Inventory Management at Bama Drinks Company: Four Progressive Cases

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ABSTRACT

Utilizing cases with real or believable scenarios can be very useful for capturing student attention for instructing the concepts and models of inventory management. We have developed four integrated cases for such instruction. The cases are connected by employing the same company and management cast throughout. The topics progress from introductory inventory concepts, costs, and ordering policies to trend, seasonality, and forecasting issues and conclude with differentiated customer service level policies. Extensive teaching notes, graphs, and tables are available from the authors. Excel files for the forecasting methodologies are also available upon request.

INTRODUCTION

When instructing inventory management concepts it is fruitful if the instructor and pedagogy allow a linkage between the inventory topics – progressing from the introductory to the more advanced. Such is the purpose of the Bama Drinks Company portfolio of cases. The cases evolve from an introductory discussion of inventory concepts and associated costs set in the believable setting of a southern soft drinks distributor (Case A). In this case students are exposed to the realism of managing inventory shortages and their associated costs. A number of Bama functional managers are introduced and their mention is continued throughout the case portfolio.

Case (B) provides specific cost details (e.g., leasing, freight, order placement, and holding costs) and requires the students develop inventory ordering policies (economic order quantity and reorder point). It also asks the students to determine the needed inventory storage space based on the inventory policies.

Case (C) builds on the techniques utilized in Case (B) by adding the realistic complexities of predicting future sales when a trend and seasonality are present. This is essential to overcome since inventory policies are based on *future*, rather than historic, sales patterns. The more accurate the sales forecast, the more realistic the inventory policies can be. It also gives the students the opportunity to explore different sales forecasts using numerous mathematical formulations. Thus, the students learn the linkage between forecasting and inventory decisions and the reality that an accurate forecast must precede.

Finally, Case (D) explores the realistic situation of having different service levels for various customers. Prioritizing customers is necessary for they do not all represent the same economic benefit to the company. The trade-offs necessary when designing such inventory policies are explored.

All cases come equipped with suggested questions. Extensive teaching notes, graphs, and tables are available from the authors. Excel files for the forecasting methodologies are also available upon request.

Since this inventory case portfolio is still a work-in-progress, it does not address all inventory situations and complexities. However, we believe the business setting of the cases and their linkages allows the "inventory story" to develop and continue. This should help foster student interest in inventory, maintain their attention, and, hopefully, build *their portfolio* of inventory knowledge.

We would appreciate any constructive comments, suggestions, and corrections for improvement.

Bama Drinks Company (A)

COMPANY BACKGROUND AND HISTORY

Bama Drinks is the main distributor of a raspberry-flavored soda called Crimson Soda that is sold in 20 oz. bottles with the image of an elephant on the packaging. The Bama Drinks distribution company was organized in the fall of 1993 as a joint venture between, Flores, a soft-drink giant and, Sasamoto Oil, a regional company that owns a chain of convenience stores. The original idea was to sell Crimson Soda to fans of the successful Crimson Tide football program in the southern states, but the drink turned out to be more popular than anticipated. The two companies decided to join forces by setting up a dedicated distribution center, Bama Drinks, to successfully meet demand for the popular drink.

The Bama Drinks distribution center, originally an auto parts warehouse, is located in Athens, Georgia and was initially leased by Flores both to house inventory and to act as the main shipping hub. From the warehouse, Crimson Soda was transported to all of the customers within a 200-mile radius. In turn, Sasamoto Oil supported the 20-30 employees that worked inside the central warehouse, including the management who were transferred from similar positions with Flores.

The business of selling Crimson Soda was an increasingly profitable venture for both companies until ten years later when profit began to decrease. Taking the shift in profitability as signal, and rather than spend additional money fixing some operational issues that had crept in, the two companies put Bama Drinks up for sale in 2003. A number of the employees that had been working at the distribution center since it opened in 1993, including management, formed a company and, with a business loan and some investment capital, purchased Bama Drinks.

It is now the beginning of 2009, six years after the transfer of ownership. The Crimson Soda drink is still produced, bottled, and transported by the soft drink giant to the warehouse, but the purchasing, marketing, selling, and delivery is done by the independent company, Bama Drinks. In addition, one of the biggest customers for Bama Drinks is still Sasamoto Oil, representing a significant chain of convenience stores that continues to order Crimson Soda year-round.

