PART II
ANSWERS TO END-OF-CHAPTER QUESTIONS

CHAPTER 2: LOGISTICS AND INFORMATION TECHNOLOGY

2-1. In what ways can information be helpful in logistics and supply-chain management?

There are a number of ways in which information can be helpful in logistics and supply-chain management. These include, but are not limited to, greater knowledge and visibility across the supply chain, which makes it possible to replace inventory with information; greater awareness of customer demand via point-of-sale data, which can help improve planning and reduce variability in the supply chain; better coordination of manufacturing, marketing, and distribution through enterprise resource planning systems; streamlined order processing and reduced lead times enabled by coordinated logistics information systems.

2-2. Name the six general types of information systems, and give one logistics application for each one that you've named.

One type is office automation systems, and a logistics application could be spreadsheets that calculate optimal order quantities. A second is communication systems; one logistics example is voice-based order picking. Transaction processing systems are a third general type, with point-of-sale systems being a logistics application. Management and executive information systems are a fourth general type of information systems; a logistics application involves logistics information systems. A fifth general type of information system is decision support systems, with warehouse management systems being a logistics-related application. The sixth, and final, general type of information system is the enterprise system, represented by logistics modules of enterprise resource planning systems.

2-3. Do you view the spreadsheet as the most relevant general software package for logisticians? Why or why not?

The text indicates that spreadsheets are indeed the most relevant general software package for logisticians. Today's spreadsheets have developed to the point that they are able to solve for basic logistics optimization models. These spreadsheet-based optimization models provide a method for logisticians to conduct a variety of "what-if" analysis in support of their decision making.

2-4. How can communication systems facilitate logistics management in the immediate aftermath of situations such as terrorist attacks and natural disasters?

One example involves the substitution of information for inventory. The total shutdown of the U.S. aviation system following the terrorist attacks of September 11, 2001 caused many air shipments to be diverted to trucks—thus adding to delivery times. Airfreight

companies such as FedEx used their communication systems to inform customers that their shipments were being diverted and when the shipments would be arriving.

2-5. What advances in telecommunications technology do you view as being most beneficial to logistics management? Why?

The answer to this question is likely to vary from student to student. Certainly cell phones, e-mail, smart phones, and wireless communications would be popular choices.

2-6. Discuss how global positioning systems have become quite valuable in transportation management.

Global positioning systems (GPS) have become quite valuable in transportation management because of high fuel costs and the relentless pressure to improve efficiency and productivity. Indeed, transportation companies that have implemented GPS have reported an increase in worker productivity, reduced operating costs, and improved customer relations. One study found that GPS implementation allows transportation companies to recapture nearly one hour per day of their drivers' time, which translates into labor savings of approximately $5,500 per employee.

2-7. Discuss the benefits and drawbacks of EDI.

Potential benefits to EDI include reductions in: document preparation and processing time; inventory carrying costs; personnel costs; information float; shipping errors; returned goods; lead times; order cycle times; and ordering costs. In addition, EDI may lead to increases in: cash flow; billing accuracy; productivity; and customer satisfaction. Potential drawbacks include a lack of awareness of its benefits; high setup costs; lack of standard formats; and incompatibility of computer hardware and software.

2-8. Discuss the relationship between automatic identification technologies and point-of-sale systems.

Automatic identification systems are an essential component in point-of-sale (POS) systems; the idea behind POS systems is to provide data and enhance managerial decision making, and automatic identification technologies can be very helpful in so doing. Operationally, POS systems involve scanning Universal Product Code (UPC) labels, either by passing the product over an optical scanner or recording it with a handheld scanner.

2-9. Why are some companies hesitant to adopt RFID technology?

A major drawback to RFID adoption involves the costs of installing the related hardware and software, which can range from $100,000 for smaller companies to $20 million for larger companies. Another drawback to RFID adoption involves privacy concerns, such as the inappropriate use of the technology. Yet another drawback is that data accuracy can be lower items with high moisture content, such as fruits and vegetables.

2-10. Discuss the importance of timely and accurate information to a logistics information system.

