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COSTS OF USING RETURNABLE VERSUS DISPOSABLE CONTAINERS IN FLUID MILK RETAILING

by

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Concern over pollution and solid waste disposal has prompted the development of new packaging techniques. Public pressure has caused several changes in packaging practices and more are expected. One example is the development of returnable, plastic milk containers for fluid milk.

Studies have been undertaken to determine the increased cost to the processor of new equipment, new rates of filling, and new packaging materials associated with the returnable plastic containers. The cost of distribution from the processor to the retailer and the cost of home delivery of milk has also been analyzed. However, little work has been done in determining the cost to the retailer of handling milk in the newer returnable containers.

In 1975, 93 percent of the total fluid milk sales in the United States were through other than home delivery, principally food stores. This large percentage of fluid milk handled by food retailers indicates a need to investigate the cost incurred by this sector of the marketing system in order to more fully determine the cost of using returnable plastic containers.

Objectives

The objectives of this study were (1) to determine the per unit cost of handling fluid milk in disposable paperboard containers in retail food stores

and (2) to estimate the per unit cost of handling milk in returnable plastic containers using three systems for handling the returned containers.

Background

Until 1950, glass was the basic package for most milk. The reduction in sales of home delivery milk and the increase in supermarket sales of milk reduced the use of glass, since consumers wanted a lighter, unbreakable package.

In the late 1940's consumers were introduced to disposable wax coated paperboard containers. Wax particles were often found in the milk and the outside of the container had a cloudy and unappealing appearance. These problems prompted the development of the polyethylene coated paperboard container. Since its introduction in the early 1960's this container has captured a major portion of the milk packaging market.

The trend in milk sales has been from small to large size containers. The quart, once the most important container for fluid milk, has largely been replaced by the half-gallon and gallon containers. The larger size paperboard containers have a tendency to leak and are oftentimes cumbersome to handle. These problems have accelerated the use of plastics for the larger size fluid milk containers.

The disposable, plastic container is lightweight and more durable than other packaging materials. Plastic containers also allow the milk to be seen and tend to create high impulse appeal. Sales in one-way plastic containers have shown noticeable increase during the past few years. In 1975 total milk sales in plastic containers were ten times higher than the 1964 sales figure when plastic containers were first introduced. In 1975 about 31 percent of the total fluid milk sales were in plastic bottles.

A recent entry into the packaging field has been the returnable plastic container. Experimentation and research into the use of this container started in the early 1960's. It was not until 1965 that permission was granted by the United States Public Health Service to market milk in returnable plastic.

Returnable plastic containers are now being used on both the east and west coasts of the United States and in Canada. The containers have captured between 25 to 40 percent of the display space in supermarkets offering the containers.

The returnable plastic container has several advantages over other packaging materials. For the processor, the plastic container will not break causing expensive delays and problems on filling lines in bottling plants. As a rule, supermarket managers do not like returnable containers, but one that will not break at the checkout area causing an expensive mess and loss of deposit as well as the embarrassment and delay would be a marked improvement over other containers. Consumers like the returnable container because it takes less space in the refrigerator, it is easier to carry, and a child cannot break it.

Methodology

The general procedure used in the analysis was the synthetic cost analysis

technique. It was assumed that a store in a given size group would require the same type dairy case and checkout equipment regardless of the type of container used for fluid milk.

In order to determine the type of equipment, operational procedure, and other characteristics that should be included in the synthetic cost analysis, a survey of retail food stores that are members of national or regional chains in the Knoxville, Tennessee area was conducted.¹ Data were obtained on total floor space, size of dairy case, space allocated to fluid milk, and other physical and operating procedures in the stores.

Survey results indicated a wide variation in store size and operational procedure. In order to account for this variation, three size model stores--small, medium, and large--were developed based on total sales. The dairy operation, operational procedures, and other characteristics of the model stores were developed from results of the survey.

The cost of handling milk in paperboard and returnable plastic containers in each model store was calculated. In order to compare the costs of handling milk in disposable paperboard containers relative to returnable plastic containers, it was assumed that the same volume of milk handled by each size store using disposable containers was also handled using returnable plastic gallon and half-gallon containers. In each case, equipment costs, investment in land and buildings, labor costs, and utility costs attributable to the handling of fluid milk was computed on a quart equivalent bases.

A retail store must have a system for handling all types of returnable containers used in packaging food or beverage. There are three major systems presently in use to facilitate the return

and handling of returnable containers: (1) the honor system, (2) the check-out system, and (3) the service desk.

The honor system assumes that people are honest and will tell the truth about returning the empty containers. Customers return the containers to the store and place them in a designated area. There is no supervision of the returning of containers and no questions are asked when customers state they have returned containers.

The check-out system is similar to the honor system except the customers retain the empty containers in their shopping carts until they are ready to check out. The cashier charges customers for container deposits if they do not have empties to exchange for full ones purchased or returns deposits for any containers in excess of purchases.

The service desk consists of an area or counter where customers take empty containers to receive deposit refunds. The service desk usually provides additional services such as check approval, information, handle complaints, and may sell some specialty items.

