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Factors Affecting Costs of Wholesale Distribution of FROZEN FOODS

Marketing Research Report No. 327

U. S. DEPARTMENT OF AGRICULTURE
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Marketing Research Division

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HIGHLIGHTS

Major Cost Components.--During 1956 and 1957, the cost of the frozen food sold accounted for 85 cents of the wholesale distributor's sales dollar received for frozen food. His operating expenses, plus net profit or loss, made up the remaining 15 cents. Labor costs accounted for half of the distributor's operating costs.

Importance of Operating Costs.--An \$80 reduction in operating costs was equivalent to the net returns from \$10,000 in sales computed on the basis of the average net profits of distributors, before taxes, for 1956 and 1957.

Variation in Operating Costs.--Operating costs per dollar of sales for the high-cost firms were as much as double those of the low-cost firms reporting.

Reasons for the Variation in Operating Costs.--Approximately two-thirds of the cost variation between individual firms could be explained by differences in 3 factors: (1) Size of order, (2) man-hours required per \$100 of sales, and (3) average hourly wage rates.

Inventory and Extended Credit.--The study indicated that some distributors could operate on less than half their present capital requirements if inventory and extended credit were in line with those of other distributors. There was considerable variation in the inventory levels and the average collection periods for the firms reporting. The size of inventory and the amount of credit extended to customers are important profit considerations for management.

The cooperating distributors reported that for each \$10 in quarterly sales, the average investment was \$3.19 in inventory and \$1.86 in extended credit.

Services Provided Customers.--The amount of service provided customers was an important factor affecting operating costs. It was closely related to the type of customer served. This was reflected by the differences in average sizes of orders and in operating costs for the sales made to (1) independent retail stores (mostly small stores), (2) chain stores (mostly supermarkets), and (3) restaurants and other institutions.

Effect of Geographical Location Upon Operating Costs.--The study included firms located predominantly east of the Mississippi. There was no significant difference in operating costs between the distributors located in the North and South.

The importance of (1) size of order, (2) man-hours per \$100 of sales, and (3) average hourly wage rates outweighed any differences in operating costs arising from geographical location.

Effect of Size of Firm Upon Operating Costs.--Medium-sized firms with yearly sales between \$1 million and \$2 million achieved sufficient economies of operation to be competitive with the larger scale operators.

Seasonal Characteristics.--The second quarters of both 1956 and 1957 showed the largest volume of sales and the highest percentage of net profits each year. However, the net profit pattern could not be explained by volume of sales alone or pattern of sales by type of products sold.

Labor Costs.--The study showed that in many cases higher wage rates were not offset by greater labor efficiency. Labor costs make up half of a distributor's total operating cost. Efficient use of labor is an important management consideration.

Implications to Individual Firms.--A comparison of costs among distributors for each function or expense category enables individual firms to pinpoint their areas of strength and weakness. If cost comparisons between firms are to be meaningful, operating expenses must be allocated on a uniform basis from firm to firm. The usefulness of such comparisons can be enhanced by grouping firms according to the predominant type of customer; that is, (1) the smaller independent retail stores, (2) independent and chain supermarkets, and (3) restaurants and other institutions. Two firms that are twins, as far as volume of sales and type of customers are concerned, may benefit considerably by comparing costs for each operation, even though both firms may be better-than-average operators. The potential savings in operating costs from such comparisons could exceed the net profits currently realized during any one quarter of the year.

Implications to the Industry.--The analysis of the cost information reveals that there is considerable variation in operating costs between firms supplying different types of customers. If an overall industry average were used as a gross profit ceiling during a national emergency, certain firms could become bankrupt if they did not eliminate some of the services they are now providing, while others would realize excessive profits.

The management guides developed from the uniform cost accounting data furnish each individual distributor with a scorecard showing his cost position relative to other distributors for each specific function or expense category. This scorecard signals to management the areas where efforts should be directed toward reducing operating costs. Aided by this management guide, each distributor must work out his own destiny within the framework of (1) type of customers served, (2) market locality and available plant facilities, (3) competitive position, (4) local labor supply, and (5) bargaining ability in buying and selling frozen foods.

FACTORS AFFECTING COSTS OF WHOLESALE DISTRIBUTION OF FROZEN FOODS

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INTRODUCTION

Frozen food marketing is in the midst of a revolution. Every segment of the industry is adjusting to the requirements of mass production and mass marketing. Retailers, distributors, wholesalers, food brokers, warehousemen, packers, and producers are being forced to adjust to the needs of a large-volume, low-margin economy. To top all this, wage rates are rising, and capital at times is difficult to obtain while growth in the frozen food industry calls for bigger investments. This is the present business climate.

The challenge of rising marketing costs can be met with increased productivity. As a basis for increasing productivity, the services performed for different types of customers must be related to the costs involved. This requires accurate information on operating costs and a uniform system for allocating these costs to the services performed. ^{1/} Such data make it possible to reflect changes in the marketing system. Operating cost information helps management to be flexible in periods of rapid change. It is a major guide for increasing efficiency in frozen food distribution.

Detailed information about costs of distributing frozen foods has not been available to guide the industry. Increasing the efficiency of frozen food distribution is part of the overall job of improving the marketing of agricultural products. Studies to improve distribution efficiency are part of the research authorized under the Research and Marketing Act of 1946, "relating to the improvement of the quality of, and the development of new and improved methods of . . . marketing, distribution . . . of plant and animal commodities at all stages from the original producer through to the ultimate consumer."

Most wholesale frozen food distributors are relatively small business operators with annual sales usually falling between \$500,000 and \$5 million. The 1954 Census reported 610 distributors with total sales amounting to \$455,882,000. ^{2/} Frozen food distributors represent an essential link in the low-temperature food marketing chain between the local distribution warehouses and the retail stores and institutional outlets. They perform an educational

^{1/}The term "cost" has been used in preference to "expense." No attempt has been made to distinguish between the two terms.

^{2/}U. S. Bureau of the Census, 1954. Wholesale Trade Warehouse and Cold Storage Space. Bul. W-2-5, table 5-A, Census of Business.

and promotional role in the development of the industry, as well as their primary function of distributing frozen foods under refrigeration. They service three distinct types of customers: (1) The smaller independent retail stores; (2) the supermarkets, both chain and independent; and (3) the institutional outlets, such as restaurants and hotels. The smaller independent retail stores are the distributors' largest customer, followed by the restaurants and the supermarkets, respectively.

Efficiency in frozen food distribution affects both the growth of the frozen food outlet for agricultural products and the prices which the consumer must pay.

This study was undertaken to determine:

1. Operating cost information for each specific function of wholesale frozen food distribution, for firms of different sizes and geographical locations.
2. The factors affecting operational efficiency in frozen food distribution.

Cost information and comparisons between firms have more meaning when these data are reported on a uniform basis. To obtain comparable cost information, an accounting firm was employed to develop uniform accounting procedures and to collect the data. Details of this study were developed in cooperation with the National Frozen Food Distributors Association. The cooperating firms adjusted their records to conform with the uniform accounting procedures. Cost information was reported on a quarterly basis. The contract with the accounting firm called for a minimum of 20 frozen food distributors supplying data for 4 consecutive quarters during the 2-year period of the study. This was essential to obtain information about the seasonal characteristics of frozen food distribution.

A total of 44 firms participated during the 2-year study, and 26 firms supplied the minimum of 4 consecutive quarterly reports. Most of these firms were located east of the Mississippi River, and they were about equally distributed between the North and South.

Only those firms having 85 percent or more of their total sales in frozen foods or firms maintaining separate accounting systems for their frozen food departments were considered eligible as cooperators. The firms ranged in size from \$200,000 to over \$5 million in annual frozen food sales. All major geographical regions in the country were represented. Within this framework, the cooperating firms appear to be typical of the industry with respect to size of operation and geographical location.

There appear to be three basic requirements for success of this type of study:

1. Industry cooperation in supplying cost information to a central office on a strictly confidential basis.

2. A uniform accounting system to insure comparability in reporting operating costs.
3. Analysis of the data, with reports sent back to the cooperating firms on a current basis.

Before any data were collected, an industry advisory committee was organized to review the proposed plan of work and to assume responsibility for industry cooperation. Concealing the identity of every individual firm is helpful in obtaining industry cooperation. Each firm in this study received a code number and it submitted reports without other identification. The individual firm's code number was known only to the accounting firm. The quarterly analysis was prepared on the basis of code number and was returned to the accounting firm for distribution to the cooperators. The practice of returning quarterly cost comparisons to the participating members encouraged cooperation among firms in the industry. Quarterly reports also made it possible to obtain suggestions and comments for improving the usefulness and accuracy of the analyses before the study was completed.

To achieve greater operational efficiency by either increased services at the same cost, or the same services at reduced cost, management can be aided by first knowing what its operating costs are for each service or operation. If operating costs are to be reduced, it is helpful to know where they are high. On the other hand, excessively low costs might indicate inadequate service to customers and hence a possible loss of sales. In order to know what costs are too high or too low, it is helpful to compare the cost of each operation with that of other firms in the industry. ^{3/} From the uniform accounting data, it was possible to develop a system for signaling to each firm where its costs appeared high or low in relation to those of other firms. ^{4/}

It is recognized that not all the factors necessary to a successful business operation can be measured by operating costs alone. However, under the usual competitive situation confronting the frozen food distributor, the more efficient firm with lower operating costs for any given combination of services is more likely to succeed.

^{3/} See appendix, pp. 50-52, for the uniform accounting schedules used for reporting sales and costs by major expense categories. The same number of firms does not appear in all of the charts. This arises from the fact that some of the firms, even though they met the minimum requirements called for in the reporting schedules, were unable to supply details for each specific item of information.

^{4/} For a preliminary description of how this system operates, see "A Traffic Signal System for Costs," by H. Wayne Bitting, 1957 Frozen Food Factbook and Directory, p. 25, National Frozen Food Distributors Association, New York, N. Y. Also, see "Exchange of Comparable Cost Information Will Keep Packers Flying Right," by H. Wayne Bitting, The National Provisioner, pp. 81-83, May 25, 1957.

FINDINGS

What Are Major Cost Components of Frozen Food Distributor's Sales Dollar?

There are two major categories of cost for the frozen food distributor: The cost of the frozen foods sold, and his operating expenses. The distributor's margin, $\frac{5}{100}$ on the average, amounts to around 15 cents of his sales dollar. This represents his operating expenses plus his net profit or loss (fig. 1). The cost of the frozen food which he sells accounts for around 85 cents of the sales dollar.