Timely information can involve several dimensions. For example, "timely" can refer to the up-to-date status of information, which can be influenced by a company's collection and analyses procedures. Although such information should ideally involve internal and external sources, internal sources of logistics information are not always as plentiful as would be desired. "Timely" can also refer to how quickly a manager receives the requested information; this is influenced by a company's retrieval and dissemination procedures. Faster and more powerful technology has helped to reduce retrieval and dissemination times.

Accurate information may reflect the effectiveness and efficiency of a company's logistics information system. This means that a logistics information system needs to consider the nature and quality of the relevant data. For example, although the Internet can be a very cheap source of external information, some Internet information is of questionable validity.

2-11. What benefits are associated with transportation and warehouse management systems?

Organizations that have implemented transportation management systems have reported decreased empty vehicle miles, reduced fuel consumption, and reduced transportation expenditures. Potential benefits to warehouse management systems include dramatic reductions in data entry errors as well as dramatic reductions in the travel distances for order picking. Other benefits to warehouse management systems include reduced operating expenses, fewer stockouts, increased inventory accuracy, and improved service to customers.

2-12. What is data mining? How might it be used in logistics?

Data mining can be defined as the application of mathematical tools to large bodies of data in order to extract correlations and rules; it uses sophisticated quantitative techniques to find "hidden" patterns in large volumes of data. Data mining has allowed Wal-Mart to discover that when hurricanes are projected to hit the state of Florida, there is a dramatic increase in demand for beer and Kellogg's Pop Tarts®. As a result, Wal-Mart makes sure that additional stocks of these products are available when hurricanes are projected to hit Florida.

2-13. Discuss advantages and disadvantages of enterprise resource planning systems.

ERP systems are attractive because they offer the potential for lower costs and both increased productivity and customer satisfaction. In theory, ERP systems provide an opportunity for all functional areas within a firm to access and analyze a common database. This should allow for enterprise-wide coordination of relevant business

processes. One of the most frequently mentioned shortcomings involves the costs of installation, and companies often fail to consider relevant costs such as upgraded hardware and employee training. Moreover, ERP implementation can be quite time consuming; actual implementation times may be 2 to 4 times longer than vendor estimates. A third shortcoming of ERP systems is that they initially lacked strong application-specific logistical capabilities such as transportation or warehouse management systems.

2-14. Refer back to the logistical activities listed in Chapter 1; pick two that you are interested in and research how they have been influenced by the Internet. Are you surprised by your findings? Why or why not?

There is any number of acceptable answers for this question.

2-15. From a logistical perspective, what are some of the differences between online and in-store retailing?

For one, the orders associated with online shopping tend to be more plentiful and in much smaller quantities that those associated with in-store retailing. As such, online retailing requires an order management system capable of handling high volumes of orders. Because of smaller order quantities, online shopping is characterized by open-case, rather than full-case picking; open-case picking is facilitated by materials handling equipment such as totes and push carts. In addition, the smaller order quantities occasioned by online retailing tend to favor transport companies with extensive delivery networks and expertise in parcel shipments.

2-16. Why is a "one size fits all" logistics strategy not likely to facilitate effective or efficient online shopping?

Rather than "one size fits all," a variety of logistics strategies might need to be applied to online shopping and it's important to recognize the potential trade-offs with these strategies. For example, one way of addressing the last-mile issue of customer unavailability would be to install some type of receptacle for the product at the customer's residence. However, these receptacles might not be feasible for large items (such as a refrigerator), perishable items (such as certain types of food), or extremely valuable items (such as jewelry).

2-17. Discuss the advantages and disadvantages of cloud computing.

Its pay-per-use formula allows customers to avoid high capital costs, and thus becomes a viable option for many companies that could not afford to purchase, install, and maintain application-specific software. Other advantages include faster and less costly installation, a smaller information technology staff, and regular upgrades and updates from the software provider. One drawback is that the regular upgrades and updates can be too frequent and numerous, and customers struggle to keep up with them. There are also

limited opportunities for customization and because the Internet is the primary transaction medium, security issues such as data protection can be a concern.

2-18. Discuss the benefits and drawbacks to electronic procurement.

