IMPROVING VENDING DELIVERIES TO RETAIL AND INSTITUTIONAL FOOD OUTLETS

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PREFACE

This study is part of a research program by the Agricultural Marketing Research Institute, Agricultural Research Service, to improve the methods of delivering food to retailers and institutional outlets.

This report was prepared under the general direction of John C. Bouma, chief, Market Operations Research Laboratory, Agricultural Marketing Research Institute.

Appreciation is expressed to all the food delivery vendors, wholesalers, and retailers who participated in this research.

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IMPROVING VENDING DELIVERIES TO RETAIL AND INSTITUTIONAL FOOD OUTLETS

By

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SUMMARY

A study was made of delivery practices of eight vending operations to retail and institutional food outlets. Three trips for each vending operation, or a total of 24 trips, were observed. The researcher studied delivery practices at 429 retail and institutional food outlets. The types of vending operations studied were ice cream, health and beauty aids, cake, bread, frozen food, dry grocery, milk, and soft drinks.

The primary objectives were: (1) To observe and describe present industry practices, (2) to determine labor productivity, and (3) to offer recommendations to improve vending deliveries.

Labor costs were based on each product-unit. Product-unit was defined as the typical size unit (package, case, or tray) that the vendor delivered to retail and institutional outlets. Labor costs per product-unit for the eight vending operations varied for loading, transporting, and unloading. Labor costs per unit were highest during unloading, based on the size of the order and the number of stops per trip. Unloading-labor costs were 4.5 cents per unit for a dry grocery, retailer call-in system that averaged 101 cases or product-units per stop and 10 stops per trip, compared with 28.5 cents per unit for a driver-salesman system that averaged 3 tray loads or product-units of cakes per stop and 30 stops per trip.

Vehicle-cube use for the eight vending operations averaged 81 percent--from a high of 96 percent for the bread delivery to a low of 53 percent for the health and beauty aid delivery. Better vehicle-cube use is one way of lowering delivery cost.

Problems in delivering products to retail and institutional food outlets occurred throughout the delivery part of the vending operation, but delays at the delivery stops caused the most problems. Delays in finding items in the

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delivery truck and in checking orders with the retailers were the problems most frequently observed. On the average, one delay (10 minutes or more) occurred every four stops, and if a driver encountered four or five delays on his trip, an extra 50 or 60 minutes would be added to his delivery time. These delays become very costly if driver overtime is a factor.

Consolidating the vendors orders would be one way to reduce delivery costs and to increase efficiency. Other recommendations that could increase the efficiency of deliveries are:

- Train plant employees to assemble, mark, and load delivery orders more accurately.
- Unitize orders on pallets and carts.
- Schedule deliveries to utilize available space in the truck better.
- Develop a program of proper vehicle maintenance.
- Mark and group individual orders in the truck.
- Have retail outlets provide personnel to check incoming merchandise promptly.
- Use adhesive labels to speed order checking at the plant and order receiving at the store.

INTRODUCTION

Research was conducted to examine the present delivery practices of vendors to retail and institutional food outlets and to assess the possibility of improving these practices. Very little research has been conducted to date in this segment of the food-distribution industry.

The vending operations studied are typical of those used for similar products in urban areas throughout the country. The size of the order varies, but generally it is small. On any particular trip, the vendor may have as many as 20 to 30 stops. Many retail or institutional outlets served are outmoded, are located in congested areas of the city, or are too small to facilitate an efficient receiving operation adequately.

These vending operations included the delivery of bread, cake, soft drink, tobacco, candy, dry grocery, and health and beauty aid products. Besides these general items, the delivery of low-temperature products, such as ice cream, frozen food, and milk, were studied also.

Basically, two distinct distribution systems were used by the vendors. These systems were the driver-salesman system or the retailer call-in system (or a combination of both). The driver-salesman system is one in which the delivery vehicle is used as a rolling warehouse, and the driver-salesman

largely determines the makeup of the order by reviewing the stock on the shelves at each delivery stop. In the retailer call-in system, the retailer telephones his order to the vendor, usually 1 or 2 days before the scheduled delivery. The driver delivers the proper items and correct quantities to the customer. Of the eight vending operations studied, four used the retailer call-in system, three used the driver-salesman system, and one used a combination of both.

