

produced the highest cost at the volume levels studied.

AN ANALYSIS OF SMALL FOOD STORE SUPPLY SYSTEMS

by

James S. Toothman
Pennsylvania State University
and

Harold S. Ricker
Agricultural Research Service
U.S. Department of Agriculture

For those working in food distribution an equally appropriate title might be "The Quantification of Conventional Wisdom about Vendor Direct Delivery." You are aware of the numerous direct deliveries to all types of food outlets made by certain processors and specialty wholesalers. The daily procession of bakery, snack, biscuit, carbonated beverage, milk, ice cream and specialty product deliveries to these outlets is too obvious to be overlooked. It is also apparent that unit delivery costs for this method are relatively high. Consequently, I'm sure that awareness of the existence, persistence and inefficiency from a logistical standpoint, of the vendor direct delivery system can be regarded as "conventional wisdom." This study provides numbers to fill some of the quantitative gaps in this "wisdom."¹ Fragmentation in the physical distribution of many types and brands of food and related products as described in this study is not a condition unique to small grocery stores. Many of the firms engaged in direct delivery to study stores were using the

same equipment, personnel, and methods to serve the entire span of retail outlets in their market area - from the smallest store or lunch counter to the largest supermarket. Therefore, this study measures only a segment of the distribution operations that would be affected by any effort to reorganize and reduce costs only for small grocery stores.

Fragmented delivery operations utilizing a large number of vehicles traversing similar routes in an urban area represent an addition to air pollution and traffic congestion. Increased productivity and energy conservation have become priority objectives in the food industry.

Recognizing the various pressures coming to bear on these problems, a study was initiated to identify and quantify the existing situation. Basically, the study has three purposes:

1. Provide a basic description of the merchandise procurement and receiving

activities in a representative group of independent and chain operated small food stores.

2. Propose a methodology for quantifying some of the major factors involved in evaluating alternative supply methods.

3. Stimulate interest in improving productivity in small store food retailing.

Data were collected in ten independently owned stores located within densely populated sections of Philadelphia and 11 Pennsylvania suburban convenience stores - 6 operated by different chains and 5 operated by the same chain. The independent stores were selected to represent stores having weekly sales of less than \$10,000 and receiving at least one weekly grocery delivery from a general line grocery wholesaler. Convenience store chains were asked to identify representative stores for the Pennsylvania area that were above average in terms of sales volume.

Daily observations were made in selected stores for one week from the time of opening until the last scheduled delivery for that day had been received. Data were collected in this manner for the 10 independent stores and 6 convenience stores operated by different chains. Additionally, daily merchandise transaction reports for a 4-week period were obtained for 5 stores operated by the same chain.

The study data are categorized into 12 product groupings: bakery, snacks and biscuits, soft drinks, groceries, produce, milk, frozen food, ice cream, eggs, deli-meat, tobacco-candy, and nonfoods. These categories reflect the way most local food and related product processing and wholesaling is organized.

The ten independent stores had weekly sales ranging from approximately \$2,100 to \$10,000 with median sales of \$3,750. They were each receiving a weekly average of 53 deliveries from 28 supply firms. The number of supply firms used by the stores ranged from 23 to 37 and the number of deliveries between 40 and 64. Bakery products accounted for 40 percent of the vendor deliveries with an average of 21 weekly deliveries per store. The deli-meat and milk product groups accounted for the next largest number of weekly deliveries per store with averages of 6.7 and 6 deliveries, respectively. Thus, bakery, deli-meat, and milk products account for nearly two-thirds of all deliveries to the urban stores. Of the other nine product categories, soft drinks (4.7), snacks and biscuits (3.4), and produce (2.8) were the only ones that accounted for more than 2 deliveries per week per store.

In these stores driver salesmen determined orders for 54 percent of the deliveries and advance salesmen solicited 4 percent of the orders. The balance of 42 percent was determined by store personnel. The estimated time spent in order preparation by store personnel ranged from 15-20 minutes for frozen food to 1-1/2-2 hours for grocery products.

