Inventory Management: A Case for Cost Accounting

Diane Satin

Abstract
This case is on inventory management for use in cost accounting class. The case ties together many of the concepts of inventory management including economic order quantity (EOQ), just-in-time (JIT) manufacturing, the relationship between production and job cost sheets, and backflush costing. It also relates management of materials inventory with management of finished goods inventory.

Keywords: inventory management, materials requirements planning, economic order quantity, just-in-time manufacturing, backflush costing

Introduction
One of the topics covered in the Cost Accounting textbooks is Inventory Management. Unfortunately when some students study the different aspects of inventory management (such as EOQ, safety stock, and backflush costing) they treat these topics as discrete, unrelated topics although the topics are actually all tied together into one inventory management system.

This inventory management case brings together the following topics: economic order quantity, reorder point, safety stock and cost of prediction error for materials purchases. For production of finished goods, which is related to the materials purchased in the first part of the case, topics include production cost, economic order quantity, just-in-time manufacturing, job cost sheets for the production of batches of product, journal entries in traditional format for production and sale of the goods, and backflush costing journal entries for the same production and sale of the goods.

The scenario in which this case takes place is a ketchup manufacturing company (Gloopy Ketchup) with tomatoes as the direct materials. The cost and quantities of tomatoes per bottle of ketchup are fairly realistic. However, the other numbers are not realistic but instead designed to yield, for the most part, round numbers as answers.

The Case
Gloopy Ketchup Company makes and sells bottles of tomato ketchup. Annual demand is 24,000 bottles. For each bottle of ketchup they need six pounds of tomatoes, which they normally purchase for $0.30 per pound. Ordering costs are $180 per order of tomatoes, and carrying costs are $1 per pound. Lead time for ordering is three days (the time between placing the order and receiving the tomatoes.)
Do the following:
1. Calculate the EOQ (economic order quantity) for the tomatoes.
2. Find the number of orders Gloopy must place to satisfy the EOQ, and also find the reorder point. Use 360 days for a year, not 365 days.
3. Now assume that stockout costs are $1.90 per pound of tomatoes. The probability of needing exactly the EOQ per period is 65%, but there is a 10% chance they will need an

extra 200 pounds, and a 2% chance they will need an extra 400 pounds above the EOQ. Find the optimal amount of safety stock to carry given the above information.

4. Refer to the original information and the EOQ you calculated in part 1. Assume that you were incorrect about the costs—that the ordering cost is really $160 per order and the carrying cost is $1.20 per pound. Find the cost of prediction error using only the relevant costs (ordering and carrying costs.)

5. Now let us move from the purchasing to the production aspect of the Gloopy Ketchup Company. Setup costs for bottles of ketchup are $135 per setup and carrying cost for a bottle of ketchup is $2 per bottle. Gloopy uses a MRP (materials requirements planning) system to produce ketchup in batches of 2,000 bottles each month (one batch per month). Gloopy's variable product costs excluding the cost of the tomatoes (the direct material) are $1.50 per bottle. What is the total annual cost of making 24,000 bottles of ketchup (variable product cost + setup cost + carrying cost)?

6. If Gloopy used EOQ instead of MRP for the production of ketchup, how many bottles of ketchup would they make per batch?

7. Based on the EOQ from #6, by how much would the annual cost of production for ketchup increase or decrease if Gloopy switched from the MRP to the EOQ system? Based on your calculations, should they switch? (Round number of setups per year up to next integer and remember to use that to recalculate number of units to produce in each run.)

8. Now Gloopy is considering switching to a JIT (Just in Time) system. After intense examination of their own manufacturing system and how it would change in a JIT system, they have decided that they would make 400 bottles of ketchup per batch. Assuming carrying costs and variable product costs are not affected by the change to the JIT system, by how much would the setup costs have to decrease (per setup) to make Gloopy indifferent between the JIT and the MRP system?

9. Name two things you think might reduce the setup costs for Gloopy Ketchup if they switch to the JIT system. (Although the answer is subjective, it should also be realistic. For example, don't say you will reduce setup costs by hiring Harry Potter for $10 to use his magic to make the machines costlessly set themselves up for production.)

10. Gloopy Ketchup Company has decided to use JIT manufacturing and to make 400 bottles of ketchup per run, because they have figured out a way to reduce setup costs to $40 per setup. On April 1 Gloopy purchases enough tomatoes to satisfy the EOQ you calculated in #1, plus any safety stock you decided they need in requirement #3. The purchase price of the tomatoes is still $0.30 per pound, and all materials purchases are made on account. All other manufacturing costs are classified as conversion costs. Total conversion costs are estimated to be $46,800 for the year and are applied based on bottles of ketchup started in production. Also on April 1 they use $500 of prepaid rent for the factory and pay a $320 factory utility bill. They also start production of 400 bottles of ketchup (call this Job #300), and finish on April 3. At that time they sell 392 bottles of ketchup to the Riskyway Grocery Store chain for $4.20 per bottle on credit. After finishing that production run, they begin another run of 400 bottles on April 6 (Job # 301), although two units were damaged in process and they only had 398 good bottles on April 9 when they finished the batch. Those were all sold to the Unlucky Grocery Store chain, also for $4.20 per bottle on credit. For both of the sales, use the perpetual inventory method and assume LIFO.

    a. Prepare the job cost sheets using traditional (normal) costing for each of these jobs. Assume that job #300 used 2,400 pounds of tomatoes, but because a crate of tomatoes was dropped on the ground, job #301 used 2,450 pounds of tomatoes. (The space time continuum is folding back on itself, and we are again at the beginning of the spring quarter…)

    b. Prepare all the relevant journal entries for the production and sale of these two jobs, including purchase of the raw materials. Put both actual and applied conversion costs into the Conversion Cost Control account. Do not close the Conversion Cost Control account. (And now you are back in managerial accounting.)

11. Refer to the information for Gloopy Ketchup in #10 above. Along with the JIT system they have decided to embrace Backflush Costing, using finishing good units and sale of units as the two trigger points. The standard purchase price of the tomatoes is $0.30 per pound, and standard quantity is six pounds per bottle of ketchup. All other manufacturing costs are classified as conversion costs. The conversion costs are (standard) $1.95 per bottle. Prepare all the relevant journal entries for Gloopy using the backflush costing system. Again, do not close the Conversion Cost Control account.

12. Why would you NOT close the Conversion Cost Control account on April 9? If you did close it then, show the journal entry that you would make on that date. (Assume there was no beginning balance in the account on April 1.)

13. Why would lean accounting be unnecessary for the Gloopy Ketchup Company?

Author
Diane Satin, Professor, Department of Accounting & Finance, College of Business and Economics, California State University, East Bay, diane.satin@csueastbay.edu