METHODOLOGY

Cooperation was arranged with various vendors to study their order assembly, truck-loading product delivery, and truck-unloading operations. Studies were made of 3 different delivery trips for each of the 8 vending operations, for a total of 24 trips, which consisted of deliveries to 429 retail outlets. Information recorded included labor for assembling orders and loading the vehicle, equipment used, description of delivery vehicles, percent of vehicle-cube use, number and type of delivery stops, driver time, mileage, labor for unloading, and problems during delivery.

A week before beginning the study, the researchers met with the company management to obtain a detailed description of the delivery practices. This step was usually followed by a tour of the facilities and the scheduling of the delivery trips to be observed.

The day before the scheduled delivery trip, researchers obtained productivity data and methodology on the assembling and loading of orders. During the delivery trip, a researcher followed the delivery truck, observing and recording total mileage driven and the number and types of stops.

At each stop, the unloading procedure was studied. Information obtained included type of stop, number and type of delays, methods of order assembly in the truck, truck unloading, checking and storing the order, and labor requirements.

DESCRIPTION OF VENDING OPERATIONS

Ice Cream

The retailer call-in system was used in this operation. Orders were telephoned to the vendor on the day before the delivery. A load sheet was made for each truck. Twenty-foot, refrigerated, eight-door delivery trucks were used. Orders were assembled in the freezer on four-wheel carts or on pallets and transported to the trucks, which were located in an enclosed area. In loading the truck, one worker handed packages to another worker who stacked them inside the truck.

At each delivery stop, the driver, while standing at street level, opened one truck door at a time and reached into the truck to remove ice cream as stipulated by the order for that stop. As the driver removed the ice cream from the truck, he placed it on a two-wheel or four-wheel handtruck, pushed the handtruck into the store, and then positioned it next to the ice cream

display case. A store employee then checked the merchandise, after which the driver usually placed the ice cream in the display case. At a few stops, the store manager did not require the driver to place the ice cream in the case but had one of the store employees perform that task.

Establishments served included restaurants, drugstores, supermarkets (small and large), military installations, carryouts, and snackbars.

Health and Beauty Aids

This retailer call-in system supplied merchandise to various retail outlets. Salesmen who visited each store 2 days before the scheduled delivery prepared the orders. Delivery trucks consisted of step vans and small panel trucks. Orders were assembled the day before the delivery trip and moved to the loading area on pallets and on two-wheel handtrucks on the morning of the trip. Trucks were backed to the loading door and swept out before being loaded. Cases were marked for each stop, and the first cases loaded were destined for the last stop. While the cases were being hand stacked in the truck, the driver checked them against his order sheet.

At the delivery stop, the driver checked the stop numbers on the cases in the truck and removed the appropriate cases by unloading through the rear door. By using a two-wheel handtruck, the driver transported the merchandise into the store. The store manager checked the number of cases against the store invoice, while store employees stacked the shelves. Outlets served included convenience foodstores, supermarkets, and small foodstores.

Cake

A driver-salesman delivered cakes and sundry items such as pies and doughnuts. Delivery trucks were straight 15-foot vans with built-in shelves that were loaded through large rear doors. Employees loaded the trucks at night according to a master load sheet that the driver prepared. The merchandise was stacked onto trays that were slid into the shelves in the truck. When the driver arrived on the morning of the delivery trip, he added any extra merchandise that he needed to the truck.

In the retail or institutional outlet, the driver removed stale merchandise, straightened the display case, determined the store's needs, and wrote the order. He then transported the merchandise from truck to store on a fold-down cart that was kept in the truck. Store personnel checked the order and then the driver restacked the store's shelves. Outlets served included supermarkets, restaurants, carryouts, drugstores, and convenience foodstores.

Bread

Bread was delivered in the same way as cake.

