think the proper way to choose a supplier is to always find the one that will give you the lowest price? When might this not be a good idea?

Ans.: Absolutely not. Low price is sometimes fine, if quality or service is not an issue, as in buying some MRO items. But when quality and service matter, price should only be one of the purchase criteria.

18. What is supplier management? What are some of the activities of supplier management?

Ans.: Simply put, this means encouraging or helping the firm's suppliers to perform in some desired fashion, and there are a number of ways to do this. This involves assessing suppliers' current capabilities and then deciding if and how they need to improve them. Thus, one of the key activities in supplier management is supplier evaluation, or determining the current capabilities of suppliers.

19. What is the difference between supply chain management and logistics?

Ans.: Logistics involves only the transportation and distribution functions. SCM includes logistics as well as production, supply management, and integration of processes.

20. What is demand management and why is this an important part of supply chain management?

Ans.: Demand management is when management tries to match demand to available capacity, either by improving production scheduling, curtailing demand, using a back-order system, or increasing capacity. In a recent survey of supply chain managers, stockouts were considered the most pressing issue in the use of demand management activities, followed closely by excess inventories and long lead times.

21. What is the difference between and MRP system and an ERP system?

Ans.: MRP systems are the older materials management system software applications, and are used for essentially basic assembly and purchase decisions. ERP systems came about a number of years later and tied all of a company's geographically distant units together by having one central database to track system inventories.

22. What role do information systems play in supply chain management? Give some examples.

Ans.: Information systems play very important roles in most supply chains. They give supply chain members information visibility, tracking capabilities, and quick communication capabilities.

23. Briefly describe the terms *lean* and *Six Sigma systems*.

Ans.: Lean refers to low waste and inventories and used to be referred to as JIT. Six Sigma originated at Motorola and refers to a quality management philosophy.

24. What are 3PLs and what role do they play in SCM?

Ans.: Third-party logistics service providers; These allow firms to concentrate more on their capabilities while allowing 3PLs to perform logistics activities like delivery and storage.

25. What is logistics? What is the objective of logistics?

Ans.: Logistics is the movement and storage of raw materials, work-in-process, and finished goods. The objective is to deliver products to customers at the right time, quality, and volume which requires a high level of planning and cooperation between the firm, its customers, and the various logistics elements or services employed (such as transportation, warehousing, and break-bulk or repackaging services). In contrast, services are produced and delivered to the customer simultaneously in most cases, so services are extremely dependent upon server capacity and successful service delivery to meet customer requirements.

26. What is the triple bottom line and how would you describe it for Walmart?

Ans.: The term **sustainability** as applied to supply chains is a broad term that includes protecting the environment, some aspects of social responsibility, as well as financial performance (hence the linking of sustainability to what is termed the **triple bottom line**, or people, planet and profits). For Walmart, it is its employees/customers, hoiw its products impact the environment, and the money it makes.

27. What tradeoffs must be considered in designing a distribution system?

Ans.: Logistics decisions typically involve a trade-off between cost and delivery timing or customer service. Motor carriers (trucks) for example, are more expensive to use than

rail carriers, but offer more flexibility and speed, particularly for short routes. Air carriers are even more expensive but much faster than any other transportation mode. Water carriers are the slowest but are also the least expensive. Finally, pipeline transportation is used to transport oil, water, natural gas, and coal slurry. Many transportation services offer various modal combinations, as well as warehousing and customs-clearing services.

28. What are the advantages and risks involved with global supply chains?

Ans.: Some of the advantages include a larger market for products, economies of scale in purchasing and production, lower labor costs, a supply base of potentially cheaper, higher-quality suppliers, and the generation of new product ideas from foreign suppliers and employees. Some of the risks include fluctuating exchange rates affecting production, warehousing, and purchasing and selling prices; government intervention or political instabilities causing supply disruptions; security concerns; and potential changes in subsidies, tariffs and taxes.

29. What does *process integration* mean? Can supply chain management succeed without it? Why or why not?

Ans.: This refers to collaborations which occur between suppliers and buyers in a supply chain. Working together is what allows supply chains to be effective. Processes in a supply chain are said to be integrated when members of the supply chain work together to make purchasing, inventory, production, quality, logistics, and other decisions that impact the overall profits of the supply chain. If one key process activity fails or is performed poorly, then the flow of goods moving along the supply chain is disrupted, jeopardizing the effectiveness of the entire supply chain. Successful supply chain process integration occurs when the participants realize that effective supply chain management must become part of each member's strategic planning process, where objectives and policies are jointly determined based on the end consumers' needs and what the supply chain as a whole can do for them.

30. Should companies require their suppliers to get certified if they are performing well?

Ans.: Yes. This could indicate weaknesses in areas covered by the certification instrument.

31. At what point should a supplier be considered to have a *strategic partnership* with a firm?

Ans.: Suppliers see significant benefits from the creation of closer working relationships with customers in terms of long-term, higher-volume sales. These trading partner relationships have come to be termed **strategic partnerships.**

32. Why are performance measurement systems important when trying to manage supply chains?

Ans.: Performance measurements must be utilized along supply chains to help firms keep track of their supply chain management efforts. It is crucial for firms to know whether certain strategies are working as expected—or not—before they become financial drains on the organizations. Firms work together to develop long-term supply chain management strategies and then devise tactics to implement these strategies. Performance measurements help firms decide the value of these tactics and should be developed to highlight performance within the areas of purchasing, operations, logistics, and integration.