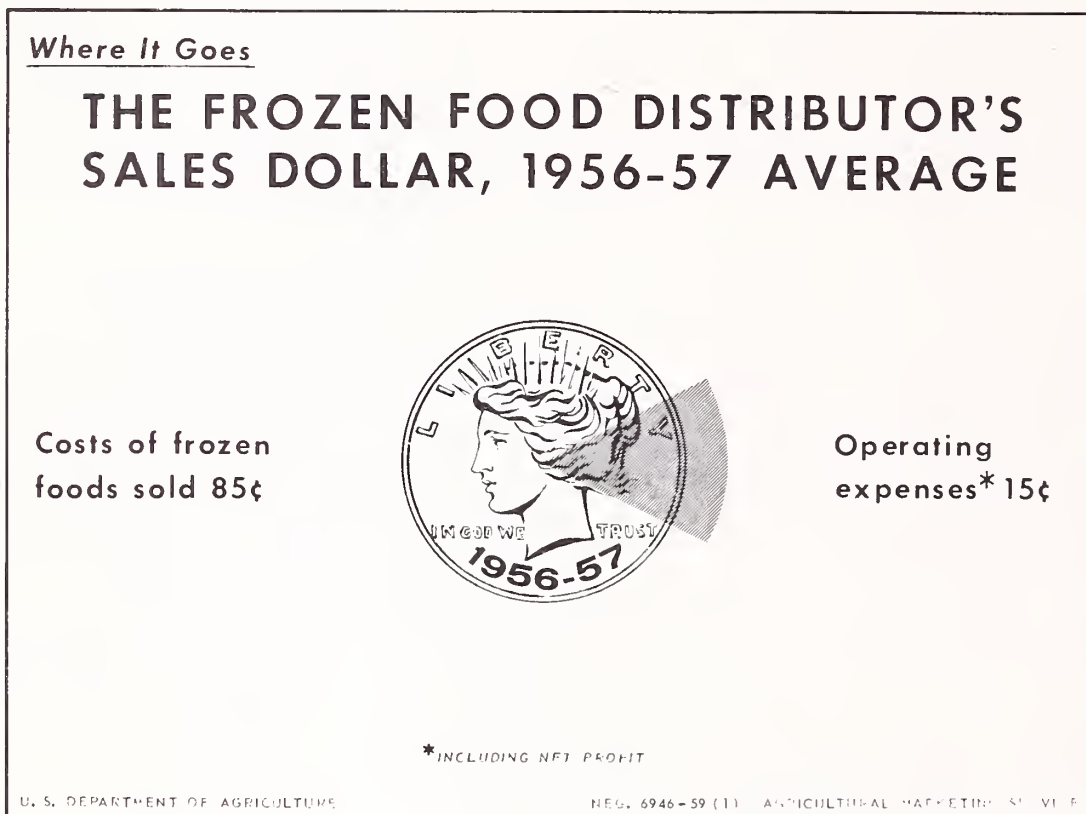


Figure 1

A comparison of net sales, gross profits, and operating costs, by quarters, is shown in table 1. Total operating costs have been broken into the major categories and expressed as percentages of net sales. The variation in number of firms reporting in various quarters somewhat limits the usefulness of these data. However, the fluctuation in number of firms reporting has not affected quarterly trends in operating expenses as determined by a comparison with the average costs of the firms reporting during the entire period.

$\frac{5}{100}$ The frozen food distributor's margin represents the difference between the cost of the frozen foods sold and the net sales return. This margin is expressed as a percentage of net sales. Similarly, the major operating expense items, or functions, are expressed as percentages of net sales, as in the net income from operations (net profit).

Table 1.--Frozen food distributors: Number reporting, net sales, gross profit, and operating expenses, by quarters, 1956 and 1957

Items	Quarters				Average
	First	Second	Third	Fourth	
1956					
Number of firms reporting-----:	23	25	26	28	26
Average net sales (1,000 dol.):	\$426	\$459	\$423	\$393	\$425
Cost of sales ^{1/} (percent)-----:	85.7	84.9	85.1	85.1	85.2
Gross profit ^{1/} (percent)-----:	14.3	15.1	14.9	14.9	14.8
<u>Operating expenses ^{1/}</u>	<u>Percent</u>	<u>Percent</u>	<u>Percent</u>	<u>Percent</u>	<u>Percent</u>
General and administrative-----:	3.5	3.6	3.7	4.0	3.7
Storage-----:	1.2	1.1	1.3	1.2	1.2
Order assembly-----:	1.4	1.3	1.4	1.5	1.4
Delivery-----:	2.8	3.3	3.6	3.8	3.3
Selling-----:	3.3	3.6	3.8	4.0	3.7
Occupancy-----:	0.9	0.9	0.8	0.9	0.9
Total operating expenses-----:	13.1	13.8	14.6	15.4	14.2
Net income from operations ^{1/} -----:	1.2	1.3	0.3	-0.5	0.6
1957					
Number of firms reporting-----:	29	23	20	17	22
Average net sales (1,000 dol.):	\$430	\$451	\$437	\$467	\$446
Cost of sales ^{1/} (percent)-----:	85.3	84.6	84.6	84.1	84.6
Gross profit ^{1/} (percent)-----:	14.7	15.4	15.4	15.9	15.4
<u>Operating expenses ^{1/}</u>	<u>Percent</u>	<u>Percent</u>	<u>Percent</u>	<u>Percent</u>	<u>Percent</u>
General and administrative-----:	3.9	3.5	3.8	4.2	3.8
Storage-----:	1.1	1.0	1.2	1.1	1.1
Order assembly-----:	1.4	1.5	1.5	1.6	1.5
Delivery-----:	3.3	3.1	3.0	2.9	3.1
Selling-----:	3.6	3.6	3.8	4.0	3.8
Occupancy-----:	0.9	0.9	1.0	1.2	1.0
Total operating expenses-----:	14.2	13.6	14.3	15.0	14.3
Net income from operations ^{1/} -----:	0.5	1.8	1.1	0.9	1.1

^{1/} Expressed as a percentage of net sales.

How Important Are Operating Costs?

The importance of operating costs to frozen food distributors may be illustrated by these figures: Average net profit before taxes from each \$10,000 of sales in 1956 and 1957 was \$80, so a reduction in operating costs by \$80 was equal to the profit from \$10,000 of sales (table 2).

Table 2.--Net profit and number of firms reporting, by quarters, 1956-57

Quarter	1956		1957		2-year average	
	Firms	Net profit	Firms	Net profit	Firms	Net profit
	Number	Percent	Number	Percent	Number	Percent
First-----	23	1.2	29	0.5	26	0.8
Second-----	25	1.3	23	1.8	24	1.6
Third-----	26	0.3	20	1.1	23	0.7
Fourth-----	28	-0.5	17	0.9	22.5	0.2
Average-----	25.5	0.6	22.3	1.1	23.9	0.8

It required \$1 of sales, on the average, to obtain a net profit of 0.8 cent. ^{6/} In contrast, every dollar reduction in operating costs affords distributors an opportunity to add the full amount to profits, if competition permits, or to pass it on in the form of lower selling prices, thereby aiding the expansion of frozen food sales.

How Much Variation Is There in Operating Costs?

Operating costs per dollar of sales for the high-cost firms were double those of the low-cost firms reporting during 1956 and 1957 (table 3). This pattern held consistently for each of the 8 quarters.

^{6/} Assuming a company with a given fixed cost structure, the additional sales may very well provide a higher than average profit percentage, but this would entail a more intensive type of analysis.

Table 3.--Wholesale frozen food distributors' total operating expenses per dollar of sales, 1956-57

Quarter	1956			1957		
	Average	Range		Average	Range	
		High	Low		High	Low
	Cents	Cents	Cents	Cents	Cents	Cents
First-----	13.0	15.9	7.6	13.8	17.7	8.1
Second-----	13.2	16.8	7.1	13.4	19.2	6.3
Third-----	14.1	18.6	8.5	14.0	17.9	8.1
Fourth-----	15.0	20.7	9.7	14.3	18.8	8.8
Average-----	13.8	18.0	8.2	13.9	18.4	7.8

Note: The 16 firms represented in the above table reported for entire period.

Why Do Operating Costs Vary?

Experience of 2 years under the uniform accounting program indicates that there are at least 5 major factors affecting operating costs and profits in frozen food distribution. These 5 factors are:

1. Average size of orders.
2. Labor productivity in terms of man-hours per \$100 of sales.
3. Average hourly wage rates.
4. Efficiency in use of working capital as measured by
(a) inventory levels and (b) amount of credit extended.
5. Services provided.

The first 3 of the 5 factors named--average size of order, man-hours per \$100 of sales, and average hourly wage rates--explain about 2/3 of the cost variation among individual firms. ^{7/} The formula setting forth the relationship between operating costs and the 3 factors--average size of order, man-hours per \$100 of sales, and average hourly wage rates--is based upon the average of the first, second, and third quarters of 1957, and is as follows:

^{7/} The amount of services rendered obviously affects operating costs. Although the accounting data do not provide a quantitative measurement of services rendered, the number of man-hours required per \$100 of sales does reflect some of the variations in the amount of services.

Total operating costs in cents per dollar of sales = 8.5 cents + 1.36 times the man-hours per \$100 of sales - 0.047 times the average size of order in dollars + 1.18 times the average hourly wage rates. 8/

For example, the firm that has an average of 3 man-hours per \$100 of sales, pays an average of \$2 per hour in wages, and has an average order of \$40 would have a calculated operating cost of 13.06 cents per dollar of sales ($X_1 = 8.5 + 1.36 (3.0) - 0.047 (40.00) + 1.18 (2.00)$ or 13.06 cents).

In effect, this relationship indicates that a firm wishing to offset a wage rate \$1 an hour higher than that of another firm must either have orders which average about \$21 higher than those of its competitor, or use almost an hour (0.87 hour) less of labor for each \$100 of sales, or must develop some combination of the two. 9/ The records show that any one of these changes is possible.

Table 4 shows the individual firm combinations for the third quarter of 1957. It also illustrates the effect on operating costs which the 3 items-- (1) variation in man-hours per \$100 of sales, (2) average size of order, and (3) hourly wage rates--have on each of the firms reporting. Where man-hours per \$100 of sales are less than the average of 3.78 man-hours, the operating costs of that particular firm would tend to be less than the group average. This is indicated by a minus sign in the column headed "Effect on costs." Where the individual firm's man-hours exceed the 3.78 average, its costs tend to be greater than the average and this effect is shown with a plus sign. Similarly, the effects of average size of order and average hourly wage rates are shown for each firm in its respective columns. The last 2 columns of table 4 show the operating costs as calculated from (1) man-hours, (2) average size of order, and (3) average hourly wage rates, in comparison with the actual costs reported. Approximately 2/3 of the variation in operating costs between firms is associated with the variation in these 3 factors ($R_{1.234} = .80$ for the third quarter of 1957). 10/ This relationship was typical of the other quarters during the 2-year study.

8/ See appendix, tables 14 and 15, for the development of this estimating formula.

9/ Price changes in frozen foods affect the physical quantities required to yield a given dollar size of order. It is conceivable that an increase in frozen food prices might increase the average dollar value per order and also decrease the man-hours required per \$100 of sales. Also, a different combination of products could achieve the same result. On the basis of information at hand, neither of these factors appears to explain any of the variation in operating costs among individual firms.

10/ The remaining 1/3 of the variation in operating costs between firms which was unexplained may be attributable to a number of factors, such as the happenstance of a cheap location, a concentrated market, availability of labor, differences in managerial ability, and a host of other factors not subject to measurement from the accounting records. See appendix, table 16, for test of the significance of the factors affecting operating costs.