This operation used the retailer call-in system, with orders arranged on the truck by stops. Depending on the size of the load, different size trucks (20 to 30 feet long with large rollup rear doors) were used. The trucks were refrigerated by freeze plates and were kept fully charged by a compressor that operated during the trip.

Orders were assembled and loaded at the warehouse at night. Figure 1 shows a plant employee removing a pallet of frozen food before order assembling.

Figure 1.--Plant employee removing a pallet of frozen food before order assembling.

Palletized orders were removed from the freezer with forklift trucks and positioned on the floor next to the truck. Nonpalletized parts of the order were moved from the freezer on four-wheel handtrucks. The order was then hand stacked in the truck by loaders according to appropriate customer sequence (fig. 2). The first boxes loaded were the last boxes to be unloaded.

At the retail outlet, orders were transported on a two-wheel handtruck. At a few outlets where it was possible, a roller-conveyor was set up; one end was placed in the truck and the other end in the store. At some stops, store personnel checked the orders, and then the driver stacked them in the freezer display cases; at other stops, store personnel alone put the orders in the display cases or in storage. Types of outlets served were military installations, convenience foodstores, and supermarkets.

Figure 2.--Loading frozen food orders in the delivery vehicle.

Dry Grocery

The dry grocery operation used the retailer call-in system. Depending on order sizes, 20-foot straights and 40-foot trailers were used to make deliveries. Figure 3 shows a typical dry grocery warehouse where orders were assembled. Order assembly usually started in the afternoon and continued through the night until all orders were assembled and loaded. Two or three warehousemen, each carrying part of the total order sheet, worked throughout the warehouse filling the order. Cases were placed on four-wheel trucks that were pushed by hand. Assembled orders were moved to the loading dock by a towline. Figure 4 shows a warehouse employee assembling a dry grocery order.

At loading time, the delivery truck was backed to the loading door, a dock plate positioned, and the inside of the truck swept out. Cases were marked with the delivery stop number, and the trucks were loaded in proper delivery-stop sequence. Orders were moved into the truck on four-wheel handtrucks and were then hand stacked in the truck.

At the retail outlet, the driver removed the order from the truck and transported it into the store on two-wheel handtrucks. In the latter part of the delivery trip, when more than half of the truck was empty, the driver set up a roller conveyor to transport cases from within the truck to the truck's rear door.

Once inside the store, the order was checked and put away by store employees. Convenience foodstores, supermarkets, and small independent foodstores were the types of retail outlet served by this vending delivery.

Milk

The driver-salesman system was used primarily with the milk delivery operation, although there was some retailer call-in. The delivery trucks were straight 20-foot refrigerated models that were loaded and unloaded through a side door.

Figure 3.--Typical dry grocery warehouse.

Figure 4.--Assembling a dry grocery order at the warehouse.

Warehousemen assembled the merchandise in the refrigerated warehouse and transported it to the trucks on electric conveyors. The trucks were usually loaded during the afternoon before the scheduled delivery trip.

At a stop where the retailer used the driver-salesman system, the driver first determined what was needed, returned to the truck to assemble the order, and then transported the milk into the store.

At a retail or institutional outlet that used the call-in system, the driver assembled the merchandise inside the truck and transported it into the store on two-wheel handtrucks. With the call-in orders, the retailer sometimes added to the order when the delivery arrived.

Retailers and institutional outlets served included supermarkets, convenience foodstores, hotels, schools, restaurants, carryouts, drugstores, and small businesses.

Soft Drinks

A driver-salesman delivered the soft drinks. The delivery vehicle, a straight truck 20 to 25 feet long, was specially designed to hold palletized cases. Built-in shelves on both sides of the truck were designed so that the driver could easily reach the merchandise by raising one of the four doors on either side and removing the items needed.

Orders were assembled and loaded immediately after the truck's return from its morning delivery trip. Palletized loads of popular items were lifted directly into the truck. After being loaded, the trucks were parked outside the warehouse, where they remained until the next day.

At the retail outlet, the driver determined what items and what quantities were needed and then returned to his truck to fill the order. The cases of soft drinks were transported into the store on a two-wheel handtruck. After the order was checked, the driver stacked the display shelves. Retailers served were grocery stores, restaurants, schools, carryouts, drugstores, and small businesses.