33. Does a global supply chain have more risk than a domestic supply chain? Why?

Ans.: Yes—distances are longer, which means more things can go wrong; also dealing with other cultures/governments can prove problematic.

34. What are big data and data analytics? How might they be used in supply chains?

Ans.: Huge volumes of data generated refer to the term **big data** in business organizations. There is also the rising awareness among executives regarding the benefits of analytics solutions. Analytics can be used along the supply chain for example, to schedule production according to expected supplier deliveries, to route delivery trucks through a distribution network, or to determine when a customer is most likely to be home to accept a delivery.

35. What are some things supply chain members could do to improve sustainability?

Ans.: by improving environmental, social and governance performance throughout the supply chain, companies can enhance processes, reduce costs, increase productivity, uncover product innovation, achieve market differentiation, and improve societal outcomes.

36. Describe supply chain visibility and why supply chain managers like it.

Ans.: Supply chain visibility can be defined as the ability of suppliers, manufacturers, business partners, and customers to know exactly where products are, at any point in the supply chain. This inventory visibility is obviously made easier by technology, and can prove very advantageous when dealing with disruptive events like hurricanes or other unexpected events.

CASES

1. Supply Chain Management – The Big Picture

Case Note

Learning Objectives:

- Describe a supply chain and define supply chain management.

- Describe the objectives and elements of supply chain management.
- Describe local, regional, and global supply chain management activities.

This case highlights how critical supply chain management is at different levels of expansion, i.e. local, regional, and global. The case discusses the four foundation elements of supply chain management, supply, operations, logistics, and integration. The case illustrates that although a company is engaged in global commerce, it may be necessary to look at supply chain management from the perspective of the specific marketplace, e.g. Europe, South America, etc. Depending on the industry, each marketplace may have different regulatory requirements.

Finally, the case emphasizes the importance of supply chain management process integration. Although each of the first three foundation elements are designed well, unless every supply chain partner includes the planning in their strategic planning process, the entire system could fail.

Answers to Questions

1. For the supply chain management element supply, important issues to address are supply base reductions, supplier alliances, supplier relationship management, global sourcing, ethical sourcing, and sustainable sourcing. These will be covered in chapters 2, 3, and 4.
2. For the supply chain management element operations, important issues to address are demand management, inventory, management, lean systems, Six Sigma quality, etc. These will be covered in chapters 5, 6, 7, and 8.
3. For the supply chain management element logistics, important issue to address are logistics management, network design, global supply chains, sustainability, and service response logistics. These will be covered in chapters 9, 10, 11, and 12.
4. The issues any company must overcome are cultural norms, adversarial relationships, silos, conflict, and barriers within and between companies. These types of issues or obstacles must be broken down, reduced, or eliminated in order for true process integration to be achieved.

* Written by Rick Bonsall, D. Mgt., McKendree University, Lebanon, IL. The people and institution are fictional and any resemblance to any person or any institution is coincidental. This case was prepared solely to provide material for class discussion. The author does not intend to illustrate either effective or ineffective handling of a managerial situation.

Appendix 1.1 The Beer Game

Questions and Exercises

1. All players but the retailer should answer this question. What do you think the retailer's customer demand pattern looked like? How did your customer orders vary throughout the game?

Ans.: Varies. Hopefully, their guesses will be nothing like the relatively constant demand pattern actually experienced by the retailer.

2. What happened to the current inventory levels as we move backward, up the supply chain from retailer to manufacturer? Why?

Ans.: The inventory levels should magnify or explode as we go back up the supply chain, as members try to fill ever-increasing orders from customers. This is due to the bullwhip effect.

3. How could the supply chain members reduce total inventory and back order costs in the future?

Ans.: Through closer, more timely and accurate communications.

4. Go to http://beergame.lim.ethz.ch/ and try playing the Internet version of the game. Report on your experiences playing the game.

Ans.: Students may have difficulty downloading the software necessary to play the game. If possible, try playing it first prior to assigning this question to the class.

Chapter Two

Discussion Questions

1. Describe the steps in a traditional manual purchasing system.

Ans.: Figure 2.1 describes a typical manual purchasing system. The user initiates the purchase by issuing a purchase requisition. If the item is not available in the storeroom, a buyer issues a purchase order to a qualified supplier.

2. Describe the e-procurement system and its advantages over the manual system. Are there any disadvantages to the electronic system? Do you think the e-procurement system will ultimately replace the manual system? Why or why not?

Ans.: Figure 2.4 describes an e-procurement system. e-procurement system eliminates duplicate data entry and thus improves accuracy. Other advantages include very fast execution time and the ability to handle mass communication effectively. Its disadvantages include additional capital investment to buy the hardware and software, training, and that it is a rapidly growing technology. Thus, new equipment and technology may become obsolete very quickly. Many savvy businesses are switching over to an e-procurement system because its advantages far outweigh the disadvantages.

3. How can purchasing help to improve the competitive edge of an organization?

Ans.: In addition to ensuring uninterrupted flows of raw materials at the lowest total cost, purchasing can help to improve an organization's competitive edge by actively seeking better materials and reliable suppliers, working closely with and exploiting the expertise of strategic suppliers to improve the quality of raw materials, and involving strategic suppliers and purchasing personnel in new product design and development efforts.

