CASE STUDY

Delivery Strategy at MoonChem

John Kresge, vice president of supply chain, was very concerned as he left the meeting at MoonChem, a manufacturer of specialty chemicals. The year-end meeting evaluated financial performance and discussed the fact that the firm was achieving only two inventory turns a year. A more careful look revealed that over half the inventory MoonChem owned was in consignment with its customers. This was very surprising, given that only 20 percent of its customers carried consignment inventory. John was responsible for inventory as well as transportation costs. He decided to take a careful look at the management of consignment inventory and come up with an appropriate plan.

MoonChem Operations

MoonChem, a manufacturer of specialty chemicals, had eight manufacturing plants and 40 distribution centers. The plants manufactured the base chemicals and the distribution centers mixed them to produce hundreds of end products that fit customer specifications. In the specialty chemicals market, MoonChem decided to differentiate itself in the Midwest region by providing consignment inventory to its customers. The company wanted to take this strategy national if it proved effective. MoonChem kept the chemicals required by each customer in the Midwest region on consignment at the customers' sites. Customers used the chemicals as needed, and MoonChem managed replenishment to ensure availability. In most instances, consumption of chemicals by customers was very stable. MoonChem owned the consignment inventories and was paid for the chemicals as they were used.

Distribution at MoonChem

MoonChem used Golden trucking, a full-truckload carrier, for all its shipments. Each truck had a capacity of 40,000 pounds, and Golden charged a fixed rate given the origin and destination, regardless of the quantity shipped on the truck. MoonChem sent full truckloads to each customer to replenish their consignment inventory.

The Illinois Pilot Study

John decided to take a careful look at his distribution operations. He focused on the state of Illinois, which was supplied from the Chicago distribution center. He broke up the state of Illinois into a collection of zip codes that were contiguous, as shown in Figure 10-9. He restricted attention within the Peoria region, which was classified as zip code 615. A careful study of the Peoria region revealed two large customers, six medium-sized customers, and 12 small customers. The annual consumption at each type of customer was as shown