Table 4.--Effect of man-hours per \$100 of sales, average size of order, and average hourly wage rate upon the individual frozen food distributor's operating costs in cents per dollar of sales, in relation to the average for the group, third quarter of 1957

Firms	Man-hours per	Average size	Average hourly	Operating				
	\$100 of sales	of order	wage rate	costs per dollar of sales				
	: Effect	: Effect	: Effect	Calcu-	Actual			
	Hours : on costs	Dollars : on costs	Dollars : on costs	lated :				
1-----	2.18	-2.18	81.98	-1.88	1.87	-0.20	9.8	8.1
2-----	2.19	-2.17	59.77	-0.83	2.15	+0.13	11.2	9.9
3-----	2.56	-1.66	88.29	-2.17	2.03	-0.01	10.2	10.7
4-----	2.53	-1.70	79.08	-1.74	2.94	+1.06	11.7	11.5
5-----	4.00	+0.30	33.75	+0.39	1.64	-0.47	14.3	12.6
6-----	3.14	-0.87	75.33	-1.57	2.13	+0.11	11.7	13.0
7-----	3.05	-0.99	49.42	-0.35	2.41	+0.44	13.2	13.0
8-----	3.10	-0.92	49.41	-0.35	2.19	+0.18	13.0	13.2
9-----	3.16	-0.84	33.79	+0.39	2.37	+0.39	14.0	13.6
10-----	4.60	+1.12	25.39	+0.78	1.20	-0.99	15.0	13.9
11-----	4.04	+0.36	33.81	+0.39	1.75	-0.34	14.5	13.9
12-----	3.28	-0.68	69.98	-1.31	2.20	+0.19	12.3	14.2
13-----	3.35	-0.59	33.09	+0.42	2.37	+0.39	14.3	14.4
14-----	4.60	+1.11	16.02	+1.22	1.91	-0.15	16.3	14.6
15-----	1.60	-2.96	18.52	+1.10	3.85	+2.14	14.3	15.2
16-----	3.50	-0.39	27.03	+0.70	2.36	+0.38	14.8	15.9
17-----	4.82	+1.42	30.36	+0.55	1.52	-0.61	15.4	16.5
18-----	5.81	+2.76	39.55	+0.12	1.40	-0.76	16.2	16.7
19-----	3.33	-0.61	20.49	+1.01	1.47	-0.67	13.8	17.0
20-----	5.96	+2.97	19.97	+1.04	1.21	-0.98	17.1	17.1
21-----	5.54	+2.39	21.39	+0.97	2.28	+0.28	17.7	17.3
22-----	6.01	+3.03	21.64	+0.96	2.02	-0.02	18.0	17.5
23-----	4.14	+0.48	48.38	-0.30	2.21	+0.20	14.5	17.9
24-----	4.15	+0.51	32.17	+0.46	1.42	-0.73	14.3	18.7
Average----	3.78	--	42.03	--	2.04	--	<u>1/14.1</u>	<u>1/14.4</u>

1/ The calculated average operating cost for the 24 firms reporting was 14.1 cents per dollar of sales, whereas the average operating cost reported was 14.4 cents. This apparent discrepancy arises from the fact that the estimating formula represents an average of the first, second, and third quarters of 1957. If the third quarter estimating formula had been used, the average calculated operating cost would have been 14.4 cents per dollar of sales.

Firm 8 in table 4 may be used to illustrate the effect which the 3 factors have upon an individual firm's operating costs in relation to the group average. In the case of man-hours per \$100 of sales, firm 8 had 3.10 man-hours. The average for the 24 firms reporting was 3.78 hours. Hence, firm 8 required 0.68 man-hour less than the average. According to the formula, each man-hour contributes 1.36 cents to the total operating costs per dollar of sales. Therefore, firm 8 had a cost advantage of 0.92 cent per dollar of sales (0.68 x 1.36 cents) over the average firm. Since this was a reduction in total operating costs from the 14.1 cents (calculated group average) it was shown as -0.92 cent under the column entitled "Effect on costs."

Similarly, firm 8 was above average with respect to size of orders. The average size of order for all firms reporting was \$42.03, compared with \$49.41 for firm 8. According to the formula for estimating total operating costs, each \$1 increase in average size of order reduces operating costs 0.047 cent per dollar of sales. Firm 8's average size of order was \$7.38 higher than the group average. This gave firm 8 a 0.35-cent cost advantage (\$7.38 x 0.047) over the calculated group average of 14.1 cents per dollar of sales. This was shown as -0.35 cent under the appropriate column, "Effect on costs."

Firm 8 paid \$2.19 an hour for labor. This was higher than the group average hourly wage rate of \$2.04. According to the estimating formula, each dollar increase in hourly wages increases total operating costs 1.18 cents per dollar of sales. Firm 8 paid 15 cents more (\$2.19 - \$2.04) per hour for labor than the group average. This increased firm 8's total operating costs per dollar of sales by 0.18 cent (\$0.15 x 1.18) above the average. The wage rate effect is shown as +0.18 cent under the column "Effect on costs."

Firm 8's advantages and disadvantages can be summarized as follows:

Firm 8	Effect on total operating costs per dollar of sales
	Cents
Man-hours per \$100 of sales-----	-0.92
Average size of order-----	-0.35
Average hourly wage rate-----	+0.18
Total-----	-1.09

Since the calculated average operating cost per dollar of sales shown in table 4 was 14.1 cents per dollar of sales, firm 8's cost would be 13.0 cents (14.1 - 1.09). Firm 8's reported cost for the third quarter of 1957 was 13.2 cents per dollar of sales. The calculated and reported (actual) costs are shown in the last 2 columns of table 4, respectively. Similar calculations are included in table 4 for each firm reporting its third-quarter operations.

Firm 19 in table 4 may be used to illustrate a situation in which the estimated costs (13.8) were considerably below the firm's actual costs per dollar of sales (17.0). This enables a manager to spot immediately a situation where he may be providing additional services to his customers which the other firms are not providing. As discussed later, such a situation could exist if this firm's customers were predominantly restaurants where frequent deliveries of small orders were required. In addition, it might be that the plant layout was poor or that management was not doing as good a job as it should. In any event, these possibilities can be reviewed by management and the specific operations or expense categories located which are responsible for the high operating costs.

From these calculations, management should be able to locate the areas and the extent of its strength and weaknesses. A more detailed approach is presented later, under the sections entitled "Cost Signals for Management" and "Comparisons Between Individual Firms."

Inventory and Extended Credit

The size of inventory and the amount of credit extended to customers have a major influence on net profits. The money invested in inventory and extended credit is not directly reflected in the operating costs, because interest expenses were excluded from operating expenses. ^{11/} For this reason, inventory level and extended credit were not used in the equation for estimating operating costs. However, both inventory level and extended credit do affect the net profit on the owner's invested capital, which is an important measure of success.

The money invested by frozen food distributors in the frozen food products they sell accounts for around 85 cents of each sales dollar. How well this part of the investment is managed is extremely important. An indication of how that investment affects management's return on that part of its invested capital is the turnover record. The average number of days required for collection and the number of days' sales tied up in inventory determine the investment turnover record for the money invested in frozen foods. If the net profit from sales averages only 0.8 cent on each sales dollar (as it did for the average of 8 quarters in 1956 and 1957), the distributor still may be netting 8 percent if he turns each dollar invested in frozen foods 10 times during the year.

Figure 2 illustrates the inventory levels and the amount of extended credit for the firms reporting the third quarter of 1957.

^{11/} The usual accounting procedure is to exclude imputed interest for those firms using their savings as operating capital. To make operating costs comparable between these firms and those borrowing money, interest expenses were excluded from operating expenses and were not reported.

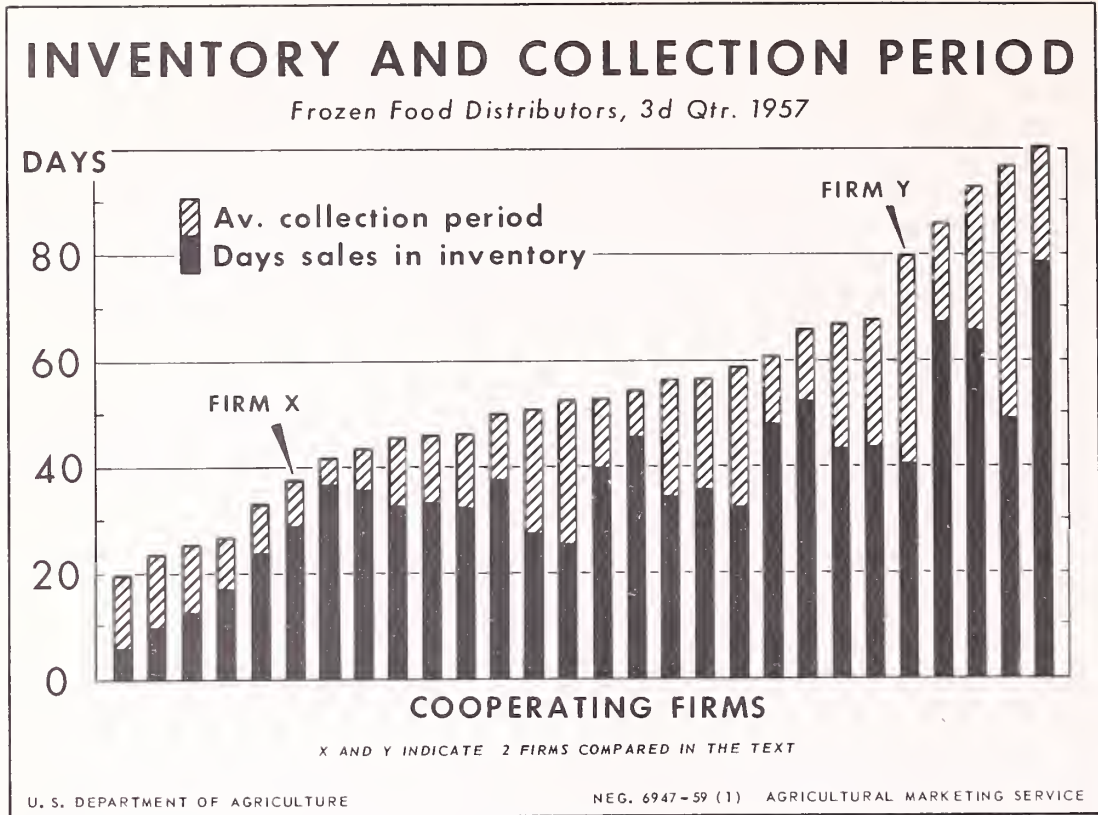


Figure 2

This chart (fig. 2) shows a wide range among the firms in both sizes of inventories and average collection periods. Even disregarding the firms with the lowest and highest number of days' sales tied up in both inventory and average collection periods, the high firms still had three times as much inventory and extended credit as the low firms. It is apparent from the accounting records that some firms are able to do as much business on \$75,000 of invested capital as other firms are doing on \$225,000.

