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An Overview of Wholesaling Research in the Transportation and Facilities Research Division of ARS

Presented by JOHN C. BOUMA

*Summarizes the current status of the many
USDA studies in this area.*

JOHN C. BOUMA is the research leader responsible for the United States Department of Agriculture research on developing efficiencies in wholesaling food products and in institutional food service operations. He obtained his B.S. and M.S. degrees at the University of Maryland. He has done research in cooperation with the country's leading food distribution warehouses. He started with the Department in 1949 and is author of many outstanding publications on warehousing, office procedures, and institutional operations. He has appeared on food distribution clinic and convention programs throughout this country and Canada.

Wholesaling research in the Transportation and Facilities Research Division of the U.S. Department of Agriculture can be divided into two broad areas: research directed toward improved urban area food centers and research directed toward improved work methods, equipment, layout, and facilities of particular types of wholesalers.

Urban Area Food Distribution Centers

Since we are meeting in Philadelphia, the origin of this city's market may prove interesting to you. Around 1960, along the banks of Dock Creek in Philadelphia was a favorite place for farmers to bring their products and display them. Later, the creek was filled in and named Dock Street. Farmers continued to bring their products to the area, and it became known as the Dock Street Market.

The market grew as the city grew, and it soon became boxed in and unable to meet the city's needs. By 1880, the market area was becoming congested with many merchant wholesalers as well as farmers marketing products in the Dock Street area. By 1925, the population of Philadelphia had doubled, and the problems of handling food at the Dock Street Market had doubled also. The market at Dock Street consisted entirely of wholesalers and there was no longer room for farmers to market their products.

By 1958, conditions in the market were undescrivable. Truck unloading and loading was done in the street, by hand, one container at a time. When trucks were loaded, they had to wait until other trucks were moved

out of the way. Often there was not enough room to bring food inside, so it was stacked outside on sidewalks and in the streets. It was estimated that over \$7 million was wasted each year in the handling of food.

Our research is aimed at improving the facilities and methods used in the marketing of food, such as those on Dock Street in Philadelphia. We develop planning criteria, and when requested, provide technical assistance in planning and promoting the construction of efficient food marketing facilities.

We were requested by Philadelphia city officials and food wholesalers to help plan a new wholesale food distribution center to solve not only the food handling problems at Dock Street, but also in other areas throughout the city.

After a study of the food wholesalers' facilities throughout the city, the kinds and amount of facilities needed were determined, and a model was built to illustrate these facilities. On the basis of information developed in the study, a new food distribution center was built, covering 388 acres, with facilities for all types of food firms. With new wholesale facilities, the cost of handling food in Philadelphia is less than would have been possible without such facilities. Before the Philadelphia Food Distribution Center was developed, the land on which it was built was a dump, which was bordered by squatter shacks and ramshackle buildings. This land produced only \$29,000 a year in taxes to the city. Now the land returns an estimated \$2 million a year to the city. In addition, Dock Street has been redeveloped with high-rise buildings, which add \$2.4 million income to the city. The new wholesale food center is reported to have cost \$100 million. A development goal was set for 10 years but was achieved in only 5 years.

Another example of this work is Boston. The Faneuil Hall Market dates back to 1740 when Peter Faneuil, a leading merchant and importer, offered a suitable building to accommodate food firms. Two hundred and seventy-three food wholesalers were located in the Faneuil Hall Market and handled much of the food for Boston.

New facilities are now in operation in Boston. The New England Produce Center opened in 1969 and the new Boston Meat Market in early 1970.

We have made studies and plans similar to those made in Philadelphia and Boston, in cities throughout the country — New York City, Atlanta, San Francisco, Denver, Chicago, and San Antonio are examples of over

65 studies we have made. We do not build these facilities, nor do we develop the construction plans for them. Our chief concern is to conduct the necessary research and determine whether new facilities should be built. If new facilities are needed, we develop general recommendations for the kinds of facilities that should be built and how they might be designed and arranged.