The cost of handling milk in returnable plastic containers using each of these three systems was computed for each size model store.

Results

Equipment costs, investment in land and buildings, labor costs, and cost of utilities attributable to the handling of fluid milk in disposable paperboard containers are presented in Table 1. It was found that the cost of handling milk in disposable paperboard containers ranged from 1.15 cents per quart equivalent in the large stores to 1.23 cents per quart equivalent in the small stores.

Part of the variation in cost is attributable to the type of checkout and dairy equipment used in the various size stores. The larger stores generally had the more modern equipment which include several customer conveniences and display advantages. These extras increased the equipment cost associated with handling milk in the larger stores.

Table 2 presents the cost of handling milk in returnable plastic containers using three different systems to facilitate the return and handling of the returnable containers in the store. The cost of handling milk in returnable plastic containers ranged from 2.177 cents per quart equivalent in the small stores to 2.719 cents in the large stores using the Honor System to handle returned bottles. The cost of handling milk in returnable plastic ranged from 2.287 cents in the small size store to 2.824 cents in the large store when the Check-out Method of handling returned containers was employed, and from 2.829 cents to 3.048 cents for the Service Desk Method.

These results indicated that the increase in the cost of handling milk in the returnable plastic containers versus disposable paperboard containers was .948, 1.202, and 1.567 cents per quart equivalent for the small, medium, and large size stores, respectively, assuming the Honor System was used to handle returned containers. Relative costs were found to be higher when the Checkout and Service Desk methods were employed.

Conclusions and Implications

These results indicate an increase in the cost of handling milk when returnable plastic gallon and half-gallon containers were used in the retail store. It is likely that all or part of this increase would be passed on to the consumers in the form of higher milk prices.

Table 1. Summary of the Annual Costs Associated With Handling Milk in Disposable Paperboard Containers for the Three Size Stores

	Size of Store ^a		
	Small	Medium	Large
	--Dollars--		
Investment Outlays			
Building	581.10	998.46	1096.69
Land	14.97	29.01	32.51
Equipment	2742.93	4266.82	4571.43
Total	3359.64	5171.28	5680.67
	--Dollars--		
Annual Operating Costs			
<u>Wages and Salaries</u>			
Full-time	1048.80	1284.66	1316.92
Part-time	547.80	390.04	445.12
Sub-total	1596.60	1674.70	1762.04
Annual Overhead Allowances			
Depreciation--equipment	246.83	384.01	411.43
Depreciation--building	17.43	28.87	32.90
Insurance--equipment	8.23	12.80	13.71
Insurance--building	1.74	2.89	3.29
Repairs and maint.--equipment	54.86	85.34	91.43
Repairs and maint.--building	11.62	19.25	21.93
Interest--equipment	90.52	140.81	150.86
Interest--building	17.88	29.74	33.88
Taxes--equipment	38.29	59.56	63.82
Taxes--building	8.32	13.84	15.76
Sub-total	495.72	777.11	839.01
Utilities			
Electricity	116.73	128.14	140.32
TOTAL--ANNUAL OPERATING COSTS	2209.05	2579.95	2741.47
Per Unit Cost ^b	.01229	.01185	.01152

^aThe size criterion was total sales.

^bPer unit cost based on quart equivalents for each size store.

Table 2. Summary of the Costs Associated With Handling Milk in Returnable Plastic Containers Using Each of the Methods of Handling Returned Containers in Each of the Three Size Stores

Size of Store	Method Used to Handle Returned Bottles	Annual Cost	Per Unit Cost ^a
-----Dollars-----			
Small	Honor System	3913.18	.02177
	Checkout System	4110.78	.02287
	Service Desk	5085.19	.02829
Medium	Honor System	5193.22	.02387
	Checkout System	5558.26	.02555
	Service Desk	6163.12	.02833
Large	Honor System	6470.63	.02719
	Checkout System	6720.48	.02824
	Service Desk	7252.98	.03048

^aPer unit costs are based on quart equivalents for each size model store.

These findings indicate that the honor system would be the best procedure for handling returnable containers in the retail store based entirely on cost. However, stores that are currently using other systems for handling soft drink bottles would likely use that system for returnable milk containers because of the costs and inconvenience involved in changing to another system.

At first thought it would not seem to matter what type of container is used for fluid milk from a retailer point of view. However, using returnable plastic containers require more space in the dairy case than disposable paperboard, requires a system to facilitate the return of the empty containers, and requires additional labor to handle and sort the returned containers. These additional requirements add to the cost of retailing milk and should be taken into account.

Footnote

¹This research was undertaken while the author was in the M.S. program at the University of Tennessee.

A simple demand analysis of the market would indicate a decrease in quantity taken subsequent to a price rise, assuming a relatively inelastic industry demand curve.

Based on the assumptions used in this study, the honor system involves the lowest unit cost of handling returned milk containers in the retail store. The Checkout System was found to be slightly more costly than the Honor System. The Service Desk method was found to be considerable more costly to operate than the other methods.