For example, firm X in figure 2 has 38 days of sales tied up in inventory and extended credit. This means that firm X is turning its dollar invested in frozen foods 9.5 times a year. Firm Y in figure 2 has 80 days of its sales tied up in inventory and extended credit. This means that firm Y is turning its dollar invested in frozen foods 4 times a year. If firms X and Y had the same daily sales volume, it would mean that firm X was doing as much business on \$75,000 invested in frozen foods as firm Y was doing on \$178,125. If the interest on the difference (\$178,125 - \$75,000) were at a 6-percent rate, it would cost firm Y \$6,187.50 (6 percent of \$103,125) more a year to operate than firm X. In addition, firm Y would have larger storage expenses. The added storage expense would show up as an increased operating expense for firm Y in Reporting Form, Statement A, p. 48. ^{12/}

^{12/} Sometimes it may be advantageous to increase the size of inventory because of reduced prices associated with large-scale purchases. Also, management may decide to speculate on future price increases. In either event, the added costs associated with larger inventories should be considered.

Not only will more efficient use of capital help increase profits, but it will enable more of the business growth to be financed from within. In times of tight money, it becomes particularly important to be able to finance the business without borrowing.

On an average for the 2-year period, distributors had \$3.19 invested in inventory and \$1.86 in extended credit for each \$10 of quarterly sales. Thus, there was \$5.05 tied up in inventory and extended credit for each \$10 in sales during the quarter. Table 5 shows these relationships, by quarters, 1956-57.

Table 5.--Investment in inventory and extended credit for each \$10 in sales, by quarters, 1956-57

Quarters	1956		1957		2-year average	
	Invest- ment in inventory	Ex- tended credit	Invest- ment in inventory	Ex- tended credit	Invest- ment in inventory	Ex- tended credit
First-----	\$3.08	\$1.91	\$3.36	\$1.87	\$3.22	\$1.89
Second-----	3.12	1.79	3.31	1.96	3.22	1.88
Third-----	3.10	1.85	3.44	1.98	3.27	1.92
Fourth-----	3.10	1.74	3.03	1.73	3.06	1.74
Average----	3.10	1.82	3.28	1.88	3.19	1.86

Inventory and extended credit account for the most important investment a frozen food distributor has in his business. It is an important management consideration. For management to do its job well requires effective stock control extending down to each specific item of frozen food handled, as well as effective credit control over every individual account.

Services

The amount of services provided by frozen food distributors is another important factor affecting operating costs. The amount of services is closely related to the type of customer served. Further use of the accounting data can be made if the cooperating firms are grouped according to the principal type of customers served. The variation in services desired by each type of customer is sufficient to warrant this separation. Such a grouping should include firms selling predominantly to: (1) The smaller independent retail stores, (2) supermarket chains and independent supermarkets, and (3) restaurants and other institutions. Ten to fifteen firms with these characteristics, added to the present cooperators, would provide a basis for grouping the cost data by type of outlet. The importance of such a step can be illustrated by the fact that it is possible for a firm serving small restaurants to have operating costs in the neighborhood of 18 cents per dollar of sales, while another firm serving supermarkets has operating costs of 10 cents. Both firms

could be equally efficient in their respective markets, and, because of differences in gross profit, could be equally profitable. The difference in services rendered, such as frequent delivery of small orders or less frequent delivery of large orders could explain most of the variations in total operating costs between these firms. If a restaurant or retail store is able to operate on the distributor's working capital, the extended credit represents an added service which the distributor is providing and one which increases his cost of doing business. However, as previously mentioned, neither imputed nor actual interest charges are reflected in the operating costs reported under the accounting procedures used.

One of the dangers of cost comparisons between firms is that the differences in service provided often are not taken into account. An order assembly and delivery operation certainly does not cost as much as an operation which also includes selling and merchandising services. Cost figures which include no overhead costs for facilities and management and no storage or selling costs, of course, are even more misleading. Someone has had to provide and pay for these services, whether it be the retailer, distributor, or frozen food packer. Only when firms are comparing costs on a uniform basis can these differences be properly allocated and legitimate comparisons made. When operating costs are reported on a uniform basis and are broken down as to functions--such as order assembly, delivery, and selling--it is possible to approach meaningful comparisons.

Management in frozen food distribution must continually weigh the value of special services--that is, additional income through higher gross profit--against the costs involved. Information on services desired and costs involved, as this relates to different types of customers, is essential as a guide to marketing efficiency. This information is necessary to provide flexibility in supplying services to different types of customers. Flexibility can be extremely important during periods when change is the order of the day.

What Effect Does Geographical Location Have Upon Operating Costs?

It has been stated by some that wage rates and other factors are sufficiently different between geographical regions to make comparisons of operating costs between regions invalid. Table 6 provides a comparison between firms located in the northern part of the United States with those in the South. Most of these firms are east of the Mississippi River. Kentucky, West Virginia, and Maryland represent the dividing line between the North and South, although none of the reporting firms was located in these three States. There appears to be as much variation within regions as there is between regions, a situation in this industry which is at variance with relationships in some other industries. ^{13/} There was no significant difference between average

^{13/} Brensike, V. John, and Askew, William R. Costs of Operating Selected Feed Mills, as Influenced by Volume, Services, and Other Factors, Mktg. Res. Rept. No. 79, U. S. Dept. Agr., Washington, D. C., February 1955. See also Bright, Imogene, The Wage Factor in Retailing Meat in 4 Cities . . . A Study of Marketing of Agricultural Products, Mktg. Res. Rept. No. 202, U. S. Dept. Agr., Washington, D. C., November 1957.

hourly wage rates in the North and in the South, even though wage rates averaged 24 percent higher in the North. This was true because of the wide variations in hourly wage rates in each region. ^{14/} The South required 11 percent more man-hours per \$100 of sales than the North, but this was not a significant difference because, as shown in table 6, the South had the firm with the lowest man-hours per \$100 of sales while the North had the firm with highest.

Table 6.--Wholesale frozen food distributors: Comparisons of data between regions, third quarter, 1957

Regions	: Average : hourly : wage : rate	: Man-hours : per \$100 : of sales	: Average : size of : order	: Total : operating : cost per \$1 : of sales
North:	: <u>Dollars</u>	: <u>Hours</u>	: <u>Dollars</u>	: <u>Cents</u>
Average-----	: 2.16	: 3.65	: 46.26	: 13.8
High-----	: 2.94	: 6.01	: 88.29	: 17.9
Low-----	: 1.64	: 2.19	: 16.02	: 9.9
South:	: :	: :	: :	: :
Average-----	: 1.74	: 4.06	: 33.55	: 15.4
High-----	: 3.85	: 5.96	: 81.98	: 18.7
Low-----	: 1.20	: 1.60	: 18.52	: 8.1

The average size of order was \$46.26 in the North, which was 38 percent higher than the \$33.55 average in the South. At the same time, the average size of order in the North ranged from \$16.02 to \$88.29, while the range in the South was from \$18.52 to \$81.98. Because of the wide variations within each region, the difference between the regional averages was not statistically significant.

Total operating cost per dollar of sales was 12 percent higher in the South than in the North. This difference also was not significant.

When adjustments are made for differences in average wage rates, average sizes of orders, and man-hours per \$100 of sales, as illustrated in table 4, valid comparisons can be made between the firms studied regardless of geographical location.

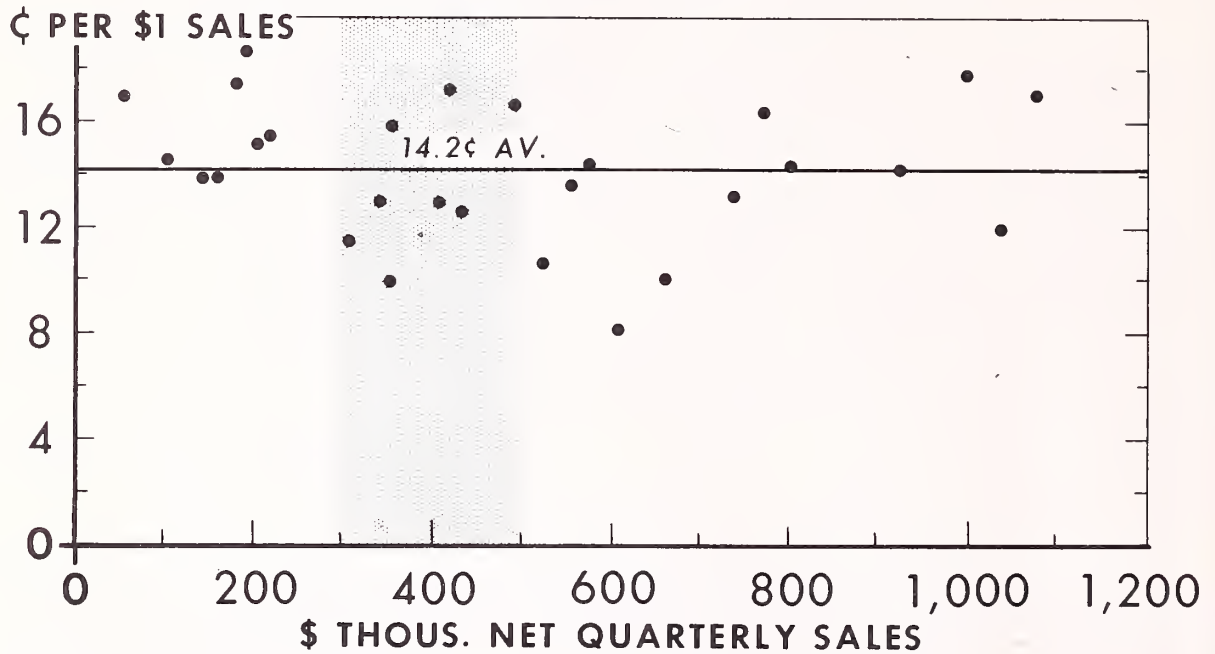
What Effect Does Size of Firm Have Upon Operating Costs?

The sales volume of most distributors falls between \$500,000 and \$5 million annually. The 2-year records under the uniform cost accounting program indicate that a distributor can achieve sufficient economies of operation at annual sales between \$1 million and \$2 million to be competitive with the large-scale operators.

^{14/} See appendix, tables 17-20.