Four types of benefits, transactional, compliance, management information, and price, are associated with electronic procurement. As an example, transactional benefits measure the transactional benefits, such as a reduced invoice-to-payment time, that come from e-procurement. One concern with electronic procurement involves the security of information that is being transmitted; there is a risk that sensitive or proprietary information could end up in the wrong hands. Another concern is that e-procurement can be impersonal in the sense that human interaction is replaced by computer transactions.

2-19. What is an online reverse auction? Why do buyers like them?

In a reverse auction, a buyer (rather than seller) invites bids from multiple sellers, and the seller with the lowest bid is generally awarded the business. Buyers tend to like reverse auctions because they aim to generate low procurement prices and the online nature of reverse auctions allows buyers to drill down to a seller's low price very quickly.

2-20. What are some of the macro-level information technology challenges that managers face?

The text identifies three macro-level information technology challenges, the first of which is that information technology is a tool that can help managers to address organizational problems and not a panacea for them. Security is a second macro-level concern, and it's important that websites be as secure as possible from computer viruses or computer hackers. A third information technology challenge involves human resource issues, and employee resistance has been identified as a major cause of information technology implementation failure.

PART III
EXAMINATION QUESTIONS

CHAPTER 2: LOGISTICS AND INFORMATION TECHNOLOGY

Multiple Choice Questions (correct answers are bolded)

1. Which of the following is not a benefit to utilizing information in logistics?

a. greater knowledge and visibility across the supply chain
b. greater awareness of customer demand via point-of-sale data
c. better coordination of manufacturing, merchandising, and distribution through ERP tools
d. more streamlined order processing and reduced lead time
e. **all of the above are benefits**

2. How do data and information differ?

a. data are a body of facts in a format suitable for decision making, while information is simply facts
b. they are the same
c. **data are simply facts; information is a body of facts in a format suitable for decision making**
d. data are associated with decision support systems; information is associated with ERP systems

3. ____ refers to the collection of large amounts of near-real-time data collected through a variety of sources such as sensors and smart phones, among others.

a. cloud computing
b. **big data**
c. data warehousing
d. decision support systems

4. ____ provide effective ways to process organizational business data, to perform calculations, and to create documents.

a. enterprise resource planning systems
b. transaction processing systems
c. decision support systems
d. **office automation systems**

5. The most relevant general software package for logisticians is ____.

a. **spreadsheets**
b. word processing

c. presentation packages
d. email

6. Which of the following is not considered a general software package?

a. spreadsheets
b. presentation packages
c. word processing
d. database management
e. **all are general software packages**

7. ____ help various stakeholders—employers, suppliers, customers—work together by interacting and sharing information in many different forms.

a. decision support systems
b. **communication systems**
c. office automation systems
d. transaction processing systems

8. What has emerged as the measuring stock for logistics information technology in the 21st century?

a. Facebook
b. the Internet
c. **wireless communication**
d. enterprise resource planning systems

9. ____ refers to a network of satellites that transmits signals that pinpoint the exact location of an object.

a. **global positioning systems**
b. geographic information systems
c. the National Security Agency
d. electronic data interchange

10. Electronic data interchange represents what general type of information management system?

a. communication system
b. **transaction processing system**
c. decision support system
d. office automation system

11. ____ refers to the computer-to-computer transmission of business data in a structured format.

a. big data
b. enterprise resource planning systems
c. **electronic data interchange**
d. data mining

12. Which of the following statements about EDI is not true?

a. EDI can have high setup costs
b. **EDI can result in increased inventory carrying costs**
c. EDI can lead to increased billing accuracy
d. the Internet is likely a complement to, rather than substitute for, EDI

13. Automatic identification systems are an essential component in ____.

a. every warehouse
b. **point-of-sale systems**
c. a logistics information system
d. dual distribution

14. The most popular automatic identification system currently in use is ____

a. voice-data entry
b. radio-frequency identification
c. magnetic strips
d. **bar code scanners**

15. Which of the following statements about radio-frequency identification (RFID) is false?

a. **RFID only offers read capabilities**
b. Walmart has been a major catalyst for RFID usage in logistics
c. RFID can store large quantities of data
d. RFID has helped to reduce the occurrence of inventory stockouts
e. all of the above are true

