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EFFECT of PACKAGING PRODUCE on RETAIL MERCHANDISING EFFICIENCY

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By
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Introduction

Most foods are packaged in some fashion before the customer places it in the shopping cart. This packaging operation is not new, for even in the days of service grocery stores, clerks packaged items for the customer. The growth of widespread packaging of fruits and vegetables in pre-priced containers however, has been a development of the post World War II period.

In Columbus, Ohio, where much of the pioneer work was conducted in the feasibility of prepackaging,[1] there existed in 1960 extreme positions. Some retailers believed that prepackaging all produce items was the most profitable method of merchandising, other retailers felt profits for the produce department would be greater if more emphasis were given to bulk merchandising. Most retailers agreed that exact retail costs are not known for the different methods of merchandising various produce items.

One retail food chain had been merchandising 100 percent of their fruits and vegetables in prepackaged form for some time.[2] Another retail food chain

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[1] Mitchell, Glen H. and Sherman, Ralph W., "History of Prepackaging Fresh Fruits and Vegetables." Dept. Mimeograph Series No. A.E. 254, 1955, Department of Agricultural Economics and Rural Sociology, Ohio Agricultural Experiment Station, Wooster, Ohio. p. 32.

[2] "Prepackaged form" is defined for purposes of this study to include methods of unitizing produce such as banding, bagging, overwrap and traying. Price marking on the merchandise which is also a method of unitizing is not considered as prepackaging. No attempt was made in this study to analyze the effects of different forms of prepackaging (i.e., banding, vs. overwrap vs. bagging.)

had been merchandising approximately 80 percent of its produce in non-prepackaged form. Other chains and stores varied their percentage of prepackaged items between those two extremes. When it is remembered that these wide differences in amounts of prepackaging produce existed within the Columbus, Ohio market at the time of this study it becomes clear that differences of opinion existed concerning the desirability of prepackaging fruits and vegetables.

This project was designed specifically to explore the profitability experienced in three methods of merchandising selected fruits and vegetables at the retail level by measuring the profitability to the retailer under actual operating conditions. This was accomplished by studies to determine the amount of produce department labor required to merchandise produce in the various forms of packaging and bulk slaes. Records of material costs such as films and bags were kept. Price reductions and the effects of waste were also recorded and included in the calculations. By combining the effects of labor requirements, waste, material costs, price reductions and the price of the produce item it is possible to determine which merchandising method will result in higher profits to the retailer under present demand and pricing conditions.

The three merchandising methods examined were these:

1. Prepackage-prepackage sale (P-P). This constitutes the delivery of produce to the retail store and sale to the consumer in previously packaged consumer size units, requiring only the application of a price mark at the retail store.

2. Bulk-prepackage sale (B-P). This is the sale of produce which the retail store buys in a form such that some processing, other than pricing, is required at the store level to put the merchandise in prepackaged form.

3. Bulk-bulk sale (B-B). The retail store buys, displays and sells produce in bulk form. Bulk form includes those methods of merchandising which require the assistance of produce personnel to weigh and price mark a customer purchase, are priced at the checkout, or where the price is marketed directly on the merchandise.

These three merchandising methods; prepackage-prepackage, bulk-prepackage and bulk-bulk are abbreviated to P-P, B-P, and B-B respectively for ease in reading in later parts of this report.

The study was conducted in Columbus, Ohio during the period 1960-61, and consisted of thirty-one separate two-week studies encompassing three retail food chains and eight retail food stores, having sales of $25,000 to $50,000 per week. The measurement of economic efficiency of the three methods of merchandising produce was conducted in two ways. The economic efficiency or profitability to the retailer of any method was measured by a gross margin that was adjusted so that the cost of produce labor attributable to each item, the cost of packaging material used in the retail store, as well as the cost of the produce itself was included in the computation. The "adjusted gross margin" was then expressed as a percentage by first subtracting from actual dollar sales, the cost of the produce item to the store, the cost of labor used in the produce department, and the cost of packaging materials used, and then dividing the resulting figure by the actual dollar sales which is then multiplied by 100 for the adjusted gross margin percentage. The adjusted gross margin is necessary when a comparison is needed among merchandising methods.[3] For example, apples are sold by retailers in three forms: P-P, B-P, and B-B. The calculation of gross margins for each method fails to indicate the true rate of profits for any of the methods. The P-P form of apples does not require packaging materials supplied by the retail store but does require produce labor to display, price and service the apples. The B-P form requires more in-store labor than the P-P form since the packaging operation is conducted at the retail level. Packaging