NEW PROBLEMS, OLD CUSTOMERS

Robert Jamison had been the sales manager at Bama Drinks since its inception, and he smiled as another full delivery truck pulled away from the dock. He had just finished a phone

call with a newer customer that requested 100 additional cases of Crimson Soda – far more than expected. Jamison was happy to promise prompt shipment of the large order. "Our numbers this quarter will look good," he thought. Demand for Crimson Soda had been much higher than anticipated in the recent weeks, though not without some lurking problems.

The phone rang again; it was the purchasing manager for Sasamoto Oil, Agustin Menendez "Que Pasa Jamison?" Agustin said, "I need 50 more cases of Crimson Soda." When Jamison tried to key the order into the computer he noticed that, after he promised the 100 cases to the newer customer, it left only ten cases for Sasamoto Oil, and another truck from the supplier wasn't due for a couple of days.

After thirty minutes of negotiating an agreeable (yet expensive) discount for the trouble caused to Sasamoto Oil, Jamison hung up the phone and sighed, "Another close one."

Since demand with newer customers had begun increasing, Sasamoto Oil had been forced to accept some late shipments, and they were getting tired of having to wait in line with the newer and less loyal customers of Bama Drinks. Jamison thought, "We'd better make sure that this does *not* happen again – Sasamoto is one of our most important customers."

An hour later, Jamison, Natalie Moore (the inventory manager), Alexander Maduro (COO) and Anneke Vandenberg (Product manager) met in the conference room. "As you all know, we had a serious inventory shortage today," Jamison began. "One of our big customers called to place a regular order for Crimson Soda, but because we didn't have enough inventory I had to give them a discount on a later order to make them happy. Luckily, I was able to resolve the issue, but it *was* expensive." He continued: "Alexander and I thought we should have this meeting to make sure it doesn't happen again."

Alexander looked at Natalie, "Maybe you should explain our current inventory policy, and then we'll go from there." Natalie explained, "When a customer places an order the system checks availability. When we have enough product available we ship it immediately, otherwise the order stays in the system until we get the next shipment from our supplier. It takes our supplier about three days to get a shipment to our receiving dock. When we have four days of expected demand left in inventory, we place a regular order with our supplier. The extra day of inventory is to make sure we place our order before we run out." "There wasn't enough this time!" Jamison interrupted. "We'll be out of Crimson Soda for almost two days!" Natalie ignored the comment and continued. "Because it is expensive to keep inventory, we determine our inventory levels based on a 90% fill rate. So, we *will* be short sometimes."

QUESTIONS:

1. Which inventory costs might Natalie be calling expensive?

2. What does Natalie mean by saying that they use a 90% fill rate?

3. Which inventory policy is Bama Drinks inherently using?

4. What are some alternative policies that Bama Drinks could use?

5. Which changes to Bama Drinks' inventory policy do you suggest?

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Bama Drinks Company (B)

Back in her office Natalie Moore, the inventory manager for Bama Drinks, thought that they should rethink their inventory ordering policies. She feels that she will need to know all the costs that could impact inventory ordering and the costs that are affected by inventory. She narrows this list down to a few costs and lists them as follows:

- the cost to place an order (purchasing and all the paperwork that goes with it is not free)
- the cost to hold inventory in the warehouse (we have to lease the warehouse just to hold the cases of drinks before they are shipped)
- the cost to ship the cases (Since Bama can choose the freight carrier for deliveries to the warehouse, they must pay the shipping charges.)

After quickly examining the sales figures for 2008 Natalie noted that the company had ordered and sold 20,600 cases of soft drinks. Bama Drinks operates 5 days a week 50 weeks a year with a two week vacation period. She learns from the purchasing agent, Augustin Menendez, that their average customer order size is 40 cases. Each case contains 24 drinks and is sold at wholesale for $42. Augustin mentions to Natalie that he figures that it cost the company $25 to place an order.

The warehouse that stores the cases before shipping contains 12,000 square feet and cases can be stacked three high. To determine the cost of storing the drinks by the case Natalie emails the company accountant, Schwadin Mutamba. After some examination Schwadin calls Natalie and tells her that the total annual cost of storing a case of drinks in the warehouse is about $2.50.

Natalie next calls the company shipping manager, Ross Martin, to learn their freight cost. Within a few hours he sends an email to Natalie stating that the freight cost from the bottler to BAMA is $100 per shipment (regardless of quantity) and that the lead time is usually three days.

Natalie now feels she has enough information to begin her analysis of their inventory ordering policies.

QUESTIONS:

1. For the moment ignore the freight cost. Using the economic order quantity (EOQ) model, what would be the inventory order quantity that would provide the lowest total annual inventory ordering, and holding cost?