16. A logistics information system begins with:

a. **a logistics manager requesting information**
b. a good computer system
c. lots of money
d. a customer order

17. All of the following statements about logistics information systems are true, except:

a. “timely” can refer to the up-to-date status of information
b. **internal sources of logistics information are relatively plentiful**
c. “timely” can refer to how quickly a manager receives requested information
d. a LIS must be concerned with the nature and quality of data
e. all of the above are true

18. The primary advantage of ____ is that enables a firm to test the feasibility of proposed changes at relatively little expense.

a. data mining
b. expert systems
c. **simulation**
d. artificial intelligence

19. Which of the following is not a logistics-related decision support system?

a. simulation
b. application-specific software
c. transportation management systems
d. **electronic data interchange**
e. all of the above are logistics-related decision support systems

20. Warehouse management systems represent an example of what general type of information management system?

a. communication system
b. transaction processing system
c. **decision support system**
d. office automation system

21. Which of the following is not a potential benefit of transportation management systems?

a. **fewer stockouts**
b. reduced fuel consumption
c. decreased empty vehicle miles
d. reduced transportation expenditures
e. all of the above are benefits

22. ____ refers to the application of mathematical tools to large bodies of data in order to extract correlations and rules.

a. fuzzy logic
b. factor analysis

c. **data mining**
d. linear regression

23. Efficient data mining is dependent upon ____.

a. good forecasting tools
b. top management commitment
c. high-speed technology
d. **data warehouses**

24. ____ create and maintain consistent data processing methods and an integrated database across multiple business functions.

a. logistics information systems
b. **enterprise systems**
c. decision support systems
d. transaction processing systems

25. The origins of contemporary ERP systems can be traced back to logistics and ____.

a. **manufacturing**
b. marketing
c. purchasing
d. finance

26. Which of the following statement about ERP is false?

a. In recent years, ERP vendors have begun to provide high-quality application-specific logistic capabilities
b. ERP implementation costs can easily reach tens of millions of dollars
c. **ERP's origins can be traced back to finance and manufacturing**
d. ERP glitches often have a logistical component to them
e. all of the above are true

27. All of the following are potential costs associated with ERP implementation, except:

a. employee training
b. system testing
c. data conversion
d. upgraded computer hardware
e. **all of the above are costs**

28. Approximately ____ percent of the world's population currently uses the Internet.

a. 45
b. **35**

c. 25
d. 15

29. The return rates for online purchases is approximately ____ percent

a. 20
b. 25
c. **30**
d. 35
e. none of the above

30. Which of the following statements is false?

a. orders associated with online retailing tend to be for smaller quantities than in-store retailing
b. online retailing is characterized by open-case, rather than full-case, picking
c. online retailers are challenged by last-mile considerations
d. **online retailing and in-store retailing experience similar rates of product return**

31. The worldwide public cloud services market grew by approximately ____ percent between 2011 and 2012?

a. **20**
b. 15
c. 10
d. 5

32. What has emerged as the most popular application of on-demand logistics software (cloud computing)?

a. warehouse management systems
b. **transportation management systems**
c. inventory optimization
d. collaborative forecasting

33. Which of the following is not a type of benefits that comes from electronic procurement?

a. transactional benefits
b. management information benefits
c. compliance benefits
d. **production benefits**
e. all of the above are benefits

34. In a reverse auction, ____.

a. multiple sellers invite bids from multiple buyers
b. one buyer invites bids from one seller
c. **one buyer invites bids from multiple sellers**
d. multiple sellers invite bids from one buyer

35. ____ has been identified as the biggest information technology challenge that companies face today.

a. software viruses
b. information security
c. **the cost of technology**
d. employee resistance

True-False Questions

1. The effective and efficient use of information allows organizations to either reduce costs or improve customer satisfaction. (False)

2. "Data" and "information" are synonymous terms. (False)

3. Big data refers to large amounts of near-real-time data collected through a variety of sources such as sensors and smart phones, among others. (True)

4. Office automation systems provide effective ways to process personal and organizational business data, to perform calculations, and to create documents. (True)