RELATIONSHIP OF SIZE OF FIRM TO TOTAL OPERATING COSTS

28 Frozen Food Distributing Plants, 3d Qtr., 1957



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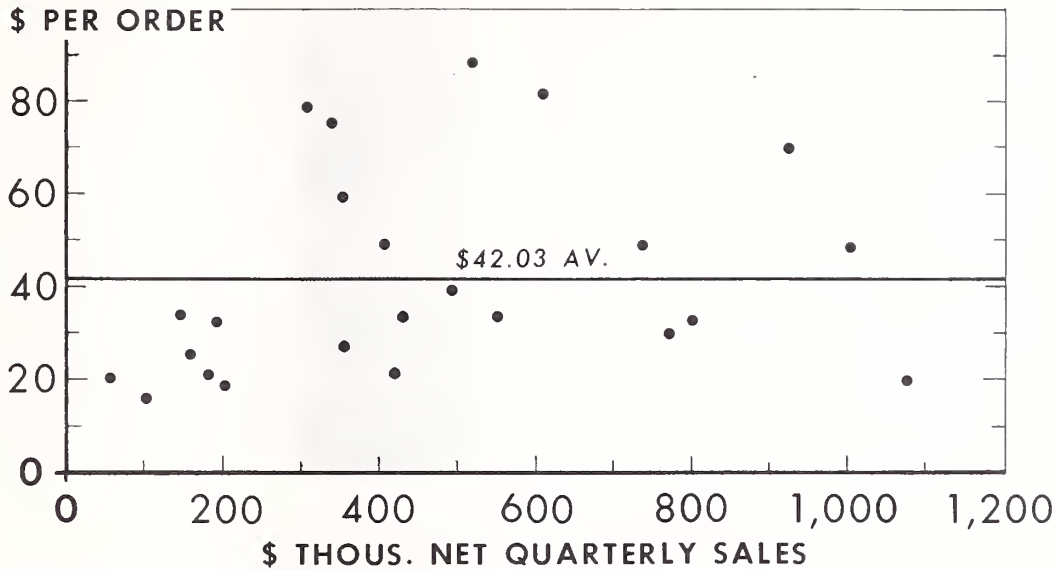
Figure 3

Figure 3 serves to illustrate this relationship for the third quarter of 1957. It shows the relationship between the size of firm and operating costs per dollar of sales.

The relationship between size of firm and average size of order is shown in figure 4. Firms having annual sales between \$1 million and \$2 million had as large an average size of orders as did the larger firms. Similarly, the firms of this same size group had as low a number of man-hours required per \$100 of sales as did the larger firms (fig. 5).

RELATIONSHIP OF SIZE OF FIRM TO AVERAGE SIZE OF ORDER

28 Frozen Food Distributing Plants, 3d Qtr., 1957



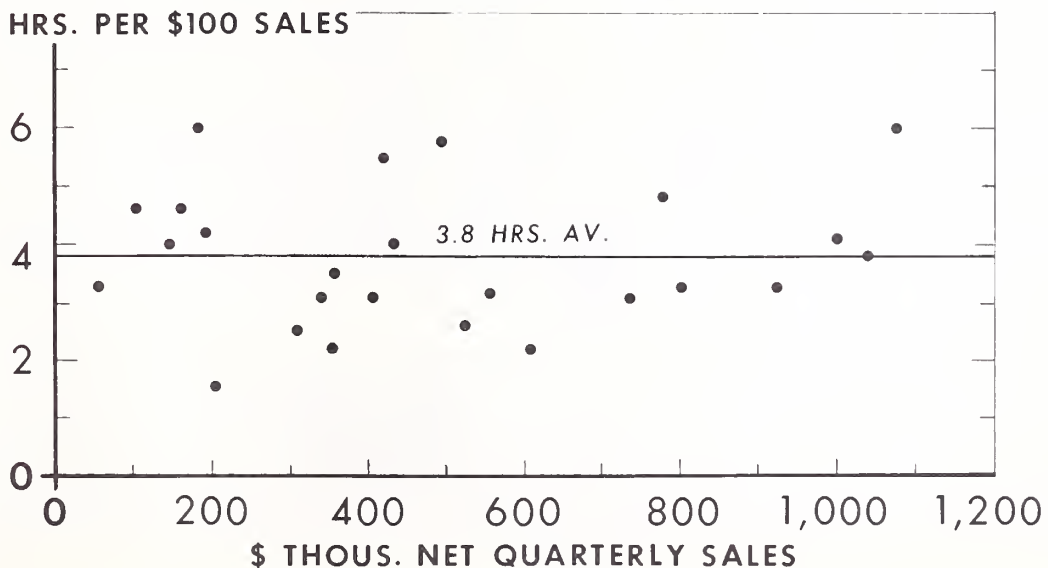
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Figure 4

RELATIONSHIP OF SIZE OF FIRM TO MAN-HOURS WORKED

28 Frozen Food Distributing Plants, 3d Qtr., 1957



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Figure 5

Seasonal Characteristics

What effect does the seasonal pattern of sales have upon operating costs and profits?

To obtain an accurate picture of the seasonal pattern of frozen food sales, it is essential that quarterly sales and cost comparisons be limited to the same group of firms reporting each quarter for the entire 2-year period. Figure 6 shows the net sales and net profit percentages by quarters for the 13 firms reporting detailed sales information during 1956 and 1957. The first quarter of 1956 is used as the base, equaling 100. The net profit bar, adjoining the bar showing each quarter's sales, is the actual net profit percentage reported for that quarter. The percentage of net profit times the dollar volume of sales would give the total amount of net profit. The second quarter of 1956 and second quarter of 1957 were the highest quarters each year in terms of both volume and percentage of net profit. Although net profits and total sales moved together in 7 of the 8 quarters in figure 6, it is important to note that the quarterly changes in total sales do not appear to explain the changes in the percentage of net profits. What factors are responsible for the net profit pattern?

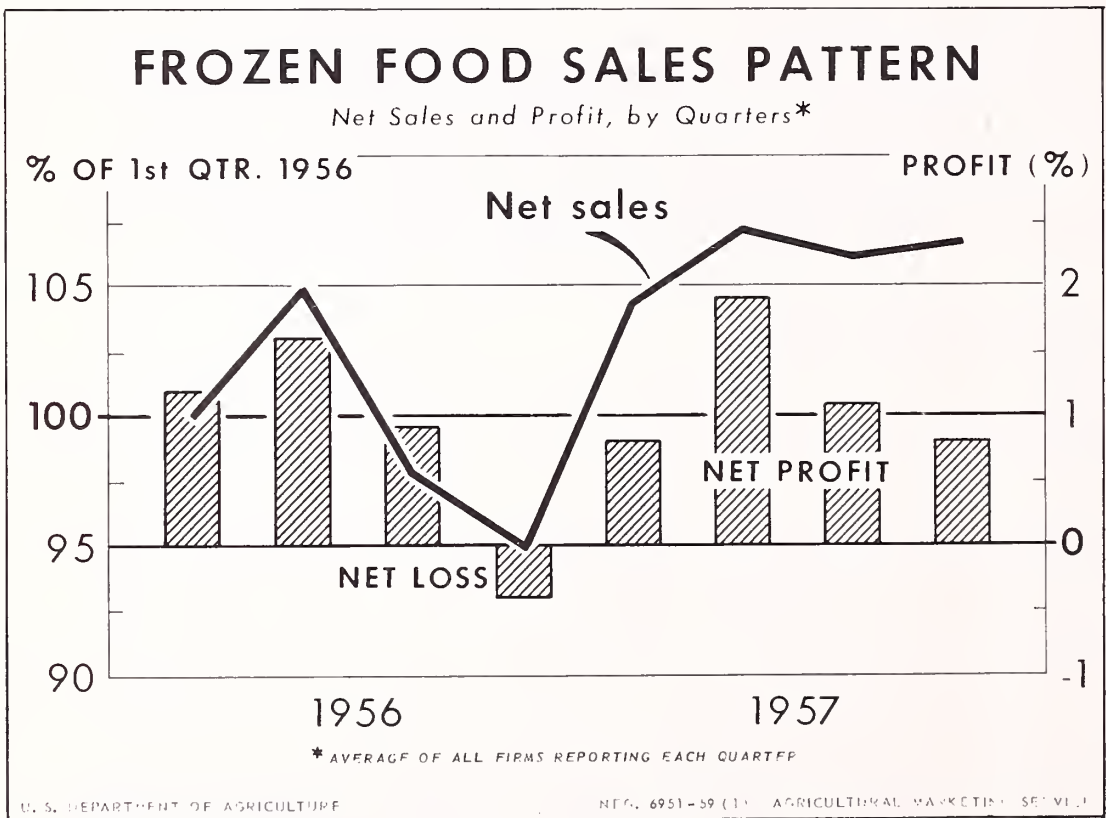


Figure 6

Why was the percentage of net profit highest during the second quarter of each year and why did the profit percentage decline during both the third and fourth quarters of each year?

Since profits are expressed as a percentage of dollars of sales, the high volume of sales during the second quarters in 1956 and 1957 should not affect the profit percentages unless costs did not increase proportionately or the gross profit margin changed. Table 7 shows how operating costs varied by quarters in absolute terms and as a percentage of net sales. In 1956, both operating costs and sales increased from the first to the second quarters. When operating costs were expressed as a percentage of net sales, they amounted to 12.8 percent of each sales dollar during both quarters. Therefore, neither the change in net sales nor the change in operating costs provided a satisfactory explanation of the increase in the net profit percentage.

The answer for 1956 is found in the increase in gross profit margin which occurred between the first and second quarters of that year. The gross profit margin rose from 14.0 to 14.4 while operating costs remained at 12.8 for each quarter. This explanation does not apply to 1957.

Table 7.--Pattern of frozen food sales, operating costs, and gross profit margin, by quarters, 1956-57

Items	1956				1957			
	1st	2nd	3rd	4th	1st	2nd	3rd	4th
	Quar.	Quar.	Quar.	Quar.	Quar.	Quar.	Quar.	Quar.
	Per-	Per-	Per-	Per-	Per-	Per-	Per-	Per-
	cent	cent	cent	cent	cent	cent	cent	cent
Frozen food sales--:	100.0	104.8	97.8	94.9	104.3	107.1	106.1	106.6
Operating costs-----:	100.0	106.4	106.0	108.7	110.3	106.0	114.3	135.9
Operating costs	:	:	:	:	:	:	:	:
as a percentage	:	:	:	:	:	:	:	:
of net sales-----:	12.8	12.8	13.7	14.7	13.7	12.8	13.8	14.0
Gross profit margin:	14.0	14.4	14.6	14.3	14.5	14.7	14.9	14.8

In 1957, total operating costs declined from the first to the second quarter, while sales increased. This had the effect of reducing operating costs from 13.7 percent of net sales to 12.8 in the second quarter. At the same time, gross profit margin increased from 14.5 percent to 14.7 percent. As a result, net profits rose from 0.8 percent of net sales in the first quarter of 1957 to 1.9 percent in the second quarter.

The decline in profits during the third and fourth quarters of 1956 came about because operating costs remained high while net sales fell and gross profits were not increased enough to offset the loss in sales revenue. In 1957, sales were maintained during the third and fourth quarters, but total operating costs rose. The gross profit margins were not increased enough to offset the rise in total operating costs. These relationships are shown in table 7.

Over the 2-year period, an increase occurred in both the volume of sales and total operating costs. However, operating costs rose slightly more than did net sales. The distributors' hope of survival under such conditions would be to find some way to reduce operating costs or increase the gross profit margin either by encouraging the sale of items carrying higher profit margins, or by increasing the selling prices, or by purchasing on more favorable terms.

Is the seasonal pattern of all frozen food sales typical of the different types of frozen foods? If not, is it possible that some particular types of frozen foods--such as frozen juice concentrates or frozen prepared foods--may explain why the net profit pattern did not follow the total sales pattern more closely?

Since gross profits were not reported by type of frozen foods sold, their effect upon total gross and net profits can be evaluated only by examining their relative sales volumes. The following charts (figs. 7 through 14) show the sales pattern of each type of frozen foods in terms of absolute sales and their relative share of total sales. By comparing the sales pattern of each type of frozen food with the overall net profit pattern, it is possible to determine whether or not any one type of frozen food may help explain the net profit pattern. The following charts indicate that the net profit pattern cannot be explained by changes in the sales of any one type of frozen foods.