Table 1 shows a summary of each vending operation's order determination, assembly, and loading. The table also shows the type and size of the delivery vehicle used and the time of day that each particular function was performed.

DELIVERY-LABOR COSTS

The labor costs shown in this report indicate the cost for each vending delivery operation. To provide a uniform basis of comparison, labor costs were based on $3.60 per hour for warehouse employees and delivery-truck helpers, while driver costs were based on $4.20 per hour. No cost comparison can be made between the eight vending operations because their product units were different. For example, the product unit of ice cream was the manufacturer's package (1/2-gallon, novelty pack, etc.); for health and beauty aids, the vendor's packing case; for bread and cake, a tray load; for milk, the wire case; and soft drinks, the wooden case; and for dry grocery and frozen food, the manufacturer's packing case.

TABLE 1.--Warehouse procedures for each of the 8 vending operations

Vending operation	Method of placing order	Assembling orders		Loading area	Vehicle description	Loading orders	
		Performed by	Time when performed			Performed by	Time when performed
Ice cream	Call-in	Selectors 1/	Evening, night.	Inside loading area.	20-ft, 8-compartment, refrigerated truck.	Selectors 1/	Evening, night.
Health and beauty aids	Salesman	---do---	Day	Trucks backed up to loading doors.	10 to 15-ft. straight truck.	Driver and loaders.	Morning.
Cake	Driver	---do---	Night	Inside loading area.	15-ft straight truck with shelves.	Driver and selectors.	Night, morning.
Bread	---do---	---do---	---do---	---do---	---do---	---do---	---do---
Frozen food	Call-in	---do---	---do---	Trucks backed up to loading doors.	20-ft straight refrigerated truck.	Selectors	Night.
Dry grocery	---do---	---do---	Afternoon, night.	---do---	Up to 40-ft semitrailers.	---do---	Afternoon, night.
Milk	Driver	---do---	Afternoon.	Outside loading dock.	20-ft straight refrigerated truck.	Loaders	Afternoon.
Soft drinks	---do---	---do---	---do---	Inside loading area.	8 compartments specially designed for holding cases of soft drinks.	Driver and selectors	---do---

1/ Selectors also loaded delivery trucks.

Loading costs include labor costs for assembling the order, transporting it to the loading area, and loading the delivery vehicle. Transportation-labor costs were for the driver while he was driving the delivery vehicle. Unloading-labor costs include expenses for the driver at the retail outlet. If the driver had an assistant, his cost was included in the transporting and unloading costs.

Table 2 shows the average labor productivity for 3 trips for each of the 8 vending operations, or a total of 24 trips. For example, the frozen-food operation's delivery labor costs were $6.30 for loading, $12.32 for transporting, and $26.89 for unloading 550 cases of frozen food. The total labor costs for 550 cases of frozen food were $45.51. This cost does not include delivery truck overhead, fuel, maintenance, warehouse overhead, or any retailer's direct or indirect costs.

Unit labor costs ranged from 1.1 to 7.1 cents per unit for loading and from 2 to 10.1 cents for transporting for the eight vending operations. Unit unloading-labor costs ranged from 3 cents to 28.5 cents per unit (table 3). The labor cost for unloading was lower in a vending operation that has a retailer call-in system with relatively large orders per stop and few stops per trip than in a vending operation that has a driver-salesmen system with small orders per stop and many stops per trip.

The dry grocery, frozen-food, and ice cream operations, all using the call-in system, had an average order size of 101, 69, and 30 units per stop, and 10, 8, and 14 stops per trip, respectively. Their unloading-labor cost ranged from 4.3 cents to 4.8 cents per unit. The bread operation and the cake operation (driver-salesman system) had an average order size of 5 and 3 units per stop, with 21 to 30 stops per trip and an unloading-labor cost per unit of 20.8 and 28.5 cents, respectively.