5. A transaction processing system helps people work together by interacting and sharing information in many different forms. (False)

6. The Internet has emerged as the measuring stick for logistics information technology during the first decade of the 21st century. (False)

7. Transportation companies that have implemented global positioning systems have reported increased worker productivity, reduced operating costs, and improved customer relations. (True)

8. Global positioning implementations often pay for themselves within six months. (False)

9. EDI is an example of a logistics-related transaction processing system. (True)

10. EDI is no longer an important logistics technology in the 21st century. (False)

11. The idea behind point-of-sale systems is to provide data to guide and enhance managerial decision making. (True)

12. Radio-frequency identification is the most popular automatic identification system currently in use. (False)

13. One prominent drawback to radio-frequency identification (RFID) involves privacy concerns. (True)

14. A logistics information system begins with a logistics manager requesting information and ends with the manager receiving regular and customized reports. (True)

15. Internal sources of logistics information are not always as plentiful as might be desired. (True)

16. "Timely" information can refer to its nature and quality. (False)

17. The primary advantage of simulation is that it enables a firm to test the feasibility of proposed changes at relatively little expense. (True)

18. Application-specific software is a type of decision support system. (True)

19. One benefit to transportation management systems is fewer stockouts. (False)

20. Activities that can be controlled by a warehouse management system include inventory management, determination of storage locations, and order shipping. (True)

21. Correlation analysis uses sophisticated quantitative techniques to find "hidden" patterns in large volumes of data. (False)

22. Wal-Mart and its vendors make extensive use of data mining to improve supply chain efficiency and effectiveness. (True)

23. The attractiveness of ERP systems comes from their potential for lower costs as well as increased productivity and customer satisfaction. (True)

24. The origin of ERP systems can be traced back to finance and manufacturing. (False)

25. There are suggestions that consultant fees for ERP implementations may be three times as costly as the software itself. (True)

26. A general rule of thumb is that the actual time to implement an ERP system may range from 1 ½ to 2 times longer than the time period specified by the ERP vendor. (False)

27. In recent years, ERP vendors have begun to provide high-quality application-specific logistical capabilities. (True)

28. About 25 percent of the world's population currently uses the Internet. (False)

29. There are few logistical similarities between online and in-store retailing. (False)

30. The smaller order quantities occasioned by online retailing tend to favor transport companies with extensive delivery networks and expertise in parcel shipments. (True)

31. The return rates associated with e-commerce are quite similar to those associated with other kinds of retailing. (False)

32. The worldwide public market for cloud computing grew nearly 20 percent between 2011 and 2012. (True)

33. One reason for the popularity of on-demand software is that is pay-per use formula allows customers to avoid high capital investment costs. (True)

34. Cloud-based software allows for a great deal of customization. (False)

35. The Internet is the primary transaction medium for cloud-based software. (True)

36. Electronic procurement uses the Internet to make it easier, faster, and less expensive for an organization to purchase goods and services. (True)

37. In a reverse auction, one seller invites bids from multiple buyers. (False)

38. Information technology should be regarded as a tool to help managers address organizational problems. (True)

39. Software viruses are viewed as the most important information technology issue that companies face today. (False)

40. People-related factors such as employee resistance have been identified as a major cause of information technology implementation failure. (True)

PART IV
CASE SOLUTIONS

CASE 2-1 JUST-IN-TIME IN KALAMAZOO

Question 1: What is the total annual cost of maintaining the components inventory under the present system?

Current system

Item	Average distance from vendor (in miles)	Number of units used each week	Current lot size purchased	Unit cost	Average freight cost per unit
Gas range	1,145	10	200	$100	$20
Toilet	606	10	240	$80	$18
Pump	26	56	125	$16	$3
Refrigerator (large)	22	6	120	$110	$20
Refrigerator (small)	22	7	15	$95	$15
Foam cushion	490	675	1,500	$8	$2
CB radio (type D)	1,800	9	24	$136	$11
Dome lights	3	824	1,720	$2	None
Awning bracket	48	540	1,200	$4	$1
Insect screen	159	570	1,240	$7	$1