4. What is the profit-leverage effect of purchasing? What is the return-on-assets effect of purchasing?

Ans.: The profit-leverage effect of purchasing measures the impact of a change in purchase spend on a firm's profit before taxes, assuming gross sales and other expenses remain unchanged. It is widely used to show that decreases in purchase spend directly increase profits before taxes by the same amount. The Return on Assets (ROA) effect of purchasing measures the impact of a change in purchase spend on a firm's ROA. Table 2.2 is an example of the profit-leverage effect.

5. How does a merchant differ from an industrial buyer?

Ans.: A merchant (e.g. wholesaler and retailer) primarily purchases for resale purposes, whereas an industrial buyer purchases raw materials and/or component parts for conversion purposes.

6. Describe the purpose of a material requisition, a purchase order, a request for quotation and a request for proposal. Does the material requisition serve the same purpose as the purchase order?

Ans.: *Material requisition* – an internal document used to request materials from the warehouse or purchasing department.
Purchase order – a document used to buy materials from suppliers. It usually contains the terms and conditions of the sale and delivery. It is legally binding on the buyer and seller when the seller accepts the terms of the sale.
Request for quotation – a document used to request the prices of goods and/or services from suppliers.
Request for proposal – a document used to solicit ideas and/or solutions for a specific good and/or service from suppliers. It is usually used when the exact specifications of the good/service are not known.
No, a material requisition is used to request goods whereas a purchase order is used to buy goods/services from supplier.

7. Why are small value purchase orders problematic? How can purchasing more effectively deal with this problem?

Ans.: It means that the ordering cost is more than the cost of the goods/services purchased. Many firms consider a total value of less than $500 to be small value purchase. There are many ways to deal with this problem, including the use of corporate purchasing cards (commonly known as p-cards), blank check purchase orders, blanket purchase orders, and Petty Cash.

8. Should unit price be used as the sole criterion for selecting suppliers? Why?

Ans.: No. A firm should always consider the total costs of acquisition, which include purchase price, transportation cost, storage cost and quality cost, among others.

9. Explain backward vertical integration. What are the advantages of outsourcing compared to backward vertical integration?

Ans.: Backward integration refers to acquiring a supplier's operations. An example would be an automobile manufacturer buying a supplier who is supplying car seats or other component parts. Outsourcing enables the buying firm to focus on core competencies and to acquire better quality components and materials from qualified suppliers who can produce the components at a lower price due to higher volume and technology. For example, a car seat supplier will be able to invest more money in R&D and produces at a higher volume if it sells car seats to two or more automobile manufacturers than what each manufacturer can invest individually.

10. When should a firm outsource instead of making the items in-house?

Ans.: If cost is the only criterion, a breakeven analysis can be used to analyze the breakeven quantity. Generally, if the volume is too small, the equipment is very expensive or it lacks the expertise to produce the items, a firm should outsource. Strategically, a firm should outsource its non-core activities to focus on core competencies.

11. What factors should be considered while choosing suppliers?

Ans.: A firm should consider a supplier's technology, financial stability, quality, delivery performance, flexibility, service, willingness to share technology and participate in new product development, and others.

12. Describe the difference between sole source and single source.

Ans.: Sole source refers to a situation when there is no option but only one supplier is capable of supplying or producing the product needed. With single source, the buying firm chooses among multiple suppliers to select a single supplier that best meets its need.

13. What are the reasons to use a single supplier? Is this the most efficient way to purchase materials in general?

Ans.: Reasons to use a single source include more consistent quality level, higher volume, and to build buyer-supplier trust and mutually beneficial relationships. In general, this is true for many savvy corporations.

14. Describe centralized and decentralized purchasing and their advantages.

Ans.: Centralized purchasing uses a centralized purchasing department or division to handle all purchases for the corporation, whereas decentralized purchasing allows an individual division or branch to handle its own purchasing activity. Advantages of centralized system include quantity purchases, which lead to better bargaining power, and a consistent system for the entire corporation. Advantages of a decentralized system include flexibility, easier to source locally, faster delivery, and less bureaucracy.

15. Describe how the hybrid purchasing organization works.

Ans.: Hybrid purchasing organizations exist in one of two forms: (1) decentralized purchasing at the corporate level, but centralized procurement function at the business unit level, and (2) centralized purchasing structure to negotiate national contracts at the corporate level, but decentralized buying at the business unit level. The hybrid purchasing organization allows the firm to exploit the advantages of both the centralized and decentralized systems.

16. Describe how blanket orders and blanket order releases can be used to manage the procurement system of a business that owns a dozen large restaurants in a city.

Ans.: An organization can use the hybrid purchasing structure to negotiate blanket orders or contracts at the corporate level where prices and other delivery terms are agreed upon. Then, the firm can use blanket order releases to release orders at the firm level.

17. How does public procurement differ from corporate purchasing?

Ans.: Public procurement is subjected to political pressure and public scrutiny. Moreover, public procurement is subjected to special rules and regulations that are established by the federal, state, and local governments. Consequently, the procedures for public procurement differ from the public sector – in addition to ensuring that purchases for goods and services are in strict compliance with statute and policies, public procurement procedures are generally designed to maximize competition.

18. Describe the different types of bid bonds.

Ans.: Bid or surety bonds guarantee the successful bidder will accept the contract; performance bonds guarantee the work of the successful bidder meets specifications and in the time specified; and payment bonds protect the buyer against any third-party liens not fulfill by the bidder.