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[3] Traditionally the gross margin percentage when computed by item is estimated by subtracting from selling price the cost of the item to the retail store and then dividing by the selling price and finally multiplying by 100. Example: An item which the retail store pays 50¢ and sells for $1 would have a gross margin percentage of 50%.

materials are required in this form of merchandising and these costs must be included. The B-B form requires labor for displaying the produce and also for servicing the needs of individual customers. Material costs in the form of paper bags must also be included in this form of merchandising. Complicating the determination of the most profitable merchandising method are the physical losses of produce, which vary among merchandising methods. The adjusted gross concept includes the costs of labor, packaging, as well as the physical losses and thus reflects the profitability or retail efficiency of merchandising any selected produce item for any of the three methods.

With any pricing policy and demand for a particulrr produce item, it may be stated that the merchandising method that results in the highest adjusted gross margin is the method that is most profitable to the retailer under short-run conditions.

The other measurement of economic efficiency was based on long-run considerations. It was assumed that the publication of the "adjusted gross margins" for various methods of merchandising selected produce items would result in increased competition among retailers and suppliers of produce, as they emphasize that method with the highest adjusted gross margin. It was also assumed that the packaging operation conducted at the store was less efficient than the same operation conducted at a central or grower location. With the assumption of increased competition and economies of scale it was possible to make long-run projections describing the methods that would prevail in merchandising selected fruits and vegetables once the comparative efficiencies are known. The merchandising method that resulted in the smallest "spread" or difference between the traditional computation of gross margin percentage and the "adjusted gross margin percentage" is the method that could be expected to prevail in the long-run. This reasoning is based upon the economic phenomenon that increased competition among firms in the marketing channels will, in the long-run, result

in reduced margins to the firms and lower prices to the consumer if it can be assumed that consumers will purchase the same total volume of a produce item regardless of the form in which the item was merchandised. It has been proposed that further research be conducted to explore in some detail this assumption.

Increased competition, with its associated lower margins, will force retailers in the long-run to eliminate all but the most efficient method, and if it may be assumed that the packaging operation is conducted more efficiently at a central location, then that method with the lowest "spread" between gross margin and the "adjusted gross margin" will dominate marketing in the long-run. Variance analysis was used to determine whether or not the differences among gross margins were significant or merely due to chance.

Results

Conclusions from analysis of the data collected during the two year study were that retailers in the Columbus, Ohio (or other areas with similar economic conditions) will find increased short-run profits resulting from merchandising selected fruits and vegetables in the forms listed in Table 1.

Table 1
Adjusted Gross Margins and
Recommended Retail Merchandising Methods for
Selected Fruits and Vegetables

Item	Recommended Method+	Adjusted Gross Margin (In percent)
Bananas	Band in the Store	27.2
Sweet Corn	Bulk Sales	26.4
Grapefruit	Bulk Sales	35.4
Grapes	Bulk Sales	27.7
Onions, Dry	Buy Prepackaged	44.7
Oranges	Either Bulk or Buy Prepackaged	30.4*
Tomatoes	Buy Prepackaged	32.1
Apples	Either Bulk or Buy Prepackaged	29.0*

+ Recommended on basis of profitability to store
* Average of two methods

The adjusted gross margins for cauliflower, celery, lemons, pears, peaches and potatoes show no significant differences at the 75 percent confidence level among the various merchandising methods.

The calculation of the traditional gross margin is a simple task, easily conducted by retailers (see footnote on page 3). This study has shown that the combined effects of physical losses, reductions in selling price, cost of direct labor and material costs often result in "adjusted gross margins" quite different from the traditional gross margin percentage. Table 2 lists the differences or spreads, observed for the various study items and methods. The retailer by calculating his gross margin and then subtracting the appropriate "spread", will have an estimate of his "adjusted gross margin."

