

**AVON PRODUCTS, INC.: REDUCING PICKING AND
RESTOCKING COSTS**

FACULTY: JOHN J. BARTHOLDI, III, PHD
STUDENT: STEPHANIE JERNIGAN

LEADERS IN LOGISTICS REPORT

The Logistics Institute
Georgia Institute of Technology
Atlanta, Georgia 30332
2002

1. BACKGROUND

1.1. Company Information. Avon Products, Inc., a distributor of cosmetics and gift items, is the fifth biggest player in the cosmetics industry. In 2000, it had a 4.7% market share and was valued at \$5.7 billion dollars. Approximately 98% of the company's revenue is generated through direct sales, and the company has 3.4 million sales representatives in 139 countries.

Each representative distributes a product catalog to their clients every two weeks, and a new catalog typically introduces 200–300 new items, often seasonal merchandise or promotional items. After a client has selected products to purchase, the representative places an order with her assigned distribution center (DC).

1.2. The Atlanta Distribution Center. The Avon DC outside Atlanta has about 360,000 ft² of floor space. Two-thirds of this space is the receiving dock and bulk storage, while the remainder is the shipping dock and the order fulfillment area, the section where orders are picked and packed for shipment.

During a typical two-week period, the order fulfillment area holds a supply of 6,000–8,000 different items; over 150,000 orders for these items are processed every two weeks. Avon spends an average of \$0.90 to process each order, for a total of \$55.8 million each year. This figure is large relative to the company's profit of \$550 million in 2000, and so it is a priority for Avon to reduce the cost of processing orders. At the same time, they are reluctant to make significant investments in new equipment. We were asked to identify ways to reduce the cost of processing orders given the existing layout in the order fulfillment area.

2. ORDER PROCESSING IN A DISTRIBUTION CENTER

We focused on improving two aspects of processing orders: picking items from the storage modes in which they are kept, and replenishing the supply of those items in the storage modes. Items in the order fulfillment area are picked and replenished in one of two ways:

- Items can be picked from a machine called an *A-frame*, which dispenses items into containers corresponding to each order. This machine can process about 40 orders a minute, so the supply of items stored there can be quickly depleted. Because of this, cases of each item picked from the A-frame are stored in flowrack located near the machine; this supply is used to replenish the A-frame. The supply in the flowrack is replenished from bulk storage, as shown by the solid arrow in Figure 1.

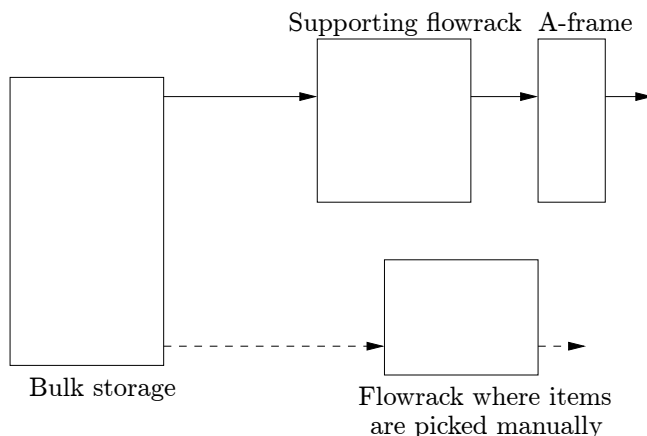


FIGURE 1. The order fulfillment area at Avon.

- Items can be picked by workers who visit an item’s storage location. Skus picked manually are stored in sections of flowrack and shelving, and items are restocked in their storage locations directly from bulk storage, as shown by the dashed arrow in Figure 1.

Every two weeks, Avon must decide which items should be picked from the A-frame and which should be picked manually. Items picked from the A-frame have a very low cost-per-pick, but the cost of restocking the supply is relatively high, because the A-frame is depleted quickly. Items picked manually have a higher cost-per-pick, but they are cheaper to restock, because they are stored in greater volumes. In addition, Avon must decide how much space each item should occupy in its assigned pick area: if an item is given more storage space, it will need to be restocked less frequently, but other items will then have less space and thus incur more restocks.

Our task was to determine

- which items should be stored in each storage mode, and
- the quantities in which they should be stored,

in order to minimize the total cost of picking and restocking the order fulfillment area. The process of assigning items to storage modes and determining the quantity in which they should be stored is called *slotting* the warehouse.

3. MODEL

We developed our method for slotting the warehouse by modeling the operations in the order fulfillment area as shown in Figure 1. We

assume that each storage area has a known capacity, measured in cubic feet, and that each item stored there is assigned a fraction of that capacity.

Previous research had shown how to slot warehouses where items travel directly from bulk storage to the mode from which they would be picked, known as a multi-mode inventory system. The order fulfillment area at Avon could not be considered a multi-mode system, because items picked from the A-frame are replenished from the flowrack that supports the A-frame, rather than directly from bulk storage. We were able to show, however, that the Avon inventory system is equivalent to a multi-mode inventory system. We were then able to use the techniques developed in previous research to slot the warehouse to minimize costs of picking and restocking.

We used our model to answer questions of resource allocation in the warehouse. Avon has divided the total supply of flowrack in the warehouse between the storage mode that supports the A-frame and the storage mode where skus are picked manually; we used our model to determine the optimal proportion of the total flowrack that should be assigned to each area.

We also extended the model of the Avon inventory system to inventory systems with an arbitrary number of storage modes, and paths between the storage modes. This allows us to model operations in many different warehouses as well as distribution systems outside of warehouses.

E-mail address: john.bartholdi@isye.gatech.edu