19. What are micro-purchases? How can they be used to improve public procurement?

Ans.: Micro-purchases are government purchases of $2,500 and below. Micro-purchases can be made without obtaining competitive quotes, and thus it improves the public buying process for small dollar value purchases.

20. Why do firms purchase from foreign suppliers? What are the risks involved in global sourcing?

Ans.: Reasons include cheaper and better materials, to meet requirements imposed by a foreign country to invest locally, and to take advantage of growth potential. Risks include political instability, currency fluctuation, and cultural differences.

21. What is countertrade? Describe the various types of countertrade.

Ans.: Countertrade is where goods and/or services are exchanged for goods and/or services of equal value or in combination with currency. There are various forms of countertrade, including barter, offset, and counterpurchase. Barter is the complete exchange of goods and/or services of equal value without the exchange of currency. Offset is an exchange agreement for industrial goods and/or services as a condition of military-related export. Offset can be divided into direct and indirect offsets. Direct offset usually involves co-production or a joint venture, and exchange of related goods and/or services, whereas indirect offset involves exchange of goods and/or services unrelated to the aerospace or defense sector. Counterpurchase is an arrangement whereby the original exporter either

buys or finds a buyer to purchase a specified amount of unrelated goods and/or services from the original importer.

22. Describe how a typical government bidding process is conducted.

Ans.: In a typical government bidding process, an invitation for bid (IFB) is used to solicit sealed bids. The specifications for the proposed purchase, instructions for preparation of bids, and the conditions of purchase, delivery and payment schedule are usually included with the IFB. The IFB also designates the date and time of bid opening. Sealed bids are opened in public at the purchasing office at the time designated in the invitation, and facts about each bid are read aloud and recorded. A contract is then awarded to the lowest responsible and responsive bidder.

23. How can global sourcing enhance a firm's competitiveness?

Ans.: Global sourcing may allow a firm to acquire better quality raw materials and components at a lower price due to better process or product technologies. Also, an overseas supplier may hold the patent of a product that limit the availability of the component locally.

24. Describe the disadvantages of global sourcing and how it can adversely affect a firm's competitiveness.

Ans.: The costs and delivery lead time of global sourcing can be prohibitive. Global sourcing also imposes more complex shipping terms and complicated logistics issues than domestic suppliers. Also, the quality levels of global suppliers may not be acceptable.

25. Describe Tier-1, Tier-2, and Tier-3 suppliers.
Ans.: A tiered supply chain model is widely used in the aerospace, automotive, and computer industries where the finished goods consists of many complex sub-assemblies that must comply with stringent quality standard and complex manufacturing process. Original equipment manufacturers (OEM) are the companies that make the final products. Tier-1 suppliers provide parts or services directly to the OEM; Tier-2 suppliers provide their outputs to Tier-1 suppliers, but not directly to the OEM; and Tier-3 suppliers sell their outputs to Tier-2 suppliers.

SPREADSHEET PROBLEMS

1. If a firm's net income (profits before taxes) is $120,000 and it has total assets of $1.5 million, what is its return on assets?

Ans.: ROA = $120,000/$1,500,000 = 8%

2. If a firm's total assets is $2.5 million and its return on assets is 12 percent, what is its net income?

Ans.: Net Income = $2,5000,000 x 0.12 = $300,000

3. If a firm is able to sustain the same level of operations in terms of sales and administrative expenses but reduces its materials cost by $50,000 through smarter purchases, what is the profit-leverage effect on gross profits? What is the profit-leverage effect on profits before taxes?

Ans.: (a) Gross profits increase by $50,000; (b) Profits before taxes increase by $50,000.

4. If a firm's cost of goods sold is $2.5 million and its average inventory is $500,000, what is the inventory turnover?

Ans.: Inventory Turnover = $2,500,000/$500,000 = 5 times

5. If a firm's cost of goods sold is $5 million and its inventory turnover is 10 times, what is the average inventory?

Ans.: Average Inventory = $5,000,000/10 = $500,000

6. If a firm's inventory turnover is 8 times and its average inventory is $160,000, what is the cost of goods sold?

Ans.: COGS = $160,000 x 8 = $1,280,000

7. A retailer in Las Vegas has an ending inventory of $250,000 as at December 31, 2012 and the following accounting information.

Month	Ending Inventory	Cost of Goods Sold
January	$225,000	$1,200,000
February	$325,000	$1,250,000
March	$240,000	$1,350,000
April	$325,000	$1,500,000
May	$460,000	$950,000
June	$220,000	$850,000
July	$85,000	$1,650,000
August	$156,000	$1,325,000
September	$220,000	$1,750,000
October	$265,000	$850,000
November	$100,000	$2,200,000
December	$350,000	$3,500,000

   a. Compute the monthly inventory turnover ratio for each of the twelve months.
   b. What are the annual cost of goods sold and the average inventory for the year?
   c. Compute the annual inventory turnover ratio. How is the retailer's performance compare to the industry standard, assuming its business is similar to Wal-Mart's?

