SUPPLY CHAIN MANAGEMENT

GBAT9127

SUPERVISED OPEN BOOK EXAMINATION

Time Allowed: 2 Hours
Reading Time: 10 Minutes

INSTRUCTIONS

1. This is a supervised open book examination. Course study guide, prescribed textbook, self-made notes, pens, pencils and erasers may be brought into the examination room.

2. You are allowed to use electronic devices for the purpose of referring to digital course materials and notes only. An off-line calculator application may also be used. These devices must not be connected to the internet, Wi-Fi must be disabled and tablets must be in flight mode. They must not be used to type your exam responses.

3. Your reading time before the examination is 10 minutes and no writing may be undertaken during that period. During reading time, only the examination paper may be read. No other materials may be read during reading time.

4. Candidates may bring drawing instruments, rules and electronic calculators into the exam. Off-line calculator applications may also be used on electronic devices taken in the exam (see point 2 above).

5. The examination paper contains FIVE (5) questions. YOU MUST ANSWER ALL FIVE QUESTIONS.

6. Questions have unequal marks. Be concise in your answers and plan your time accordingly.

7. Black or blue pen is to be used.

8. Please answer all questions in the same answer booklet(s). If you use more than one booklet ensure they are marked Book 1 of …., Book 2 of …. etc.

9. Please ensure that you have written your name and other details on every exam booklet used and any other necessary documentation.

10. This exam paper must be returned with your answer books. No materials are to be retained at the conclusion of the exam.

11. The exam contributes 35% towards your final grading in this course.
QUESTION 1 (20 Marks)

Annual spending on weddings in the US is $40 billion, and the average wedding costs $15,000–$20,000. A significant expense is the bridal gown. The average gown costs $800. Most are sold by independent retailers or by stores affiliated with particular designers.

An example of an independent retailer is Ultimate Bride, which offers over 60 different gowns from 12 designers. A review of the shop promises “Sales people are nice as can be” and “You don’t have to sort through dresses, searching blindly for the perfect dress. Instead, a consultant discusses your ideas, your shape and the wedding details, then starts bringing out dresses.” Gowns at Ultimate Bride start at $2,000 and average $3,000–$4,000.

An example of a designer-affiliated store is Priscilla’s of Boston. A review describes their store as “Quiet enough to hear a pin drop, you can expect one-on-one attention ... Don’t be surprised if you’re the only one there during your appointment time since the wedding professionals here work hard to please your personally.” The store offers over 80 designs and gowns range from $1,800 - $6,000. Stores carry a limited number of sample dresses that brides can try on. (Many brides settle for trying a dress in the wrong size.) The final gown chosen is then custom-ordered with delivery times commonly taking over two months. Gowns are only made in standard sizes so most brides must spend several hundred more dollars on alterations to their gowns.

Another new store, David’s Bridal is unique in the industry, selling 20% of all wedding gowns in the US. David’s sells its own private label gowns as well as Oleg Cassini and Gloria Vanderbilt designs. A typical David’s store has in stock over 2,500 gowns in sizes ranging from 2 to 26. All cost less than $1,000. During promotions, gowns start at $99. If one store does not have a desired design in the correct size, it can be transferred from another store or specifically ordered. Special orders typically take 6 to 12 weeks. An online review of one of their seven Chicago area stores reads “Princesses need not apply ... The staff is helpful and knows the merchandise but doesn’t provide extensive one-on-one attention or advice. Stores (particularly on weekends) can be swamped with brides-to-be.”

Please answer the following questions relating to this article.

1.1)  Porter identified two major competitive strategies. Identify and explain what these generic strategies are and discuss which of the strategies you think the companies mentioned in the above article are pursuing.  
(5 marks)

1.2)  For the wedding dress industry, list what you think would be the order qualifiers and the order winners?  
(5 Marks)

1.3)  Discuss how you think each company would align its supply chain drivers to implement its chosen competitive strategy.  
(10 marks)
A newsagent has just one station that deals with lottery ticket purchases. The newsagent is worried about the time that some customers are waiting for their lottery tickets and carries out a survey. On a typical day a total of 400 customers bought lottery tickets. The newsagent is open from 8.30 am to 5.30 pm continuously and the following table shows the number of people in the lottery ticket queue (including the person being served) as counted at different times during the day.

<table>
<thead>
<tr>
<th>Time</th>
<th>9.00</th>
<th>10.00</th>
<th>11.00</th>
<th>12.00</th>
<th>1.00</th>
<th>2.00</th>
<th>3.00</th>
<th>4.00</th>
<th>5.00</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number in queue</td>
<td>8</td>
<td>4</td>
<td>10</td>
<td>3</td>
<td>7</td>
<td>0</td>
<td>6</td>
<td>5</td>
<td>2</td>
<td>45</td>
</tr>
</tbody>
</table>

(a) Use this information to estimate the average waiting time for a customer. 

(b) The newsagent has also timed the actual transaction of purchasing lottery tickets and finds that this takes 70 seconds per customer. Use the P-K formula to make a different estimate of the average waiting time for a customer. State any assumptions that you make.

(c) Comment on the possible reasons for any discrepancy you observe in your estimates from part (a) and part (b).
QUESTION 3 (20 Marks)

Toyota have for many years rightfully been considered one of the ultimate supply chain performers with their lean approach to supply chain and production management. It has, however, not all been smooth sailing in recent years.