Obviously, when a driver-salesman has to spend considerable time determining customer needs, writing the order, and returning to the truck to fill the order, more time is spent than when the driver has only to unload a predetermined order and transport it into the store. With the many more stops and small size orders of the driver-salesman system compared with the retailer call-in system, low labor productivity at unloading is not surprising. Since different products were delivered by the eight vending operations, a true comparison of unloading is not possible, but one may assume that greater labor efficiency is achieved with a retailer call-in system that has large orders per stop and few stops per trip than with a driver-salesman system that has small orders per stop and many stops per trip.

TABLE 2.--Productivity in loading, transporting, and unloading food orders for 8 vending operations

Vending operation	Loading			Transporting		Unloading		Total cost
	Load size	Man-hours	Labor cost 1/	Man-hours	Labor cost 1/	Man-hours	Labor cost 1/	
	Number		Dollars		Dollars		Dollars	Dollars
Ice cream	415	1.82	6.55	2.82	11.84	4.30	18.06	36.45
Health and beauty aids	156	2.00	9.00	2.52	10.58	1.10	4.62	24.20
Cake	97	.58	2.09	1.18	4.96	6.60	27.72	34.77
Bread	106	.67	2.41	1.37	5.75	5.25	22.05	30.21
Frozen food	550	1.75	6.30	3.04	12.32	6.51	26.89	45.51
Dry grocery	1,011	7.80	28.08	5.40	21.06	11.80	46.02	95.16
Milk	172	3.40	12.24	4.39	17.38	5.28	21.11	50.73
Soft drinks	168	1.83	6.59	2.89	11.70	5.49	22.62	40.91

1/ Based on an estimated wage rate of $3.60 per hour, or $0.06 per minute for warehouse employee and driver's assistant, and $4.20 per hour or $0.07 per minute for the driver.

TABLE 3.--Unit labor costs for loading, transporting, and unloading for the 8 vending operations

Vending operation	Loading	Transporting	Unloading			Total labor cost per unit
	Labor cost per unit	Labor cost per unit	Order size per stop	Stops per trip	Labor cost per unit	
	Cents	Cents	Units	Number	Cents	Cents
Ice cream	1.5	2.8	30	14	4.3	8.6
Health and beauty aids	5.7	6.7	11	14	3.0	15.4
Cake	2.1	5.1	3	30	28.5	35.7
Bread	2.2	5.4	5	21	20.8	28.4
Frozen food	1.1	2.2	69	8	4.8	8.1
Dry grocery	2.7	2.0	101	10	4.5	9.2
Milk	7.1	10.1	7	26	12.2	29.4
Soft drinks	3.9	7.0	8	22	13.4	24.3

ANALYSIS OF DELIVERY

The Vendor's Warehouse

The efficiency of any delivery system depends, among other things, on the efficiency of the people employed. Common problems that originated at the warehouse were "short orders," items misplaced in the truck, and boxes that were assembled individually and marked incorrectly. A short order is one in which a certain item was to have been loaded onto the truck but not found at the time of delivery. If the workers at the plant did a good job of loading and marking orders, few serious problems developed on the trip. Sufficient assembly and loading space was another problem encountered during the study. In some vending operations, loading space at the warehouse has not kept pace with growing sales. As a result, when several vehicles were loaded at the same time, orders sometimes became mixed.

The following tabulation shows the total percent of vehicle cube used in the delivery trucks for each of the eight vending operations on their three observed trips. The average percent of vehicle-cube use (81 percent) was low and ranged from 53 percent for health and beauty aids to 96 percent for bread.

Vending operation	Percent of vehicle-cube use
Ice cream	80
Health and beauty aids	53
Cake	93
Bread	96
Frozen food	90
Dry grocery	74
Milk	70
Soft drinks	92
Average	81

Better vehicle-cube use would result in lower transport costs. Route reorganization could result in higher vehicle-cube use and in lower delivery costs.

Many distributors found computerized vehicle-scheduling programs helpful in maximizing vehicle cube use and in increasing routing and unloading efficiency. 2/ With a vendor supplying such inputs as merchandise volume, location of delivery stops, and truck capacities, the computer can recommend better schedules to achieve greater vehicle-cube use.