Current system (continued)

Item	Safety stock	Average inventory	Total inventory	Inventory cost	Inventory carrying charges	Inventory maintenance cost
Gas range	40	100	140	$62,400	$3,360	$65,760
Toilet	40	120	160	$50,960	$3,136	$54,096
Pump	56	63	119	$55,328	$450	$55,778
Refrigerator (large)	6	60	66	$40,560	$1,716	$42,276
Refrigerator (small)	7	8	15	$40,040	$319	$40,359
Foam cushion	1,350	750	2,100	$351,000	$4,200	$355,200
CB radio (type D)	36	12	48	$68,796	$1,411	$70,207
Dome lights	824	860	1,684	$85,696	$674	$86,370
Awning bracket	540	600	1,140	$140,400	$1,140	$141,540
Insect screen	1,140	620	1,760	$237,120	$2,816	$239,936

Total inventory maintenance cost per year = $1,151,522

Using JIT

Item	JIT lot size	Unit cost	Average freight cost per unit (surface)	Inventory maintenance cost
Gas range	10	$105	$22	$66,040
Toilet	10	$100	$18	$61,360
Pump	7	$15	$4	$55,328
Refrigerator (large)	6	$113	$25	$43,056
Refrigerator (small)	1	$85	$15	$36,400
Foam cushion	75	$7	$3	$351,000
CB radio (type D)	3	$130	$26	$73,008
Dome lights	36	$4	None	$171,392
Awning bracket	60	$5	$1	$168,480
Insect screen	50	$7	$2	$266,760

Total inventory maintenance cost per year = $1,292,824.00

The table in this case is a 10% sample of the firm's inventory and reflects the inputs needed for one week's activities. We must calculate the average stock on hand for each item (safety stock + ½ order lot size), and must calculate the cost per item (unit cost plus freight). For the first item—gas ranges—a safety stock of 40 units is maintained, and ½ the order lot size is 100 units, for a total inventory in stock of 140 units. Unit cost ($100) plus freight ($20) equals $120. Multiplying average inventory (140) times $120 equals $16,800. Doing all the items on table gives a total of $96,175. Because this is a 10% sample, the total parts inventory would be worth $961,750. Inventory carrying costs on this, at 20% per year, would be $192,350.

Question 2: What would be the total annual cost of maintaining the components inventory under the JIT system (assuming no safety stocks)?

One would look at the average number used per week, but apply the new, usually higher unit costs and freight charges. For one week's activity shown on the table, the new cost would be $24,862 per week (compared with about $21,818 under the existing system). Hence the cost of the JIT system is higher.

Question 3: Should Ballenger take into account any other costs or benefits from the JIT system? If so, what are they?

Under a JIT system, Ballenger should exhibit less concern with various problems associated with maintaining a large inventory such as shrinkage and obsolescence.

Question 4: If the JIT system is adopted, are there safety stocks of any item that should be maintained? If so, which ones, and how much?

Unfortunately, the case does not provide sufficient information to answer this question. Parts that are crucial to the process would need to be indicated by management, or perhaps work-flow process charts.

Question 5: If the JIT system is adopted, what changes, if any, should occur in the relationships between Ballenger's firm and his suppliers of components? Discuss.

He would need better discipline in terms of prompt delivery and freedom from defects.

Question 6: Assume that Ballenger has switched to the JIT system and that he receives a surprise phone call from a competitor who is going out of business. The competitor wants to sell Ballenger 7,000 dome lights of the type listed on Exhibit 3-C. Should Ballenger buy them? If so, at what price?

Probably not, because this would undermine the discipline envisioned by the JIT system. On the other hand, if the purchase price was very low, and there were no unique storage requirements, Ballenger might buy them.

Question 7: Carrying costs are 20%. Is there a level of carrying costs at which both Ballenger's present system and a JIT system have similar costs? If so, what is it?

Using a basic spreadsheet package, we found that at the astronomical rate of **167%**, the two systems were equal.

DISCUSSION

This is a difficult case although it can be approached in several ways. One must calculate the average costs of all the goods, as they are used each week, plus a figure for inventory carrying costs.