

Memorandum

Date: November 2, 2004

Subject: Crate Inventory

To: Dr. Matt Ford

From: Julie Glaser

Introduction

As you requested, I have examined the current company policy regarding packing crate inventory. My findings are based on the information provided in the text, and I have examined the economic order quantity (EOQ).

Findings

- The current policy has an ordering cycle of about 30 days and an order quantity is 800 crates per order.
- Based on EOQ analysis, I propose a new policy. The policy calls for an ordering cycle of about 15 days and an order quantity of 392 crates per order.
- The new policy will reduce the total annual cost (TAC) to \$1,371, compared to the current TAC of \$1,736. The proposed policy will result in annual inventory savings of \$365.

Details

An EOQ analysis is useful because it provides a fixed order size that will minimize the total of holding and ordering costs.

Several Assumptions must be made when dealing with the model. These assumptions are listed in Figure 1.

Figure 1. Assumptions for EOQ

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| <ol style="list-style-type: none">1. Only one product is involved.2. Annual demand requirements are known.3. Demand rate is reasonably constant.4. Lead time is constant.5. Each order is obtained in a single delivery.6. There are no quantity discounts. |
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The information in this box is from the text, page 493.

The information on the current policy that the text provides is shown in Table 1. This information will be useful in calculating EOQ.

Table 1. Information Provided by the Text

Annual Demand (per year) = D	9600 crates
Ordering Costs (per order) = S	\$28
Holding Costs (per crate per year) = H	\$3.50
Length of ordering cycle	≈ 30 days
Purchase price (per crate)	\$10

Holding costs = 35% of the purchase price per crate = .35(10) = \$3.50

Economic Ordering Quantity (EOQ):

Based on this information I was able to calculate the EOQ:

$$EOQ = \text{square root } [(2 \cdot D \cdot S) / H]$$

$$= \text{square root } [(2 \cdot 9600 \cdot 28) / 3.50]$$

$$EOQ \approx 392 \text{ crates per order}$$

This order size offers the lowest combination of ordering costs and holding costs. These costs are explained in more detail in the section titled, “New Policy.”

New Policy:

Table 2 compares the current policy to the proposed policy. The table shows the differences in length of the ordering cycle, as well as differences in annual ordering and annual holding costs. Also, please note that Total Annual Cost decreases by \$365 under the proposed policy.

Table 2. Inventory Policy Comparison

	Current Policy	Proposed Policy
Ordering Quantity (Q)	800 crates	392 crates
Length of Ordering Cycle	≈ 30 days	≈ 15 days
Annual Ordering Cost	\$336	\$685
Annual Holding Cost	\$1400	\$686
Total Annual Cost (TAC)	\$1,736	\$1,371

$$\text{Length of Ordering Cycle} = Q / D$$

$$\text{Annual Ordering Cost} = (D / Q) * S$$

$$\text{Annual Holding Cost} = (Q / 2) * H$$

$$TAC = \text{Annual Ordering Cost} + \text{Annual Holding Cost}$$

Limitations

This recommendation could fail if certain factors change. For example, if the lag time increases, we could run out of crate inventory before the next shipment arrives. If lag time increases, we will have to make our reorder point sooner.

On the other hand, if lag time decreases, we may have more inventory on hand than we need, which increases our holding costs. If lag time decreases, we will have to make our reorder point later

Of course, if ordering costs, holding costs, or demand change, we will have to reanalyze our EOQ, since the EOQ depends on these three factors.

Other limits to EOQ analysis include the assumptions that are listed in Figure 1.

Next Step

I recommend an “on paper” trial as a conservative next step. While no actual policy changes would be made, we can record what inventory would be with EOQ in a special file, in order to see if the new policy would be effective.

For example, at our first reorder point, we would write down an increase of 392 crates. As crates were used, they would be subtracted from our inventory record. Fifteen days later, we would write down another increase in 392 crates.

With the on paper trial, we could see the effects of the new policy without making any changes. If after several months the paper trial shows that the new policy will effectively meet demand, we can change to the EOQ policy.

MF comments: I would have added estimates of # of annual cycles and reorder point (r) to Table 2 to provide a bit more context so that the reader could better understand what each policy ‘looks like’ when enacted.