The Transport Trip

If the driver was to deliver a salable product and keep his customers satisfied, he had to consider certain factors, such as the route, the number of stops, the special delivery requirements or restrictions of his customers,

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2/ Hallberg, M. E., and Kriebel, W. R., Designing Efficient Pickup and Delivery Route Systems by Computer, Pa. Ag. Expt. Sta. Bul. 782, 61 pp. June 1972.

and the nature of his product. The sequence and the number of stops on the delivery route were important to the driver because of arrival times specified by certain customers. If the stops were in heavily congested areas or if they had special delivery restrictions, the driver sometimes deviated from his route to arrive at these stops on time. Of course, trucks loaded by sequence of stops could not deviate from the established route.

Some metropolitan areas restrict truck traffic during certain hours to help alleviate traffic congestion. In almost 30 percent of the stops, deliveries had to be made between certain hours. Because drivers usually have the same route, most stops were familiar to them. However, when a new stop was added, additional time was needed to locate it. Table 4 shows the number

TABLE 4.--Average distance per trip and average distance between stops for each of the 8 vending operations

Vending operation	Trips	Distance per trip	Distance between stops
	Number	Miles	Miles
Ice cream	3	50	2.5
Health and beauty aids	3	89	3.1
Cake	3	71	2.0
Bread	3	43	.7
Frozen food	3	56	3.1
Dry grocery	3	47	2.2
Milk	3	36	1.4
Soft Drinks	3	33	.7

of trips observed, the average total mileage per trip, and the average mileage between stops for each of the eight vending operations.

The delivery vehicles observed during the study were in safe operating condition. Only one instance occurred when a delivery vehicle did not run. Vendors with refrigerated vehicles have the added responsibility of maintaining adequate refrigeration for their product. Some refrigerated vehicles had accumulated much frost on their freeze plates, and a few vehicles had broken or worn gaskets around their doors, resulting in loss of refrigeration. In a few of these vehicles, the trouble was so severe that their merchandise was thawing.

Proper vehicle and refrigeration system maintenance is essential if a vending operation is to function properly. The vending operation must include regular periodic checks to insure that the refrigeration system is functioning properly, that plates are defrosted, and that door seals are tight enough to prevent loss of refrigeration.

The Retailer

The food retailers and institutional outlets served by the eight vending operations varied greatly in type and size. Retailers ranged from small

carryouts to large supermarkets and from stores located in the central city to suburban shopping centers. For the drivers, the small, crowded outlets in the older central city created more problems, such as traffic congestion, limited parking, and inadequate storage facilities, than did the larger spacious outlets in the suburbs.

Delays in parking were the first problems encountered by the driver at his stop. The driver on arriving at the retailer must first find a close and accessible parking space to the store to make delivery easier. Since restrictions at some stops forbid more than one vendor to unload at the same time, drivers must sometimes wait or go on to another stop if nearby.

If the retailer call-in system was used, the driver did not need to go into the store first, but only check his invoice for the type and quantity of products needed. With the driver-salesmen system, the driver must enter the store, determine its needs, fill out the invoice, and return to his truck for the merchandise. Figure 5 shows a driver delivering an ice cream order to a small retail store.

Figure 5.--Driver delivering an ice cream order to a small retail store.

The condition of the load in the truck could present problems at the first few stops. If the truck was fully loaded or nearly fully loaded, load shifting was possible. In this situation, the driver would have difficulty in locating needed items. Since the trucks would be partly empty later in the trip, the driver would not have as much difficulty in locating items. If orders were marked by stops, drivers had less difficulty in locating items. If items were not marked and had to be located in the truck, the driver hoped that the loading at the plant had been done correctly. If not, considerable time was wasted while the driver and his helper searched the truck for a missing item.