Other indicators of the delivery problem include the average wholesale value of delivery and the length of time necessary to delivery merchandise. The average wholesale value of the deliveries was lowest for bakery products (\$11.82) and highest for grocery orders (\$1,440). Forty-six percent of the deliveries had an average wholesale value of less than \$25 while 80 percent had an average of less than \$55.

Convenience Stores

With a few notable exceptions, convenience stores have concentrated their efforts on building stores and have not integrated back into the wholesaling functions. Consequently, their stores are primarily supplied by independent processing and wholesaling firms in the areas where the stores are located. Stores in or near metropolitan areas had the largest number of suppliers and deliveries suggesting that stores outside these areas may offer fewer brands and items because there are fewer nearby processors and distributors.

No unique delivery equipment or work methods were being employed during delivery operations observed in this study. A collapsible tray dolly enabled the driver for one large bakery firm to move a large quantity of product from the truck to the display shelves. The time required to set up and put away this handling device could deter its use for small orders.

The sales of the 6 convenience stores averaged \$4,675 per week. The stores were supplied by an average of 34 vendors making 61 deliveries during the week. The average total time delivery vehicles spent at the store was 17 hours per week. In addition to the truck deliveries, salesmen were observed making an average of 5.6 calls per store at about 19 minutes per call. Thus total vendor personnel time averaged about 19 hours per store per week.

Six different activities were identified and measured to determine how truck drivers utilized their time at the convenience stores. For all product groups the drivers spent 19 percent of their time in preparing to deliver merchandise, 42 percent in product handling, 4 percent in waiting for

an order check, 9 percent in an order check, 22 percent pricing and shelving merchandise, and 4 percent in driver personal time.

The average delivery time ranged from a low of 4.3 minutes for egg vendors to a high of 34.4 minutes for milk deliveries. The bakery, snacks and biscuits, and soft drink categories accounted for 53 percent of the suppliers and 63 percent of the total deliveries.

Fifty percent of all deliveries had a wholesale value of \$20 or less and over three-fourths of all deliveries had a wholesale value of \$50 or less. The average value of deliveries was lowest for the bakery category (\$14.33), and highest for grocery (\$680.53). In addition to bakery, produce, eggs, snacks and biscuits, deli-meat and soft drink deliveries had wholesale values averaging below \$50.

The gross weight and cubic dimensions of most deliveries were determined from sampling products as they came into the store and invoice data. The average bakery delivery weighed 37 pounds and required 4.4 cubic feet of space. Similar measures were obtained for the other 11 product categories. These figures take on added importance when evaluating truck capacity needed in evaluating alternatives to the present delivery system.

Conclusions: The present supply system for small retail food stores is characterized by many truck deliveries, poorly coordinated merchandise receiving practices and a large number of orders and invoices. Retailers are served by many different suppliers and the deliveries have a relatively low wholesale dollar value. Order preparation, invoicing and material handling methods are primitive and inefficient. Little evidence was found of efforts on the part of either

suppliers or stores to adapt new information processing and material handling technology to the unique requirements of small retail food outlets.

Sales and delivery costs as a percentage of wholesale value range substantially higher for most processor and specialty wholesalers than for grocery wholesalers. Distribution costs represent 35 percent or more of wholesale value for bakery products, about 25 percent for snack and biscuit vendors and over 20 percent for carbonated beverages. Conventional small store supply operating practices are becoming increasingly expensive with serious implications for suppliers, store operators and consumers.

The pressures associated with increasing transportation costs, and

pending environmental regulations and restrictions are going to force some major changes in the delivery of food products. The large number of deliveries with relatively low wholesale value going to each store are unlikely to be able to continue. At the same time, the low income urban and rural people on the receiving end of this distribution system cannot afford higher food costs. Consolidation of deliveries appears to offer an economically viable solution to the problem.

A detailed report describing the results of this study entitled "An Analysis of Small Food Store Supply Systems," Experiment Station Bulletin No. 809 is available from the Pennsylvania State University. A follow-up study will discuss an improved simulation model and two actual partial consolidations that were conducted with one convenience store chain.

Footnote

¹Additional related information has been reported by Mongelli, Robert C. Improving Vending Deliveries to Retail and Institutional Food Outlets. ARS-NE-48. USDA.