Ans.: (see Excel Worksheet below)

Ending Inv @ 12/31/2012	$250,000											
Fiscal Year 2013	January	February	March	April	May	June	July	August	September	October	November	December
Ending Inventory	$225,000	$325,000	$240,000	$325,000	$460,000	$220,000	$85,000	$156,000	$220,000	$265,000	$100,000	$350,000
Cost of Goods Sold	$1,200,000	$1,250,000	$1,350,000	$1,500,000	$950,000	$850,000	$1,650,000	$1,325,000	$1,750,000	$850,000	$2,200,000	$3,500,000
Average Inventory	$237,500	$275,000	$282,500	$282,500	$392,500	$340,000	$152,500	$120,500	$188,000	$242,500	$182,500	$225,000
(a) Monthly Inventory Turnover	5.05	4.55	4.78	5.31	2.42	2.50	10.82	11.00	9.31	3.51	12.05	15.56
(c) Annual Inventory Turnover	75.49											
$18,375,000	(b) Total or Annual Cost of Goods Sold											
$243,417	(b) Average Inventory for the Year											
75.49	(c) Annual Inventory Turnover Ratio											

Note: To evaluate the retailer's performance against the industry standard, compare its annual inventory turnover ratio against the industry standard or to the leading firms in the industry such as Wal-Mart or Target.

8. A small firm has an ending inventory of $52,000 as at December 31, 2012 and the following accounting information.

Month	Ending Inventory	Cost of Goods Sold
January	$75,000	$225,000
February	$56,000	$325,000
March	$25,000	$240,000
April	$85,000	$325,000
May	$125,000	$460,000
June	$95,000	$220,000
July	$72,000	$85,000
August	$45,000	$156,000
September	$52,500	$220,000
October	$120,000	$265,000
November	$162,500	$100,000
December	$255,000	$350,000

   a. Compute the monthly inventory turnover ratio for each of the twelve months.
   b. What are the annual cost of goods sold and the average inventory for the year?
   c. Compute the annual inventory turnover ratio. What can the purchasing department do to improve the firm's performance?

Ans.: (see Excel Worksheet below)

Ending Inv @ 12/31/2012	$52,000											
Fiscal Year 2013	January	February	March	April	May	June	July	August	September	October	November	December
Ending Inventory	$75,000	$56,000	$25,000	$85,000	$125,000	$95,000	$72,000	$45,000	$52,500	$120,000	$162,500	$255,000
Cost of Goods Sold	$225,000	$325,000	$240,000	$325,000	$460,000	$220,000	$85,000	$156,000	$220,000	$265,000	$100,000	$350,000
Average Inventory	$63,500	$65,500	$40,500	$55,000	$105,000	$110,000	$83,500	$58,500	$48,750	$86,250	$141,250	$208,750
(a) Monthly Inventory Turnover	3.54	4.96	5.93	5.91	4.38	2.00	1.02	2.67	4.51	3.07	0.71	1.68
(c) Annual Inventory Turnover	33.43											

$2,971,000	(b) Total or Annual Cost of Goods Sold
$88,875	(b) Average Inventory for the Year
33.43	(c) Annual Inventory Turnover Ratio

The purchasing department can reduce order quantity and work with suppliers to deliver purchased items more frequently. This should lower total inventory.

Ending Inv @ 12/31/2012	$125,000											
Fiscal Year 2013	January	February	March	April	May	June	July	August	September	October	November	December
Ending Inventory	$52,000	$88,000	$85,000	$55,000	$75,000	$85,000	$156,000	$215,000	$65,000	$100,000	$165,000	$105,000
Cost of Goods Sold	$85,000	$1,250,000	$950,000	$750,000	$950,000	$850,000	$555,000	$1,325,000	$985,000	$850,000	$1,250,000	$1,050,000
Average Inventory	$88,500	$70,000	$86,500	$70,000	$65,000	$80,000	$120,500	$185,500	$140,000	$82,500	$132,500	$135,000
Monthly Inventory Turnover	0.96	17.86	10.98	10.71	14.62	10.63	4.61	7.14	7.04	10.30	9.43	7.78
Annual Inventory Turnover	103.66											

$10,850,000	(b) Total or Annual Cost of Goods Sold
$104,667	Average Inventory for the Year
103.66	Annual Inventory Turnover Ratio

Q7

Ending Inv @ 12/31/2012	$250,000											
Fiscal Year 2013	January	February	March	April	May	June	July	August	September	October	November	December
Ending Inventory	$225,000	$325,000	$240,000	$325,000	$460,000	$220,000	$85,000	$156,000	$220,000	$265,000	$100,000	$350,000
Cost of Goods Sold	$1,200,000	$1,250,000	$1,350,000	$1,500,000	$950,000	$850,000	$1,650,000	$1,325,000	$1,750,000	$850,000	$2,200,000	$3,500,000
Average Inventory	$237,500	$275,000	$282,500	$282,500	$392,500	$340,000	$152,500	$120,500	$188,000	$242,500	$182,500	$225,000
(a) Monthly Inventory Turnover	5.05	4.55	4.78	5.31	2.42	2.50	10.82	11.00	9.31	3.51	12.05	15.56
(c) Annual Inventory Turnover	75.49											

$18,375,000	(b) Total or Annual Cost of Goods Sold
$243,417	(b) Average Inventory for the Year
75.49	(c) Annual Inventory Turnover Ratio

