

Memorandum

Date: September 5, 2007
Subject: Shipping Policy to Nashville and Memphis
To: Matt Ford
From: Andy Rauf

Background

As requested, the current shipping policies of our customers in Nashville and Miami have been investigated. The costs of these policies have been compared to the Economic Shipping Quantity.

Findings

1. Costs

The costs under the current policy are \$96.25/day and \$108.25/day for Nashville and Miami, respectively. These costs are based on our current policy of shipping at full truck load. The costs under the Economic Shipping Quantity (ESQ) are \$94.84/day and \$108.16/day for Nashville and Miami, respectively.

2. Policy Differences.

The difference in cost between our current policy and the proposed ESQ quantity is \$43 per year for our Miami client and \$514 for our Nashville client. These differences represent the savings reflected when shipping under the ESQ policy –37,947 pounds per shipment to Nashville, and 43,267 pounds per shipment to Miami –instead of shipping full truckloads of 45,000 pounds to both clients.

3. Conservative Next Step

A conservative next step would be to contact our customers in Nashville and Miami and convince them to allow us to change the shipping quantity to their ESQ. No other shipping quantity would provide more savings than the ESQ. Using these clients as a “pilot program,” we can determine whether ESQ should be applied to all our clients.

Discussion

Method

The shipping costs are derived from the ESQ method, which limits cost as much as possible. Q^* is a quantity derived from a formula that provides the most cost effective shipment quantity possible. This method is accurate, assuming the customer demand remains constant, transportation costs are proportional to distance, and our inventory costs are fixed. All of these assumptions are upheld in our organization. The economic shipping quantity is derived from the formula:

$Q^* = \sqrt{(2C_S D)/C_H}$ where: C_S = Shipping Cost
 D = Demand Rate/day
 C_H = Inventory Holding Cost per unit/day

Once the ESQ is derived from the formula above, a comparison can be made between the cost of the current policy and the ESQ. Again, the ESQ will provide the lowest possible cost for a shipment policy. In order to determine the total cost of a shipping policy, use the formula:

$$TC = C_S(D/Q) + C_H(Q/2)$$

where: C_S = Shipping Cost
 D = Demand Rate/ day
 C_H = Inventory Holding Cost per unit/ day
 Q = Quantity Ordered

Findings

Current Shipping Costs

In our organization now, we ship full truckloads ($Q = 45,000$ pounds) to both Nashville and Miami. Although this method utilizes the entire truck capacity, it may not be the most cost effective way to ship. The total cost of the current policy is shown below in Table 1.

Economic Shipping Quantities

Using the Q^* formula, the ESQ for both clients has been computed. For our Nashville client, $Q^* = \sqrt{2[1200(1500)]/.0025}$ or 37,947 pounds per shipment. For our Miami client, $Q^* = \sqrt{2[2600(900)]/.0025}$ or 43,267 pounds per shipment. This information has been gathered from internal data on these customers.

Total Shipping Costs

The current shipping costs are compared to the shipping costs under the ESQ. Table 1 shows a comparison of the costs.

Table 1: Shipping Costs and Policy						
Shipping Factor	Current Nashville	ESQ Nashville	Diff.	Current Miami	ESQ Miami	Diff.
COST						
C_S (in \$)	1200	1200		2600	2600	
D/Q (lbs)	.0333	.0395		.02	.0208	
Shipping factor (\$)	39.96	47.40		52.00	54.08	
C_H (in \$)	.0025	.0025		.0025	.0025	
$Q/2$ (in \$)	22,500	18,974		22,500	21,634	
Holding factor (\$)	56.25	47.44		56.25	54.08	
Total	\$35,131	\$34,617	\$514	\$39,511	\$39,478	\$43
Cost/year						
POLICY						
Q (lbs)	45,000	37,947	7053	45,000	43,267	1733
Cycle Time (days)*	30	25.3	5.3	50	48.1	1.9
Orders/year*	12.2	14.4	2.2	7.3	7.6	0.3

*Shipping factor = $(C_S \times D/Q)$

*Holding factor = $(C_H \times Q/2)$

*Total Cost/yr = $(C_S \times D/Q) + (C_H \times Q/2)$

*Cycle time = Q/D

*Orders/ year = $D/Q \times 365$

Discussion

An important item in the table is the “difference” column. It shows the total annual savings, or the savings that will be recognized when changing shipments to the ESQ policy. For our client in Nashville, the total annual savings under the ESQ policy is \$514 per year. For our client in Miami, the total annual savings is \$43 per year. Although these differences are not extreme, they are easily recognizable savings that are waiting to be had. The difference column also shows the effect of the changes that must be made. For example, changing from our current quantity to the ESQ for our Nashville client is a difference of 7053 pounds per shipment. This provides an idea for the magnitude of the change that is being implemented.

Limitations

This method is accurate, assuming the customer demand remains constant, transportation costs are proportional to distance, and our inventory costs are fixed. Another factor to consider is that we are only considering two client sites in this analysis. Overall, shipping costs may not be proportional to distance for our entire client base. All of these assumptions are upheld in our organization. However, if any factor changes, a change must be made in the calculation to determine Q^* accurately.

Conservative Next Step

In order to recognize these savings, we must contact our clients in Miami and Nashville and convince them to let us change their shipping quantity to the Economic Shipping quantity. They will most likely not object, as this policy will save them money. Using Nashville and Miami as a pilot program, we could track the savings that are recognized over a given period of time. Assuming that this method does indeed save us and our clients money, then we should try to convince all of our clients to change their shipping quantity to the ESQ.