In March 2010 Business Week magazine had an article titled “The Humbling of Toyota”. It describes an aggressive cost cutting program called CCC21 (Construction of Cost Competitiveness for the 21st Century) of Toyota. Under CCC21, Toyota realised cost reductions of more than 200 billion yen ($2.2 billion) a year on a consolidated basis around 2005. Later Toyota had a more aggressive version of CCC21, called Value Innovation, which promised more savings by making the entire development process cheaper and faster, further trimming parts, production costs, and time to market. According to the article, Toyota had managed to slash the time it took to bring models into production once a design was final to about 12 months, compared with an industry average of between 24 and 36 months.

However, at the end of 2009 and throughout 2010 Toyota was forced to perform several product recalls as consumers started reporting quality problems related to unintended vehicle acceleration. It has been estimated that the total cost of the recalls, from lost output and sales was approximately $2 billion. Their reputation as quality leaders also took a severe battering.

Then in March 2011, a massive earthquake, followed by a tsunami, hit Japan. After the earthquake, Toyota closed all 12 factories in Japan. Toyota’s largest car-part maker, Denso Corp, being in the same region, also shut almost all its factories. The disruption of Toyota’s production lasted for months.

Toyota’s Lean Production System features just-in-time manufacturing with minimum inventory held and strategic alliances with local suppliers. From these events, some people attributed Toyota’s vulnerability to its suppliers and its inability to recover from the earthquake sooner to “Lean”, and argued that “Lean” makes Toyota highly vulnerable to “catastrophic breakdown”.

Questions

Is such vulnerability a weakness of “lean”? What is your view?

Discuss the ways in which Toyota, and other companies that pursue lean supply chain strategies, can build a resilient supply chain capable of responding to, and recovering from events that occur.
QUESTION 4 (20 Marks)

HP produces printers for sale in Europe in its Taiwan factory. Printers sold in different countries differ in terms of the power outlet as well as the language of the manuals. Currently, HP assembles and packs printers for sale in individual countries. The distribution of weekly demand in different countries is normally distributed, with means and standard deviations as shown in the following table.

Weekly Demand for HP Printers in Europe

<table>
<thead>
<tr>
<th>Country</th>
<th>Mean demand</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>France</td>
<td>3,000</td>
<td>2,000</td>
</tr>
<tr>
<td>Germany</td>
<td>4,000</td>
<td>2,200</td>
</tr>
<tr>
<td>Spain</td>
<td>2,000</td>
<td>1,400</td>
</tr>
<tr>
<td>Italy</td>
<td>2,500</td>
<td>1,600</td>
</tr>
<tr>
<td>Portugal</td>
<td>1,000</td>
<td>800</td>
</tr>
<tr>
<td>UK</td>
<td>4,000</td>
<td>2,400</td>
</tr>
</tbody>
</table>

(a) Assume demand in different countries to be independent. Given that the lead time for the Taiwan factory is eight weeks, how much safety inventory does HP require in Europe if it targets a cycle service level of 95 per cent ($z=1.64$) using a continuous review policy?

(10 marks)

(b) HP decides to build a central distribution centre (CDC) in Europe. It will ship base printers (without power supply) to the CDC. When an order is received, the CDC will assemble power supplies, add manuals, and ship the printers to the appropriate country. The base printers are still to be manufactured in Taiwan with a lead time of eight weeks. How much saving of safety inventory can HP expect as a result if the CDC also maintains the same cycle service level of 95% ($z=1.64$)?

(5 marks)

(c) Suppose each printer costs HP $200, and the carrying charge is 25%. What saving in the holding cost of safety inventory can HP expect as a result of building the European CDC? If final assembly in the European CDC adds $2 to the production cost of each printer, would you recommend the move? Justify your recommendation.

(5 marks)
QUESTION 5 (25 Marks)

(a) Yankee Company Ltd. is in the business of making and marketing premium apparel to the United States. One popular item sold each winter is a man’s ski jacket that Yankee sources from an Asian supplier, Red Star. Due to the long production and transportation lead-times, Yankee has to order from Red Star well in advance of the selling season. The unit price Yankee charges its customers (the retailers) is $300. The unit wholesale price charged by Red Star is $140 (including shipment cost). Any unsold jackets at the end of the season can be sold to an outlet chain at $100 per unit. Based on the estimates of the Sales Department, demand for the jacket follows the following discrete distribution.

<table>
<thead>
<tr>
<th>Demand $d$</th>
<th>1500</th>
<th>2000</th>
<th>3000</th>
<th>3400</th>
<th>4000</th>
<th>5000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability</td>
<td>0.05</td>
<td>0.15</td>
<td>0.20</td>
<td>0.30</td>
<td>0.20</td>
<td>0.10</td>
</tr>
<tr>
<td>$F(d)$</td>
<td>0.05</td>
<td>0.20</td>
<td>0.40</td>
<td>0.70</td>
<td>0.90</td>
<td>1.00</td>
</tr>
</tbody>
</table>

(i) What is the optimal ordering quantity of the jackets that Yankee should order from Red Star before the selling season? 

(ii) What is the customer service level? 

(iii) What is Yankee’s expected profit? 

(b) Suppose Yankee can order from a local US supplier Blue Star at a unit wholesale price of $210 (including shipment cost) during the selling season. In this case, Yankee will place a first order to Red Star before the selling season. During the selling season, if demand is larger than the first order quantity, Yankee will place an order to Blue Star to make up for the shortfall. (Blue Star can respond quickly without causing any significant delay to the customers of Yankee.) If the demand is less than the first order quantity, no second order will be placed and the unsold jackets will be sold to a discount chain at a unit price of $100 as before.

(i) Identify the overage cost and underage cost. 

(ii) Based on the values calculated in (i), how many jackets should Yankee order from Red Star before the selling season? 

(iv) What is the corresponding customer service level? 

(v) What is Yankee’s expected profit? 

(vi) Briefly comment if this dual sourcing strategy works. 

END OF EXAM