Q8

Ending Inv @ 12/31/2012	$52,000											
Fiscal Year 2013	January	February	March	April	May	June	July	August	September	October	November	December
Ending Inventory	$75,000	$56,000	$25,000	$85,000	$125,000	$95,000	$72,000	$45,000	$52,500	$120,000	$162,500	$255,000
Cost of Goods Sold	$225,000	$325,000	$240,000	$325,000	$460,000	$220,000	$85,000	$156,000	$220,000	$265,000	$100,000	$350,000
Average Inventory	$63,500	$65,500	$40,500	$55,000	$105,000	$110,000	$83,500	$58,500	$48,750	$86,250	$141,250	$208,750
(a) Monthly Inventory Turnover	3.54	4.96	5.93	5.91	4.38	2.00	1.02	2.67	4.51	3.07	0.71	1.68
(c) Annual Inventory Turnover	33.43											

$2,971,000	(b) Total or Annual Cost of Goods Sold
$88,875	(b) Average Inventory for the Year
33.43	(c) Annual Inventory Turnover Ratio

9. You are given the following information:

Costs	Make Option	Buy Option
Fixed Cost	$125,000	$5,000
Variable Cost	$15	$17

a. Find the break-even quantity and the total cost at the break-even point.

Ans.: (see Excel Worksheet)
Breakeven quantity, Q = 60,000 units; cost at breakeven point = $1,025,000

b. If the requirement is 150,000 units, is it more cost-effective for the firm to buy or make the components? What is the cost savings for choosing the cheaper option?

Ans.: (see Excel Worksheet)
Make option is cheaper; cost saving = $2,555,000 - $2,375,000 = $180,000

BreakevenAnalysis	Option A	Option B
Fixed Cost	$ 125,000.00	$ 5,000.00
Variable Cost	$ 15.00	$ 17.00

Breakeven Quantity	60,000	Units
Breakeven Cost	$ 1,025,000.00	

Quantity Needed	150,000	Units
Cost - Option A	$ 2,375,000.00	
Cost - Option B	$ 2,555,000.00	
Cost - Difference	$ (180,000.00)	

10. You are given the following information:

Costs	Make Option	Buy Option
Fixed Cost	$25,000	$3,000
Variable Cost	$8	$12

a. Find the break-even quantity and the total cost at the break-even point.
b. If the requirement is 4,500 units, is it more cost-effective for the firm to buy or make the components? What is the cost savings for choosing the cheaper option?
c. If the requirement is 6,000 units, is it more cost-effective for the firm to buy or make the components? What is the cost savings for choosing the cheaper option?

Ans.: (a) 5,500 units, $69,000 (b) buy, $4,000 (c) make, $2,000
(use worksheet above)

11. Ms. Jane Kim, Purchasing Manager of Kuantan ATV, Inc., is negotiating a contract to buy 20,000 units of a common component part from a supplier. Ms. Kim has done a preliminary cost analysis on manufacturing the part in-house and concluded that she would need to invest $50,000 in capital equipment and incur a variable cost of $25 per unit to manufacture the part in-house. Assuming the total fixed cost to draft a contract

with her supplier is $1,000, what is the maximum purchase price that she should negotiate with her supplier? What other factors should she negotiate with the suppliers?

Ans.: $27.45, delivery, quality and volume flexibility, among others.
(use worksheet above)

12. A Las Vegas, Nevada, manufacturer has the option to make or buy one of its component parts. The annual requirement is 20,000 units. A supplier is able to supply the parts for $10 each. The firm estimates that it costs $600 to prepare the contract with the supplier. To make the parts in-house, the firm must invest $50,000 in capital equipment and estimates that the parts cost $8 each.

    a. Assuming that cost is the only criterion, use break-even analysis to determine whether the firm should make or buy the item. What is the break-even quantity and what is the total cost at the break-even point?

       Ans.: Breakeven quantity = 24,700 units, if the requirement is 20,000, the firm should buy the item; cost at breakeven point = $247,600

    b. Calculate the total costs for both options at 20,000 units. What is the cost savings for choosing the cheaper option?

       Ans.: Make = $210,000; Buy = $200,600; Cost saving = $9,400
       (use worksheet above)

13. Given the following information, use total cost analysis to determine which supplier is more cost-effective. Late delivery of raw material results in 60 percent lost sales and 40 percent back orders of finished goods.

Order lot size	1,000
Requirements (annual forecast)	120,000 units
Weight per engine	22 pounds
Order processing cost	$125/order
Inventory carrying rate	20% per year
Cost of working capital	10% per year
Profit margin	15%
Price of finished goods	$4,500
Back-order cost	$15 per unit

Unit Price	**Supplier 1**	**Supplier 2**
1 to 999 units/order	$50.00	$49.50
1000 to 2,999 units/order	$49.00	$48.50
3,000+ units/order	$48.00	$48.00
Tooling cost	$12,000	$10,000
Terms	2/10, net 30	1/10, net 30
Distance	125 miles	100 miles
Supplier Quality Rating	2%	2%
Supplier Delivery Rating	1%	2%

Truckload (TL ≥ 40,000 lbs): $0.85 per ton-mile
Less-than-truckload (LTL): $1.10 per ton-mile
Note: per ton-mile = 2,000 lbs per mile; number of days per year = 365

Ans.: (see attached Excel Worksheet)
Supplier 1 is more cost effective.