2. Using your answer to question (1), what would be Bama's total inventory ordering and holding cost for the year?

3. Again using your answer to question (1), how many orders would Bama place per year?

4. Now including the freight cost what is the economic order quantity that would provide the minimum total annual inventory, holding, and freight cost? Does adding in the freight cost make much of a difference in the economic order quantity? Does the EOQ increase or decrease? Is that what you expected?

5. Given a lead time of three days at what inventory level should Bama place an order?

6. Assuming that: (1) a case of soft drinks requires 2.5 square feet of floor space and (2) the case stacking conditions mentioned in the case, what is the maximum amount of storage space (floor space) Bama would need in its warehouse to store inventory? What would be the average amount of floor space needed?

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Bama Drinks Company (C)

As Robert Jamison, the company sales manager, reviewed Natalie Moore's recommendations for the company's inventory ordering policies, he wondered if sales for 2009 would be the same or similar to that for 2008. He believed that sales had followed a noticeable upward trend over the last five or six years. To examine his beliefs he prepared an analysis of aggregate and quarterly sales for 2003 through 2008. The result is Figure 1. Robert called in Natalie Moore (the inventory manager) to examine the figures. Pointing to the exhibit Robert said, "Natalie, these figures show that we have increased our sales each year and, if 2009 sales follows the trend, sales will again be higher. Can we really use the sales for 2008 to calculate the best inventory order policies for 2009? Also, it appears that we have some seasonality in our sales. First quarter sales for soft drinks are slow, as might be expected in the cold season. Sales then move up over the rest of the year. Should we somehow adjust our inventory policies for each quarter?" Natalie stared at the figures momentarily and then responded, "This might explain why we have excess inventory early in the year and shortages later." Both Robert and Natalie hesitated to talk further. Who would speak first?

Exhibit 1
Bama Drinks Company
Company Sales
(in number of cases sold)

Year	Quarter	Quarterly Sales	Annual Sales
2003	1	2,815	
	2	2,721	
	3	2,282	
	4	4,301	12,119
2004	1	3,113	
	2	3,523	
	3	3,260	
	4	5,211	15,107
2005	1	3,633	
	2	4,121	
	3	3,965	
	4	6,922	18,641
2006	1	2,639	
	2	3,740	
	3	4,217	
	4	6,424	17,020
2007	1	3,934	
	2	4,676	
	3	4,633	
	4	6,981	20,222
2008	1	4,348	
	2	4,788	
	3	4,298	
	4	7,178	20,612

QUESTIONS:

1. Is Bama experiencing a pattern of seasonality in its sales or are the seasonal fluctuations just random?

2. If sales are indeed increasing per year and the company sales are experiencing seasonality what should the expected sales figures be for 2009 and how should they be determined?

3. If inventory policies are tied to expected future sales, not past sales, what should Bama's inventory ordering policies be for 2009?

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Bama Drinks Company (D) Case

PRIORITIZING CUSTOMERS

Alexander was pleased with the description of their current inventory policy, and said, "So we *have* been out of inventory before, and when that happened we just placed an order with our suppliers and we received the product within a few days, problem solved. What's different this time?"

"This time," Jamison said, "it happened to an order from Sasamoto Oil. We cannot afford to lose them. We've made a lot of promises to keep them since the buy-out, and I don't think they will accept this again. In fact many of our long-time customers and our larger customers, Like Sasamoto Oil, Hill Co., and Exxoff, demand higher service levels. We generally have to give discounts on their late orders, which is money from the bottom line. On the flip-side, the newer customers are used to having some delays, as are most of the low-volume customers – thus delaying orders to them are not as costly.

"Could we increase our service level for Crimson Soda?" Anneke asked. "We could, but increasing the service levels is expensive," Natalie continued, "And, it is no guarantee that we will not run out of inventory in the future." "Maybe we could set a different policy for the more important customers," Alexander asked, "Jamison, how could we have handled the orders differently today?" "Well, this morning we had a large surprise order from a newer customer, and it depleted inventory," Jamison responded, "The newer customer usually buys from our competitors so I though this might be a way to get their business. But, if I had known that we would run out of inventory for one of our large customers, I would have tried to convince the newer customer order to accept a later shipment."

QUESTIONS:

1. Which changes can Bama Drink make to the inventory policy to increase service levels?

2. What trade-offs should be considered when setting service levels?

3. Based on Jamison's comment above, design a new inventory policy for Bama Drinks.

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