Our current studies of urban area wholesale food centers include:

Los Angeles

Highlights of a study of wholesale facilities and methods for distributing food in the Los Angeles area were presented in June to over 600 people who attended a public meeting held in the new Los Angeles Convention and Exhibition Center. Attending were representatives of local food firms, government agencies, trade associations, and labor groups, and others interested in improving food distribution in the area. It was pointed out that 244 of the 538 wholesale food firms studied needed new facilities. A model, which illustrates a master plan for a 470-acre wholesale food distribution center, was unveiled at the meeting. Estimated costs for the new facilities recommended for handling food range from \$72 to \$103 million, depending on the site selected. No appreciable savings in food handling costs are expected immediately as a result of the new center. In fact, these costs could increase if the center is built on an expensive site. Savings can be expected only after the individual food wholesalers develop their new operations and the center has more facilities and a greater volume of business, which would be expected in about 5 years.

Wilkes-Barre, Scranton, Pennsylvania

Field work has been completed in evaluating the wholesale food distribution facilities in a seven-county area of northeastern Pennsylvania. Data were collected from about 200 wholesale food firms and are being analyzed to determine the need for overall improvement in the food handling facilities of the area.

Wichita, Kansas

A study was started last month to evaluate the wholesale food distribution facilities in Wichita, Kansas. This study was requested by the Wichita Chamber of Commerce, City Commission, County Commission, Urban Renewal Agency, and the Metropolitan Area Planning Commission.

Special Technical Studies

We also conduct technical studies to develop general criteria for use in planning wholesale food marketing facilities. Examples of these are:

- Determining the cost of handling food products in warehouses using specific handling systems.
- Determining the most effective and least costly refrigeration system for use at food distribution centers.
- Determining the most effective systems for handling and disposing of trash and garbage at urban food centers as reported by Bob Sterns yesterday morning.

Research on the Wholesale Facility

Research directed toward improved urban area wholesale food centers is only part of our work in wholesaling. Additional research is directed toward improved work methods, equipment, layout and facilities of particular types of wholesalers. Some of this work is commodity oriented and may include some processing. Since 1960, we have worked with more than 300 food marketing facilities to find ways to make them more efficient and

more effective in their marketing program. Some of the facilities studied include: Fruit and vegetable packing plants, poultry and egg processing plants, as well as wholesalers; livestock auction and slaughtering facilities, meat packing plants, and meat wholesalers or purveyors; and dairy products processing, manufacturing and wholesale distribution facilities.

Carts Compared With Pallets for Shipping Groceries

Our study to evaluate the use of carts compared with pallets for assembling and shipping grocery orders from the warehouse to retail stores was recently completed. This study was essentially an updating of Marketing Research Report No. 473, "Handling Groceries From Warehouse to Retail Store Shelves," which was published in 1961. An updating of the 1961 study, in which eight systems were evaluated, was needed because: labor costs have increased substantially at both the warehouse and the retail store; adhesive labels, showing item description and retail price, have been widely adopted; systems such as SLIM (space, labor, and inventory management) for full case stacking are being used; and mobile carts for shipping groceries to retail stores have been developed and implemented.

Studies of warehouse order assembly were conducted in four firms. The labor productivity for assembling and loading orders averaged 178 cases per man-hour with the pallet method and 211 cases per man-hour with the mobile-cart method. By applying a wage rate of \$4.20 per hour for warehouse employees and prorating the equipment cost, we find the total warehouse order assembly and loading costs to be \$27.31 per 1,000 cases for the pallet method, and \$31.06 per 1,000 for the mobile-cart method. Warehousing costs for the mobile-cart method are greater because of the high costs of carts, all of which are allocated to the warehouse.

Using the delivery cost data obtained from the four cooperating firms in the study and assuming a 60-mile round trip, the delivery cost would be \$49.59 per 1,000 cases using pallets and \$41.48 per 1,000 cases using mobile carts.

Data were obtained in eight retail stores during the study. Four stores received merchandise on pallets and four received merchandise on mobile carts. In the analysis, we assumed that costs were the same after the merchandise was received and moved to the salesfloor.

The total cost incurred at the retail store was \$16.06 per 1,000 cases for the pallet method and \$8.93 per 1,000 cases for the mobile-cart method. This cost includes: (1) The labor cost for unloading the merchandise and moving it to the salesfloor; (2) the labor cost for reloading empty pallets or carts; (3) the equipment costs; and (4) the delivery equipment tie-up cost.