Description	Supplier 1			Supplier 2		
1. Total Engine Cost	120,000 units x $49		$ 5,880,000.00	120,000 units x $48.50		$ 5,820,000.00
2. Cash Discount						
n/30	$5,880,000 x 10% x 30/365	$ 48,328.77		$5,820,000 x 10% x 30/365	$ 47,835.62	
1/10	N/A			$5,820,000(10% x10/365+1%)	$ 74,145.21	
2/10	$5,880,000(10% x10/365+2%)	$ 133,709.59		N/A		
Largest discount			$ (133,709.59)			$ (74,145.21)
3. Tooling Cost			$ 12,000.00			$ 10,000.00
4. Transportation Cost						
(22,000 lb LTL)	125miles x 120,000units x 22lbs x $1.10/2000		$ 181,500.00	100miles x 120,000units x 22lbs x $1.10/2000		$ 145,200.00
5. Ordering Cost	120,000 / 1,000 x $125		$ 15,000.00	120,000 / 1,000 x $125		$ 15,000.00
6. Carying Cost	1,000 / 2 x $49 x 20%		$ 4,900.00	1,000 / 2 x $48.50 x 20%		$ 4,850.00
7. Quality Cost	$5,880,000 x 2%		$ 117,600.00	$5,820,000 x 2%		$ 116,400.00
8. Delivery Rating						
Backorder (40%)	120,000 x 1% x 40% x $15		$ 7,200.00	120,000 x 2% x 40% x $15		$ 14,400.00
Lost Sales (60%)	120,000 x 1% x 60% x $4,500 x 15%		$ 486,000.00	120,000 x 2% x 60% x $4,500 x 15%		$ 972,000.00
TOTAL COST			$ 6,570,490.41			$ 7,023,704.79

14. A buyer received bids from three suppliers for a vital component part for its latest product. Given the following information, use total cost analysis to determine which supplier should be chosen. Late delivery of the component results in 70 percent lost sales and 30 percent back orders of finished goods.

Order lot size	2,000
Requirements (annual forecast)	240,000 units
Weight per engine	40 pounds
Order processing cost	$200/order
Inventory carrying rate	20% per year
Cost of working capital	10% per year
Profit margin	15%
Price of finished goods	$10,500
Back-order cost	$120 per unit

Unit Price	**Supplier 1**	**Supplier 2**	**Supplier 3**
1 to 999 units/order	$200.00	$205.00	$198.00
1,000 to 2,999 units/order	$195.00	$190.00	$192.00
3,000 + units/order	$190.00	$185.00	$190.00
Tooling Cost	$12,000	$10,000	$15,000
Terms	2/10, net 30	1/15, net 30	1/10, net 20
Distance	120 miles	100 miles	150 miles
Supplier Quality Rating	2%	1%	2%
Supplier Delivery Rating	1%	1%	2%

Truckload (TL ≥ 40,000 lbs): $0.95 per ton-mile

Less-than-truckload (LTL): $1.20 per ton-mile
Note: per ton-mile = 2,000 lbs per mile; number of days per year = 365

Ans.: (see attached Excel Worksheet)
Supplier 2 is more cost effective.

Description	Supplier 1			Supplier 2		
1. Total Engine Cost	240,000 units x $195		$ 46,800,000.00	240,000 units x $190		$ 45,600,000.00
2. Cash Discount						
n/30	$46,800,000 x 10% x 30/365	$ 384,657.53		$45,600,000 x 10% x 30/365	$ 374,794.52	
n/20						
1/10	N/A			N/A		
1/15	N/A			$45,600,000(10% x15/365+1%)	$ 643,397.26	
2/10	$46,800,000(10% x10/365+2%)	$ 1,064,219.18		N/A		
Largest discount			$ (1,064,219.18)			$ (643,397.26)
3. Tooling Cost			$ 12,000.00			$ 10,000.00
4. Transportation Cost						
(80,000 lb TL)	120miles x 240,000units x 40lbs x $0.95/2000		$ 547,200.00	100miles x 240,000units x 40lbs x $0.95/2000		$ 456,000.00
5. Ordering Cost	240,000 / 2,000 x $200		$ 24,000.00	240,000 / 2,000 x $200		$ 24,000.00
6. Carying Cost	2,000 / 2 x $195 x 20%		$ 39,000.00	2,000 / 2 x $190 x 20%		$ 38,000.00
7. Quality Cost	$46,800,000 x 2%		$ 936,000.00	$45,600,000 x 1%		$ 456,000.00
8. Delivery Rating						
Backorder (30%)	240,000 x 1% x 30% x $120		$ 86,400.00	240,000 x 1% x 30% x $120		$ 86,400.00
Lost Sales (70%)	240,000 x 1% x 70% x $10,500 x 15%		$ 2,646,000.00	240,000 x 1% x 70% x $10,500 x 15%		$ 2,646,000.00
TOTAL COST			$ 50,026,380.82			$ 48,673,002.74

Description	Supplier 3		
1. Total Engine Cost	240,000 units x $192		$46,080,000.00
2. Cash Discount			
n/30	N/A		
n/20	$46,080,000 x 10% x 20/365	$ 252,493.15	
1/10	$46,080,000(10% x10/365+1%	$ 587,046.58	
1/15			
2/10	N/A		
Largest discount			$ (587,046.58)
3. Tooling Cost			$ 15,000.00
4. Transportation Cost			
(80,000 lb TL)	150miles x 240,000units x 40lbs x $0.95/2000		$ 684,000.00
5. Ordering Cost	240,000 / 2,000 x $200		$ 24,000.00
6. Carying Cost	2,000 / 2 x $192 x 20%		$ 38,400.00
7. Quality Cost	$46,080,000 x 2%		$ 921,600.00
8. Delivery Rating			
Backorder (30%)	240,000 x 2% x 30% x $120		$ 172,800.00
Lost Sales (70%)	240,000 x 2% x 70% x $10,500 x 15%		$ 5,292,000.00
TOTAL COST			$52,640,753.42

CASES

1. 3 Bees Buttermilk Corporation – Supplier Selection*

Case Note

Learning Objectives:

- Understand sourcing decisions and the factors impacting supplier selection.
- Understand and be able to compute total cost of ownership.
- Describe the opportunities and challenges of global sourcing.