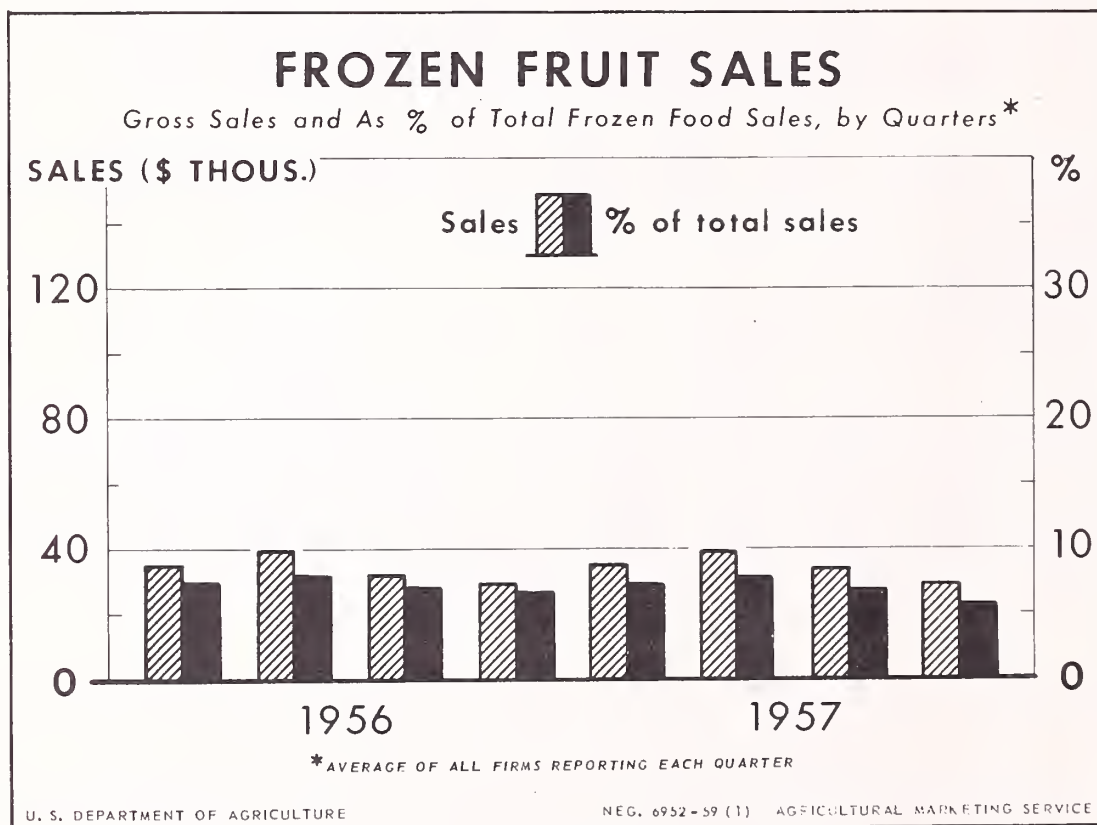
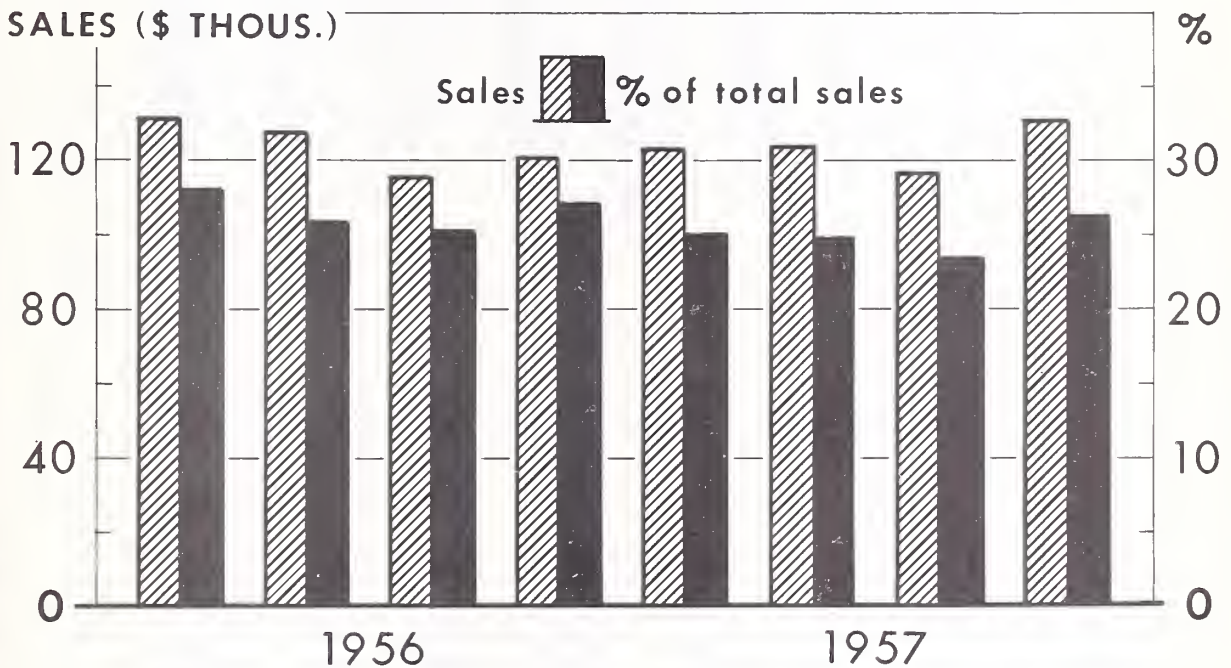


Figure 7

Figure 7 shows the pattern of frozen fruit sales and the percentage which they represent of total frozen food sales. In comparing figure 7 with figure 6, note that in the third and fourth quarters of 1957 frozen fruit sales do not follow the pattern of total frozen food sales. Frozen fruit sales correspond more closely to the net profit pattern in figure 6 than they do to the total frozen food sales. However, the changes in frozen fruit sales do not appear to be sufficient to explain the variation in net profits. Frozen fruits accounted for only 6 to 8 percent of total frozen food sales.

FROZEN VEGETABLE SALES

Gross Sales and As % of Total Frozen Food Sales, by Quarters*



* AVERAGE OF ALL FIRMS REPORTING EACH QUARTER

Figure 8

In figure 8, frozen vegetable sales account for 24 to 28 percent of total frozen food sales. In comparing vegetable sales with the total frozen food sales and net profit pattern in figure 6, it appears that vegetables would not help explain the net profit pattern in figure 6.