Table 2
Spreads Between Gross Margins and Adjusted Gross Margins
for Selected Fruits and Vegetables
(In Percent)

Item and Method	Spread	Item and Method	Spread
Apples		Lemons	
B-B	7.66	B-B	3.37
B-P	9.10	B-P	4.75
P-P	3.16	Lettuce, Head	
Bananas		B-P	15.62
B-B	9.98	Onions, Dry	
B-P	8.96	B-B	18.48
Cabbage		B-P	14.31
B-P	11.45	P-P	2.38
Carrots		Oranges	
P-P	2.18	B-B	7.67
Cauliflower		B-P	8.57
B-P	15.99	P-P	2.74
P-P	24.42	Pears	
Celery		B-B	19.81
B-B	8.76	B-P	9.24
B-P	12.07	Peaches	
Corn		B-B	14.98
B-B	7.79	B-P	16.65
B-P	22.32	Potatoes	
Grapefruit		B-B	8.36
B-B	9.18	B-P	11.84
B-P	12.45	P-P	2.37
P-P	2.33	Strawberries	
Grapes		P-P	2.15
B-B	14.15		
B-P	19.32		

The forms of prepackaging listed in Table 2 for the B-P method were as follows: Apples, mostly bag; Cabbage, bag; Cauliflower, bag; Celery, bag; Corn, tray; Grapefruit, bag; Grapes, tray; Lemons, mostly bag; Onions, bag; Pears, tray; Peaches, tray and four pound basket; Potatoes, bag. The effects of labor, material costs and physical losses are combined in the "spread". The effect of labor, material costs or physical losses alone are not reported here, but will be the basis for another publication.

As explained previously, in the long-run it is believed that the method with the lowest spread between gross margin and adjusted gross margin will dominate other merchandising methods because of increased competition among retailers and suppliers of produce. Table 3 summarizes these long-run projections.

Table 3

Predictions of Methods of Merchandising
Which Will Prevail in the Long-Run
for Selected Fruits and Vegetables

Item	Method
Bananas	Band in the Store
Sweet Corn	Bulk Sales
Grapefruit	Buy Prepackaged
Grapes	Bulk Sale
Onions, Dry	Buy Prepackaged
Oranges	Buy Prepackaged
Apples	Either Bulk Sale or Buy Prepackaged
Pears	Packaged in the Store
Potatoes	Buy Prepackaged

Retailers were found to be generally unknowledgeable concerning the physical losses encountered in the merchandising of produce items. Table 4 lists those physical losses by merchandising method and produce item.

Table 4

Physical Losses for Selected

Produce Items[1]

Item and Method	Physical Losses in Percent of Weight	Item and Method	Physical Losses in Percent of Weight
Apples		Lemons	
B-B	4.87	B-B	2.78
B-P	2.96	B-P	.53
P-P	1.81	Lettuce, Head	
Bananas		B-P	33.62*
B-B	2.64	Onions, Dry	
B-P	2.06	B-B	9.24
Cabbage		B-P	1.90
B-P	19.46*	P-P	1.23
Carrots		Oranges	
P-P	.23	B-B	7.26
Cauliflower		B-P	2.43
B-P	40.81*	P-P	1.69
P-P	11.37	Pears	
Celery		B-B	6.75
B-B	13.71*	B-P	.54
B-P	11.88*	Peaches	
Corn		B-B	7.96
B-B	18.71	B-P	6.74
B-P	32.35*	Potatoes	
Grapefruit		B-B	1.62
B-B	9.23	B-P	1.57
B-P	2.42	P-P	.12
P-P	2.80	Strawberries	
Grapes		P-P	2.05
B-B	10.22		
B-P	6.21		

* Includes Trim Wastage

[1] The nine fruits and eight vegetables listed in this table represented approximately 80% of produce sales in the department studied.

This study leads to the conclusion that no particular merchandising method is inherently superior to other methods for all items, and retailers will find that their greatest profits will come from a mixture of all three methods; i.e. certain produce items should be merchandised in the P-P form, others in the B-P or B-B form for the greatest short-run profits. The detailed recommendations

for merchandising listed in Tables 1-4 are based on conditions as they existed in Columbus, Ohio, during the period 1960-61, and so the findings must not be extrapolated to vastly different situations.

The most efficient method for merchandising selected fruits and vegetables have been listed, but the individual retail store will find total produce profits increased only if the management function is conducted efficiently so that a combination of merchandising methods is possible without wasted effort on the part of produce personnel. In retail stores selling over $30,000 per week, the produce staff is generally of such a size as to permit sale of produce in all three methods without wastage of produce labor, if management makes efficient use of that labor.

The detailed methodology used in this study is contained within a doctoral dissertation titled Effects of Packaging Selected Fruits and Vegetables on Efficiency of Retail Merchadising by James G. Kendrick, The Ohio State University, 1962.