The primary emphasis of this case is on supplier selection. The 3 Bees Buttermilk Corporation is an international company and sources its supplies globally. They understand how critical supplier selection is to their bottom line. The owners, Basil, Bernie, and Buford discuss with Buck, intern with the 3 Bees, some of the factors they consider when selecting suppliers. Every factor is important; however, each owner has specific factors they focus on such as process and product technologies, the supplier's willingness to share technologies and information, and communication capability.

In addition to the supplier selection criteria, Bernie, Chief Financial Officer, is big on the cost factor. He explained to Buck that you had to determine the total cost of ownership. This went beyond the price. Total cost of ownership also included payment terms, cash discount, ordering cost, carrying cost, and much more.

Answer to Questions:

1. Students' answers may vary, but here are two factors not mentioned in the case.

a. Capacity – 3 Bees Buttermilk Corporation must consider whether suppliers have the capacity to fill not only the current orders, but larger orders if necessary.
b. Location – 3 Bees Buttermilk Corporation must consider how the supplier's location will affect delivery lead time, transportation costs, etc.

2. Early supplier involvement (ESI) brings the supplier's expertise to the design table. ESI can ensure cost effective design choices, provide alternative conceptual solutions, and aid in design assessment.
3. Some qualitative and quantitative factors are freight and inventory costs, tooling, tariffs and duties, currency exchange rates, and nonperformance costs.

* Written by Rick Bonsall, D. Mgt., McKendree University, Lebanon, IL. The people and institution are fictional and any resemblance to any person or any institution is coincidental. This case was prepared solely to provide material for class discussion. The author does not intend to illustrate either effective or ineffective handling of a managerial situation.

2. Frank's Driving Appurtenances – A Make-or-Buy Decision*

Case Note

Learning Objectives:

- Understand sourcing decisions and the factors impacting the make-or-buy decision.

This case highlights the importance of deciding whether to make the product one plans to sell or to buy it from a supplier. While this is a crucial decision for all businesses, it could truly be a make or break decision for a new company. Although Frank has the skill to design and manufacture the unique car accessories he plans to sell, he must determine if making them is the correct financial decision. Using the make-or-buy breakeven analysis, Frank can easily determine which is the best approach for him at this time.

Answers to Questions:

1. One purpose for using the breakeven analysis is to calculate the cost effectiveness of sourcing decisions. It is an essential tool when cost is the most important criterion.
2. The two types of cost are fixed costs and variable costs.
3. The fixed cost is higher for the make decision because of initial capital investment for equipment, facilities, etc. However, the variable costs are higher for the buy decision because the supplier includes its profit margin as part of the price of the product.

* Written by Rick Bonsall, D. Mgt., McKendree University, Lebanon, IL. The people and institution are fictional and any resemblance to any person or any institution is coincidental. This case was prepared solely to provide material for class discussion. The author does not intend to illustrate either effective or ineffective handling of a managerial situation.

3. Middleton Fine Furniture – Supply Chain Savings Opportunities*

Case Notes

Learning Objectives:

- Understand the role of purchasing and its strategic impact on an organization's competitive advantage.
- Understand sourcing decisions and the factors impacting supplier selection.
- Understand the pros and cons of single sourcing versus multiple sourcing.

This case addresses how to leverage supply chain management to improve the bottom line. Middleton Fine Furniture is experiencing financial difficulties as a result of a downturn in the economy. CEO Sally Sherman has tasked her CFO and Vice President of Supply Chain Management to develop a long term solution. Sally wants more than immediate relief for the current financial predicament; she wants plans put in place that will enable Middleton to weather any financial storm.

Ms. Yost, CFO, and Ms. Gomez, Vice President of Supply Chain Management, outline three major initiatives they are pursuing, inventory turnover analysis, single versus multiple sourcing for specific parts, and an evaluation of whether to change from make or buy where applicable. They believe that these initiatives will reduce costs in the near term and ensure costs are managed more effectively over the long term.

Answers to Questions:

1. As Kenisha stated, inventory was money on the shelf. The higher the inventory turnover ratio, the more frequently the inventory was being sold. Consequently, if Middleton Fine Furniture could increase its inventory turnover ratio, the money tied up in inventory would be converted into revenue.
2. One way single sourcing can help reduce expenses is by lowing the cost of the inventory. Generally, if a company single sources, it purchases a larger volume from the supplier. This usually results in a lower cost per until for the company. A second way single sourcing can help reduce expenses is by lowering transportation costs. For example, since Middleton is purchasing large volumes they may be able to take advantage of full truckload shipment rates, rather than having to pay less-than-full truckload rates, which are more expensive.
3. The two types of cost are fixed costs and variable costs.

* Written by Rick Bonsall, D. Mgt., McKendree University, Lebanon, IL. The people and institution are fictional and any resemblance to any person or any institution is coincidental. This case was prepared solely to provide material for class discussion. The author does not intend to illustrate either effective or ineffective handling of a managerial situation.

SAMPLES