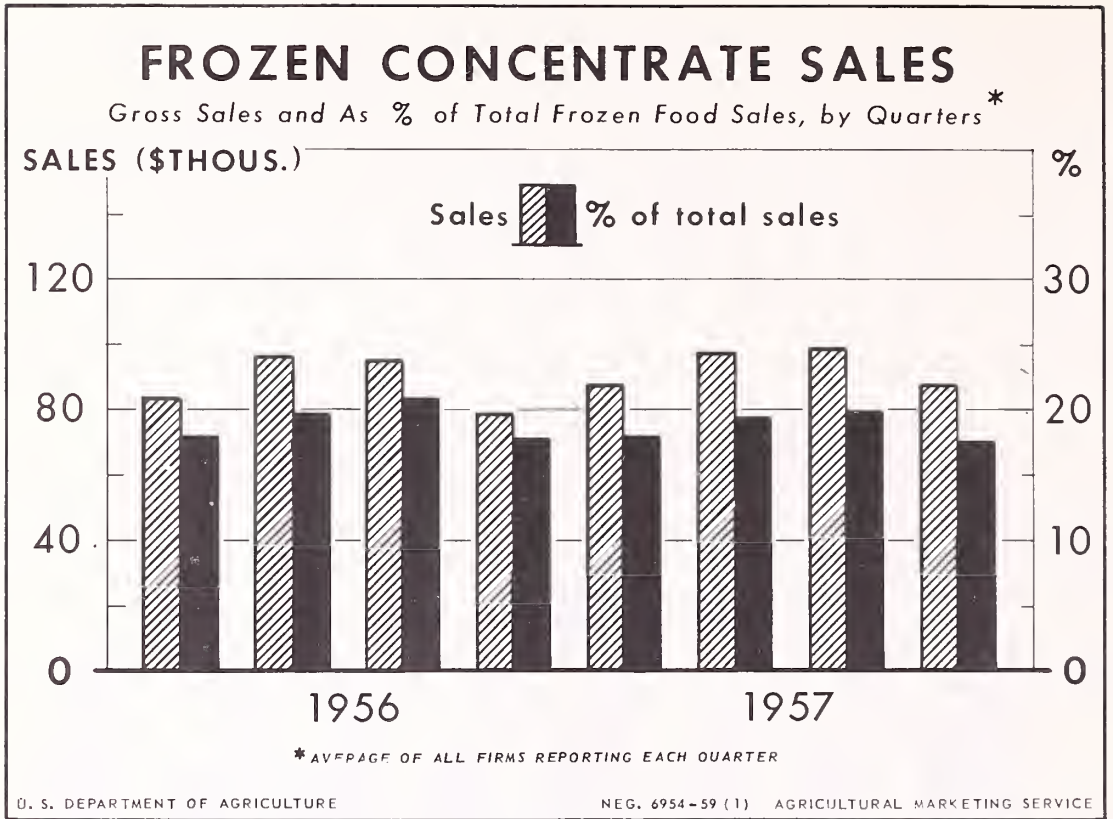


Figure 9

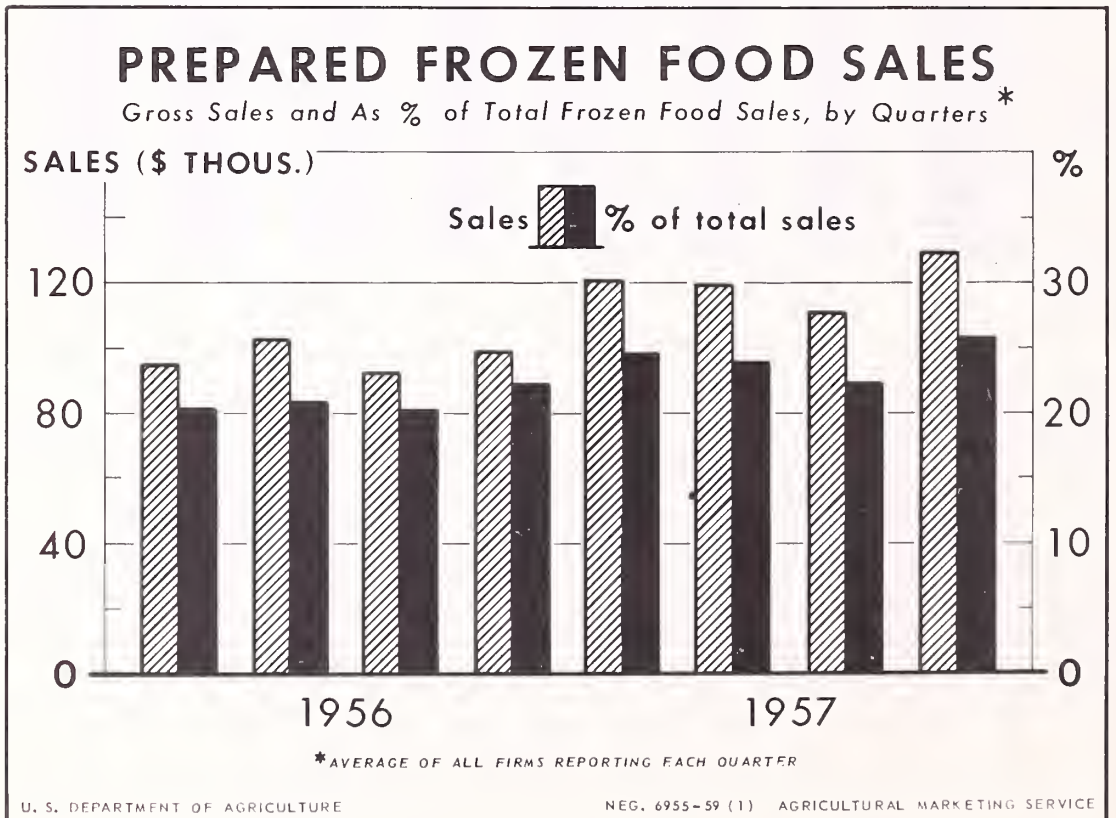


Figure 10

Figure 9 shows the pattern of frozen juice concentrate sales. In comparing this figure with figure 6, one can observe that, while there is a rise between the first and second quarters in both 1956 and 1957 and a decline in the fourth-quarter sales, there is a lack of similarity to the overall net profit pattern. Frozen juice concentrates account for about one-fifth of total frozen food sales.

Figure 10 shows the pattern of sales of frozen prepared foods. The relative share of total frozen food sales which these items constitute has risen from 1/5 of total sales in 1956 to over 1/4 of total sales in the fourth quarter of 1957. It is possible that they may have contributed to the improvement in the net profit pattern in 1957 over that in 1956.

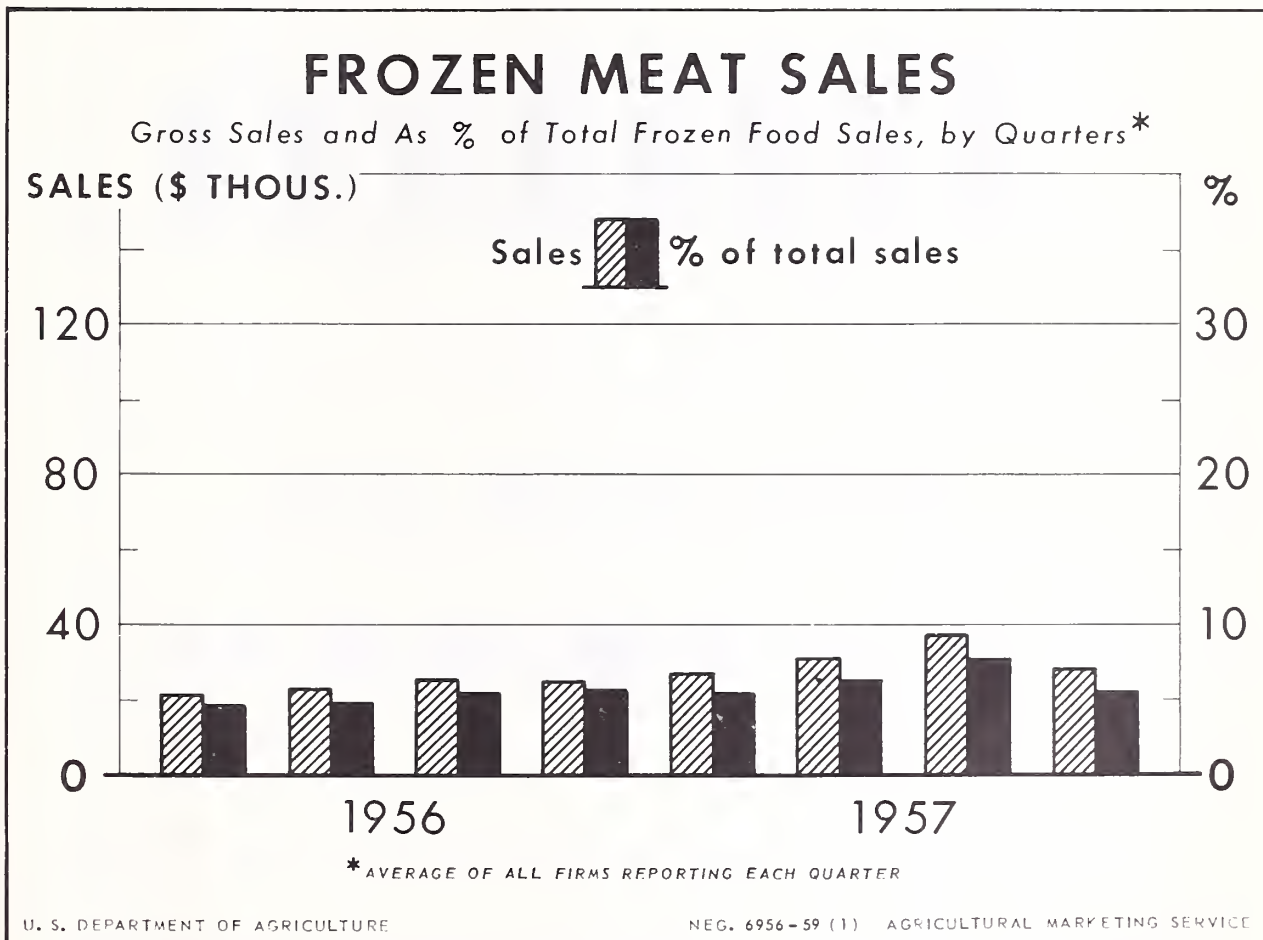


Figure 11

Frozen meat sales, shown in figure 11, account for 4.6 to 7.6 percent of total frozen food sales. The sales pattern does not correspond to total frozen food sales nor to the net profit pattern.

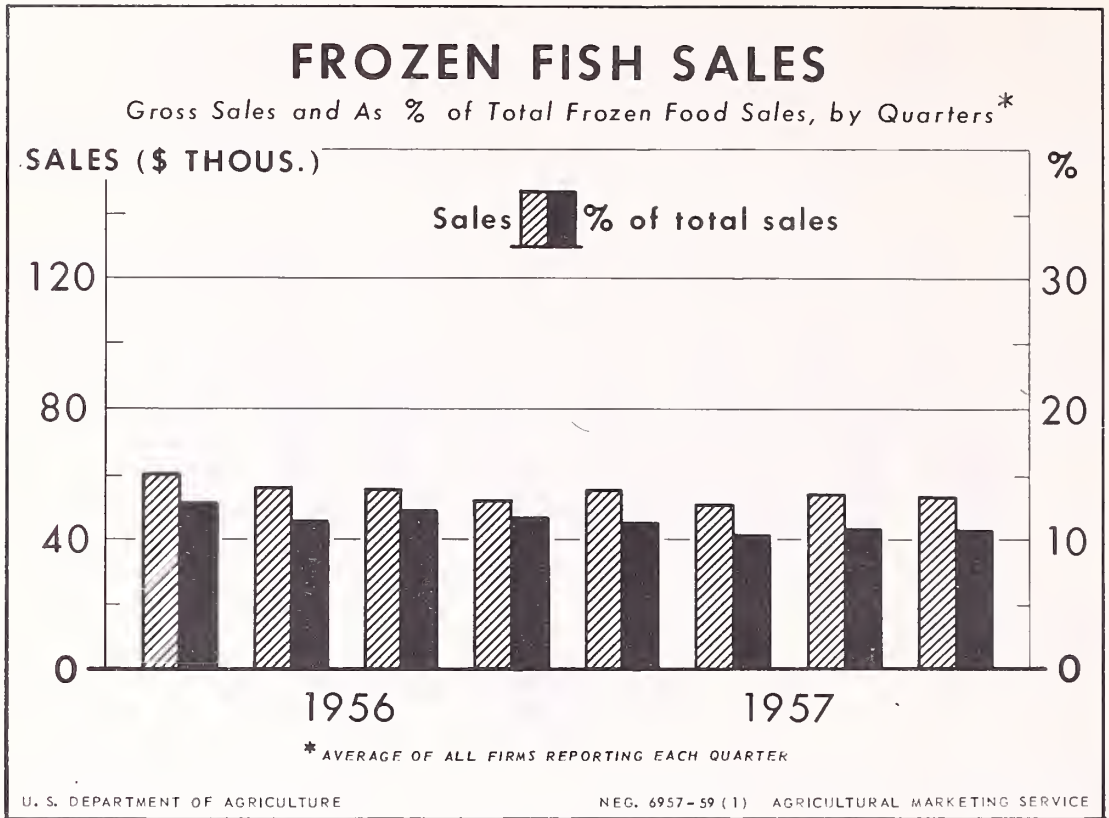


Figure 12

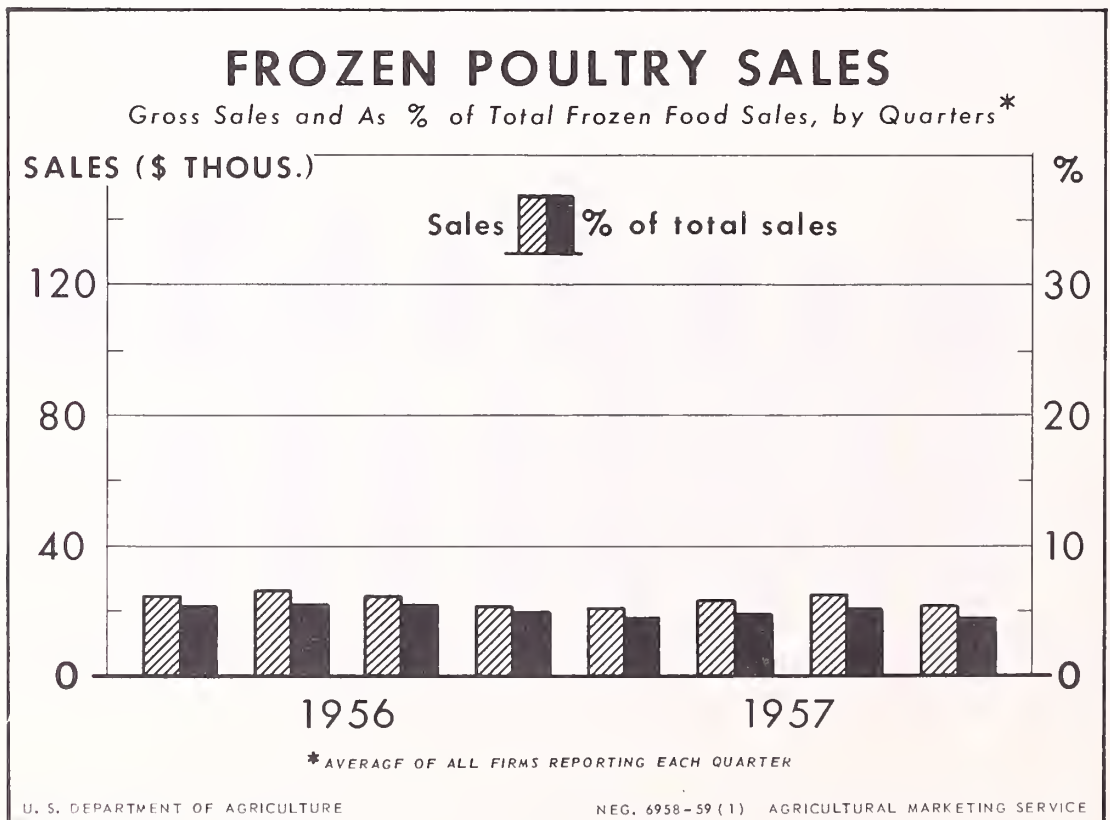


Figure 13

Figure 12 shows that frozen fish sales were highest during the first quarter of each year. There appears to have been some decline in fish sales from 1956 to 1957. They accounted for slightly over 10 percent of total frozen food sales. The pattern is not similar to that of total frozen food sales or net profits.