Based on the data obtained in the study, the total cost to assemble orders at the warehouse, load them, deliver them 30 miles from the warehouse, unload them from the trailers, and move them into the store was \$92.96 per 1,000 cases for the pallet method and \$81.47 per 1,000 cases for the mobile-cart method (Table 1) — a difference of \$11.49. The availability of delivery equipment to haul merchandise to the warehouse on the return trip from the retail store in order to generate backhaul income is a key factor for consideration in determining whether to adopt the pallet system or the mobile-cart system, or whether to adopt a combination of both systems. Costs favor the pallet system when a backhaul income of more than \$11.49 per 1,000 cases delivered is available, because empty pallets do not occupy a large amount of trailer space.

Table 1. — Cost for Shipping Groceries From Warehouse Slot to Salesfloor With Warehouse Pallets and Mobile Carts

Cost element	Warehouse pallets	Mobile carts
	Dollars per 1,000 cases	Dollars per 1,000 cases
Warehouse	27.31	31.06
Delivery	49.59	41.48
Retail Store	16.06	8.93
Total cost	92.96	81.47

Warehouse Ceiling Height

Another study to compare the costs of constructing, equipping, and operating grocery warehouses that have 25 feet of clear stacking heights with those that have only 21 feet is now underway. Because of increasing costs, especially land costs, many firms are considering incorporating higher stacking heights into their warehouse design than the conventional 18 or 21 feet. A contractor's study of the problem has been received; however, fire and safety regulations have been instituted since the study was completed that greatly increase the cost of constructing warehouses with higher stacking heights. Supplemental data will be collected to revise this study, and a report will be prepared during the next year.

Alternative Methods for Servicing Small Store Owners

Research is being conducted, under contract, to develop efficient, low-cost order assembly and delivery methods for use by grocery wholesalers who handle small store orders. Handling small store orders result in small-lot deliveries, excessive handling multiple stop by many trucks each day, inadequate inventory control, and exposure of products to excessive damage and pilferage. All of these factors make the grocery wholesalers' handling costs higher for servicing small stores than for servicing their larger competitors. Improving the servicing of small store grocery orders, through better warehouse layouts, equipment, loading and unloading methods, and routing and scheduling and containerized deliveries, consolidation of small lots, and other modifications of existing practices, are being determined and evaluated.

Advanced Warehouse Mechanization

A contracted study to develop time and cost standards for advanced mechanized warehouses, which are cur-

rently in operation, is now underway. Systems that are being evaluated include the storage-retrieval or stacker crane operations; automatic order selection systems; semi-automatic order selection systems, using machines to take the selector to the product for order selection; and short selection line conveyor systems used for selecting several retail store orders at a time. Data developed in this study will provide guidelines that individual firms can use to evaluate the potential systems that are available presently.

A major objective of the study is to develop a model and recommendations for an advanced mechanized grocery warehouse operation for 1980. The model will emphasize design criteria and performance characteristics needed in future design. Members of the food distribution industry will be able to use the model to develop their own mechanized operations or to determine whether mechanization will be economical in their operations. A report on this subject will be prepared during the coming year.

Warehouse Layout and Equipment for Institutional Grocery Wholesalers

A study to evaluate various methods of assembling institutional grocery orders including conventional assembly with four-wheel handtrucks; tow tractors and pallets, selection up to a height of 20 feet with a forklift truck with platform controls; and batch assembly methods where a number of orders are combined, the products brought to the shipping dock, and individual orders placed in cages, is now underway. Because institutional grocery orders are relatively small compared with conventional retail store orders, layouts that reduce order selector travel distance are also being evaluated. One layout concept being evaluated is the "U" bay, or walk-in area from main aisles. Research in this area will be completed this year.

All of our work is done in the field at the facilities involved. The work is carried out in cooperation with State departments of agriculture, city and county governments, extension services, local industry, and others connected or concerned with the marketing of food. Appreciation is extended to many of you for your helpful participation in studies I have described.