At two stops during the ice cream deliveries, the driver spent 12 and 15 minutes, respectively, trying to locate items that had been misplaced in the truck. At one dry grocery stop, the driver spent over 15 minutes trying to locate missing parts of an order. He finally gave up the search and credited the store for the missing items. Once the driver of a frozen-food truck had to rearrange part of his load in order to find misplaced parts of an order. This search took over 20 minutes and greatly irritated the store manager. This type of situation causes many drivers to insist on assisting in loading their trucks. If the items failed to be loaded at all, then additional delays occurred while the driver explained to the store manager why he was not receiving an item that he had ordered. Since in the driver-salesman system, the driver could substitute for items that were not in the truck, failure to load certain items was not as serious.

Table 5 shows the type, number, and percent of the total of the various food retail and institutional outlets served by the 8 vending operations on the 24 delivery trips.

The most common procedure was to unload the order, or part of it if it was large, next to the truck and then to transport the order into the store. Two-wheel handtrucks, shopping carts, four-wheel handtrucks, and upright shelved carts were the more common devices used to move the order from the truck into the establishment.

Most of the orders were small enough so that only one or two trips from truck to store were necessary. With larger orders, more trips were needed, and with some very large orders, where space was available, the driver would back the delivery truck up to the front door and set up a roller conveyor between the truck and the store's interior. The order was conveyed directly from the truck into the store.

Once the order was in the store, finding space to place the order so that it did not block aisles and interfere with customer traffic was sometimes a problem. In larger, modern stores, space was not a problem, but in older, smaller stores, space was usually limited. Checking the order required much time. The manager usually did this checking with the driver, and in many small stores, the checking was interrupted while the manager waited on customers. Only when free would he devote time to checking the order. Rarely did the manager delegate authority for checking orders to other employees.

TABLE 5.--Types of outlets served by the 8 vending operations

Vending operation	Convenience foodstores (chain)	Super-markets	Carryouts, snackbars, restaurants	Drug-stores	Schools	Small businesses 1/	Small, independent foodstores	Military	Other 2/
	Number	Number	Number	Number	Number	Number	Number	Number	Number
Ice cream	--	4	8	14	2	4	4	2	3
Health and beauty aids	27	7	--	--	--	--	5	--	2
Cake	25	26	10	12	--	3	5	--	9
Bread	9	13	12	14	5	2	2	--	5
Frozen food	12	4	--	--	--	--	1	6	--
Dry grocery	23	6	--	--	--	--	1	--	--
Milk	10	5	21	3	27	3	3	--	5
Soft drinks	11	7	5	4	5	22	5	--	6
Total	117	72	56	47	39	34	26	8	30
Percent of total	27	17	13	11	9	8	6	2	7

1/ Small businesses consisted of gas stations, liquor stores, beauty parlors, and barbershops.
2/ "Other" consisted of theaters, hotels, churches, hospitals, and public buildings.

The value of the orders per stop varied among the eight vending operations. The following tabulation shows the average order value per retailer (average for the three trips) for each vending operation. Average value per order for bread delivery was lowest ($15.14 per stop), while frozen-food delivery was highest ($478.90).

Vending operation	Average value of order per stop
Ice cream	$ 64.64
Health and beauty aids	310.57
Cake	19.10
Bread	15.14
Frozen food	478.90
Dry grocery	458.10
Milk	31.75
Soft drinks	22.29

Finding adequate refrigerated storage or display space was sometimes a problem when the driver delivered perishable products. Some stores did not have sufficient space or if they did, their refrigeration equipment was not functioning properly.

Arrangements were made between some retailers and vendors for drivers to place the orders in the display cases or storage areas; as was true with the ice cream, cake, bread, frozen-food, milk, and soft-drink drivers. The dry grocery and health aid drivers were instructed to leave the orders on the retailer's floor after the orders had been checked.

Table 6 shows the most common delays and their number of occurrences during the 24 trips. Only delays of 10 minutes or more were recorded and,

TABLE 6.--Types of delays that occurred during the 24 delivery trips

Type of delay	Number	Average delay time
		Minutes
Checking order with manager	53	14.07
Locating misplaced items in the vehicle	33	13.01
Finding parking space at store	15	11.12
Restacking order from extreme load shifting within vehicle	6	17.09
Total or average	107	13.82

on the average, these delays occurred every four stops. If a driver encountered four or five delays on his trip, an extra 50 to 60 minutes could be expected to be added to the delivery time. These delays are particularly expensive when drivers must work overtime and must be paid at the rate of time and one-half.