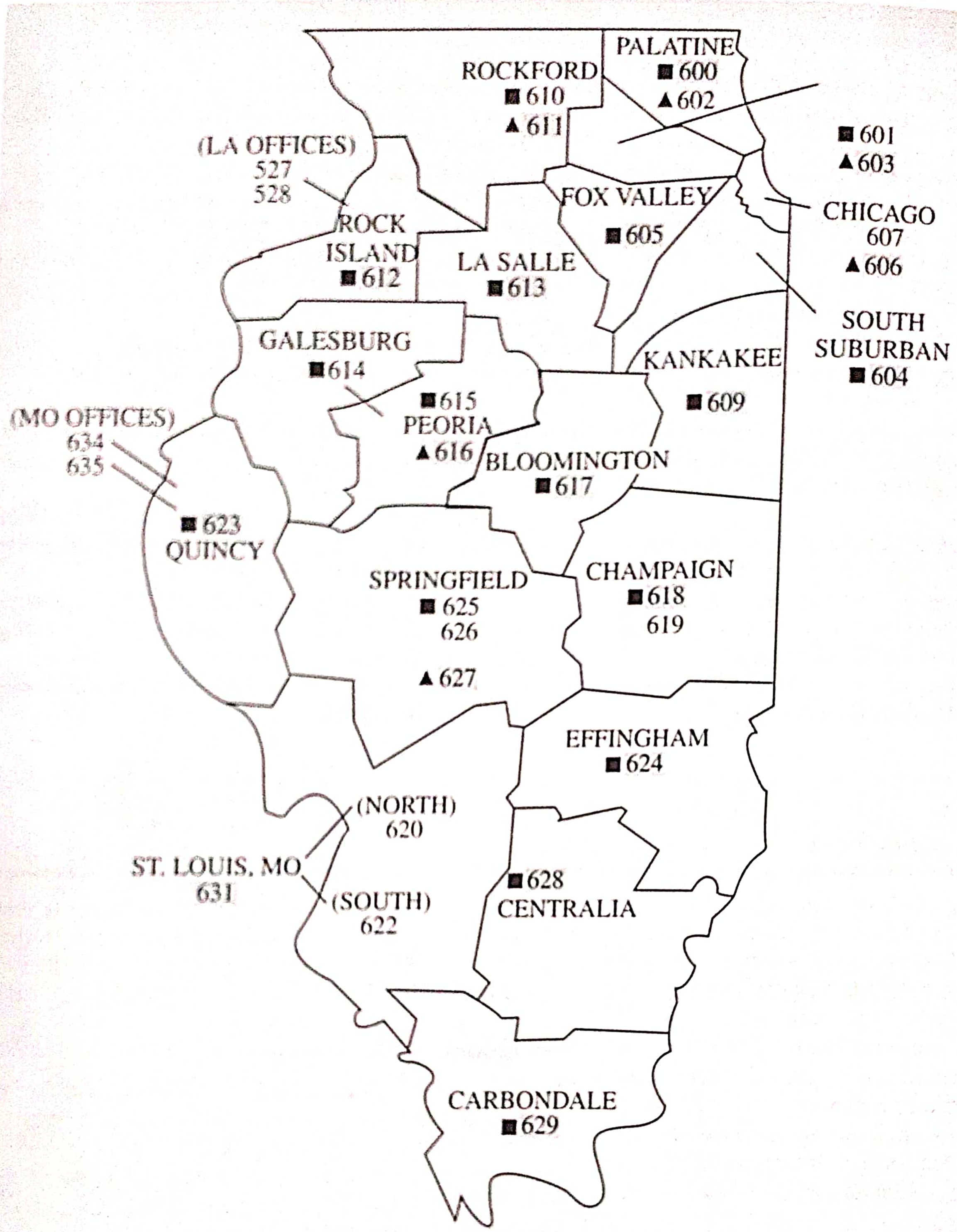

FIGURE 10-9 Illinois Zip Code Map

in Table 10-4. Golden charged $400 for each shipment from Chicago to Peoria, and MoonChem's policy was to send a full truckload to each customer as needed.

John checked with Golden to find out what it would take to include shipments for multiple customers on a single load. Golden informed him that they would charge $350 per truck and add $50 for each drop-off that Golden was responsible for. Thus, if Golden carried a truck that had to make one delivery, the total charge would be $400.

TABLE 10-4 Customer Profile for MoonChem in Peoria Region

Customer Type	Number of Customers	Consumption (Pounds per Month)
Small	12	1,000
Medium	6	5,000
Large	2	12,000

...wever, if a truck had to make four deliveries, the total ...arge would be \$550.

Each pound of chemical in consignment cost ...onChem \$1, and MoonChem had a holding cost of ...5 percent. John wanted to analyze different options for ...stribution available in the Peoria region to decide on the ...ernal distribution policy. The detailed study of the Peoria ...egion would provide the blueprint for the distribution strat-...egy that MoonChem planned to roll out nationally.

Questions

1. What is the annual cost of MoonChem's strategy of sending full truckloads to each customer in the Peoria region to replenish consignment inventory?
2. Consider different delivery options and evaluate the cost of each. What delivery option do you recommend for MoonChem?
3. How does your recommendation impact consignment inventory for MoonChem?

APPENDIX 10A
Economic Order Quantity

Objective:

Derive the economic order quantity (EOQ) formula.

Analysis:

Given an annual demand D, order cost S, unit cost C, and holding cost h, our goal is to estimate the lot size Q that minimizes the total annual cost. For a lot size of Q, the total annual cost is given by

$$\text{Total annual cost, } TC = (D/Q)S + (Q/2)hC + CD$$

To minimize the total cost we take the first derivative with respect to the lot size Q and set it to zero. Taking the first derivative with respect to Q, we have

$$\frac{d(TC)}{dQ} = -\frac{DS}{Q^2} + \frac{hC}{2}$$

Setting the first derivative to be zero, the EOQ is given by

$$Q^2 = \frac{2DS}{hC} \quad \text{or} \quad Q = \sqrt{\frac{2DS}{hC}}$$