In the 24 deliveries to 429 outlets, 107 delays (10 minutes or more) occurred. Delays while checking the order at the retailer's occurred 53 times (one-half of all the delays recorded). Other significant delays included finding parking space, restacking shifted loads, and locating misplaced items in the truck.

RECOMMENDATIONS

When a vending operations serves many retailers and a retailer receives merchandise from many vendors, the resulting traffic flow creates constant problems for both vendor and retailer. The problems are more serious for small retailers who have limited parking space for vendors' trucks, limited storage space for the products delivered, and few store employees to check incoming merchandise. Pilferage in the store occurs more often when store employees are busy checking orders. Managers of large supermarkets complain also of the many small vending deliveries. Some food retailers have as many as 50 to 60 deliveries per week.

Consolidating deliveries is one way of reducing congestion inside the retail store. Reducing deliveries to a retailer to one per week may not be possible, but by combining related merchandise, the vendor could greatly reduce the number of weekly deliveries. For example, health and beauty aids, bread, and bakery items could be combined with dry grocery items. Frozen foods and ice cream could be compartmentized next to other refrigerated items such as milk and dairy products. Some supermarket warehouse operators now use one truck to deliver combination loads that include dairy, delicatessen, produce, and eggs to one supermarket.

Advantages of consolidating orders would be fewer deliveries, less traffic congestion, less paperwork, reduced pilferage, and less order checking.

A disadvantage of consolidating would be that retailers would have to train store personnel to determine store needs and to write orders, a previous job of driver-salesmen.

Other recommendations that could increase the efficiency of existing vending operations are:

- Train plant employees to assemble, mark, and load delivery orders more accurately.

Some major problems of drivers during their deliveries were misplaced items, short orders, and mismarked packages. A training program to overcome inaccurate warehouse order assembly and loading could substantially reduce

delivery time. Also, well-trained employees would eliminate the practice of having higher paid drivers doing part or all of their own loading.

° Unitize orders on pallets and carts.

Vendors could unitize large orders on pallets or carts and reduce the time-consuming piece loading and unloading of delivery trucks.

° Schedule deliveries to better utilize available space in the truck.

A rescheduling of delivery stops and trips could result in better vehicle-cube use. In the study of the eight vending operations, vehicle-cube use averaged 81 percent, although it dipped to as low as 53 percent for some vending operations.

° Develop a program of proper vehicle maintenance.

A program of periodic inspection of all vehicles should be conducted. With refrigerated vehicles, check for adequate refrigeration output, excessive frost buildup, broken or worn door gaskets, and loose refrigerator doors.

° Mark and group individual orders in the truck by stop.

If possible, individual orders should be loaded together and marked clearly with the name of the delivery stop. This will speed delivery time and prevent the delivery of items to the wrong stop. 3/ Also, when only a few large orders are on a truck, nets could be placed over individual orders. The netting would conform to the shape of the order, and the driver would more easily find each order, even if the cases were not marked.

° Have retail outlets provide personnel to check incoming merchandise promptly.

The retailers should have store employees check the orders quickly and correctly so that drivers can be on their way with a minimum of delay and the products put away quickly.

° Use adhesive labels to speed order checking.

Labels that describe the contents can be attached to cases during order assembly to identify each item on the order. Store personnel could check the incoming order faster by counting the number of cases and checking the sum against the invoice total. If a wrong item is received, it would be noted during shelf stacking; with proper credit easily assured from the vendor. 4/

3/ Mongelli, R. C., and Lundquist, A. L. An Evaluation of Five Ice Cream Delivery Systems. U.S. Dept. Agr., Agr. Res. Serv., ARS-NE-41, 23 pp. 1974.

4/ Bartz, D. J., Catel, J. M., and Bouma, J. C. Use of Adhesive Labels for Price-Marking Cases at the Grocery Warehouse. U.S. Dept. Agr., Agr. Res. Serv., ARS 52-23, 19 pp. 1967.

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