Frozen poultry sales, shown in figure 13, accounted for around 5 percent of total frozen food sales. It appears that their relative importance declined slightly from 1956 to 1957. Frozen poultry sales would not explain the total net profit pattern.

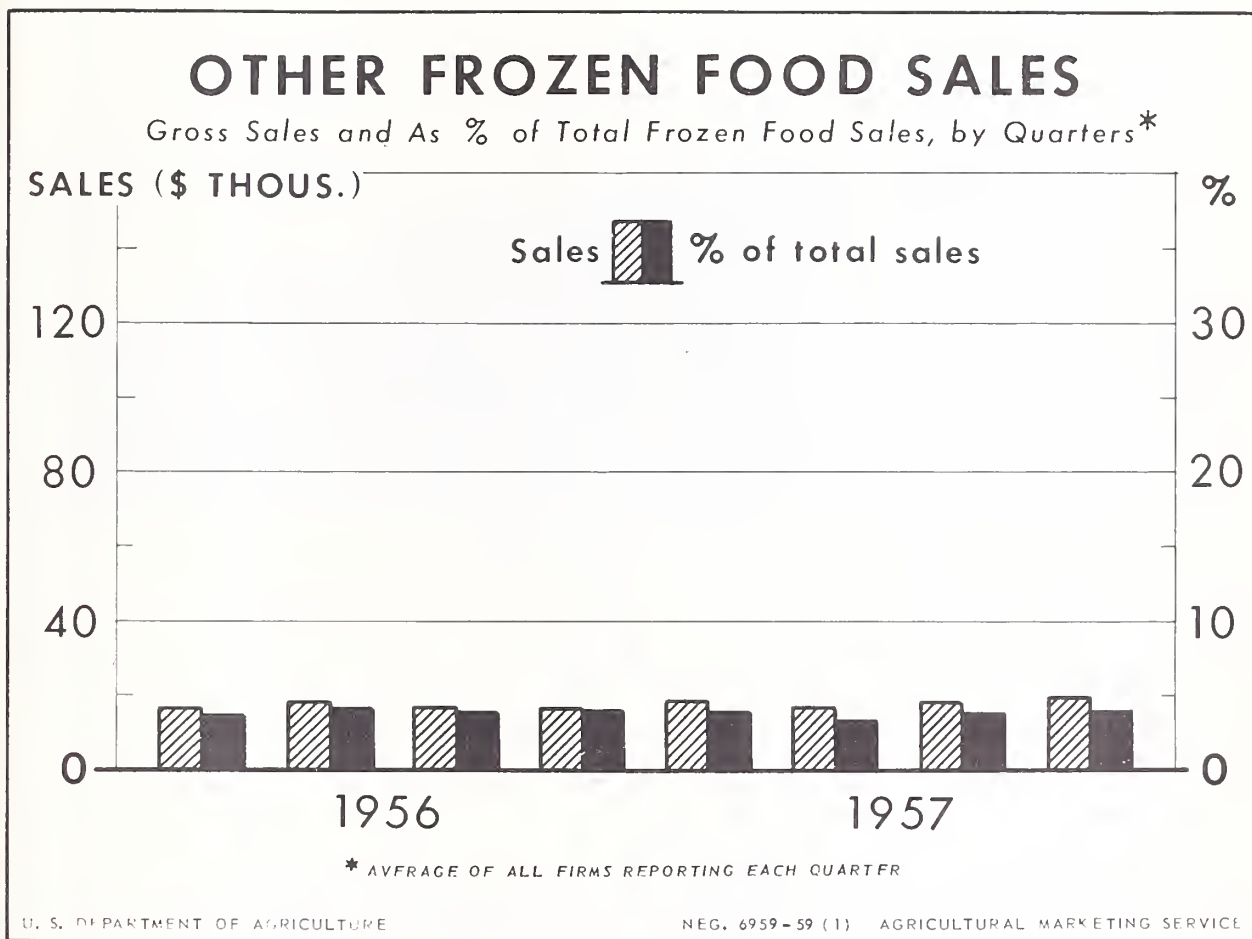


Figure 14

Figure 14 shows the sales pattern of other frozen foods not included in the previous frozen food categories. These items do not help explain the pattern of net profits. They account for slightly less than 4 percent of all frozen food sales by distributors. Data are not available for determining the gross profit pattern for each category of frozen foods. The data presented for sales of frozen foods by type of product appear to indicate that no one category of frozen foods can be used to explain the net profit pattern.

Labor Costs

Labor costs account for half of the total operating costs of the frozen food distributor. Salaries and wages, other than executive salaries (labor costs), ranged from 29 percent of total operating costs to 73 percent (table 8). There appeared to be no relationship between size of firm and the percentage of total operating costs represented by labor. Executive salaries contributed an additional 6 percent to the 50-percent average accounted for by labor.

Table 8.--Salaries and wages as percentage of total operating costs, by size of firm

Firm	: Quarterly : : gross : : sales <u>1/</u> :	: Labor : : costs <u>2/</u> :	::	Firm	: Quarterly : : gross : : sales <u>1/</u> :	: Labor : : costs <u>2/</u> :
	: Dollars : (000)	Percent	::		: Dollars : (000)	Percent
1-----	57	28.7	::	15-----	439	52.1
2-----	106	60.1	::	16-----	493	48.7
3-----	146	50.8	::	17-----	530	48.7
4-----	161	39.6	::	18-----	556	51.6
5-----	183	69.6	::	19-----	579	60.1
6-----	192	31.5	::	20-----	610	50.0
7-----	204	40.4	::	21-----	662	44.4
8-----	223	46.8	::	22-----	740	51.5
9-----	313	64.5	::	23-----	780	44.5
10-----	348	51.3	::	24-----	801	55.3
11-----	358	51.9	::	25-----	929	50.6
12-----	358	47.4	::	26-----	1,005	51.0
13-----	408	56.7	::	27-----	1,042	56.9
14-----	421	73.0	::	28-----	1,093	42.2
				Average----	491	50.7

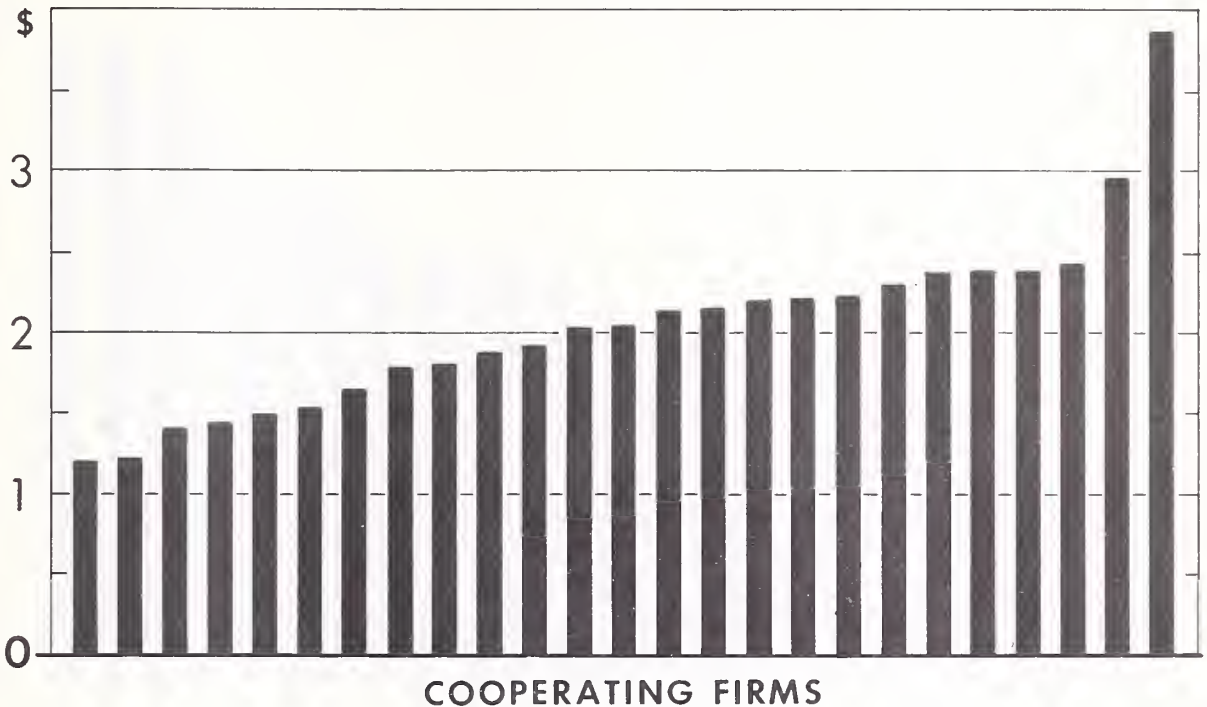
1/ Multiply by 4 to obtain annual rate.

2/ Salaries and wages other than executive salaries, including paid vacations, holidays, sick leave, overtime, bonuses, and commissions.

Average hourly wage rates and labor efficiency determine the labor costs for a particular firm. To what extent are higher wage rates offset by greater labor efficiency? With labor costs making up around half of a distributor's total operating costs, the efficient use of labor is an important management consideration.

AVERAGE HOURLY WAGE RATES

In Frozen Food Distributing Plants, 3d Qtr., 1957



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Figure 15

Figure 15 shows that the range in average hourly wage rates reaches almost 3 to 1. However, most of the wage rates fall between \$1.50 and \$2.35 per hour. Are the higher wage rates in this chart offset by higher labor productivity? If not, higher wage rates mean higher operating costs. In most cases, labor productivity does not offset higher wage rates.

Column 2 in table 9 shows the average hourly wage rates for each cooperating firm during the third quarter of 1957. The corresponding man-hours per \$100 of sales and labor costs per \$100 of sales are shown for each of these firms. In many cases, high wage rates were not offset by greater labor productivity.

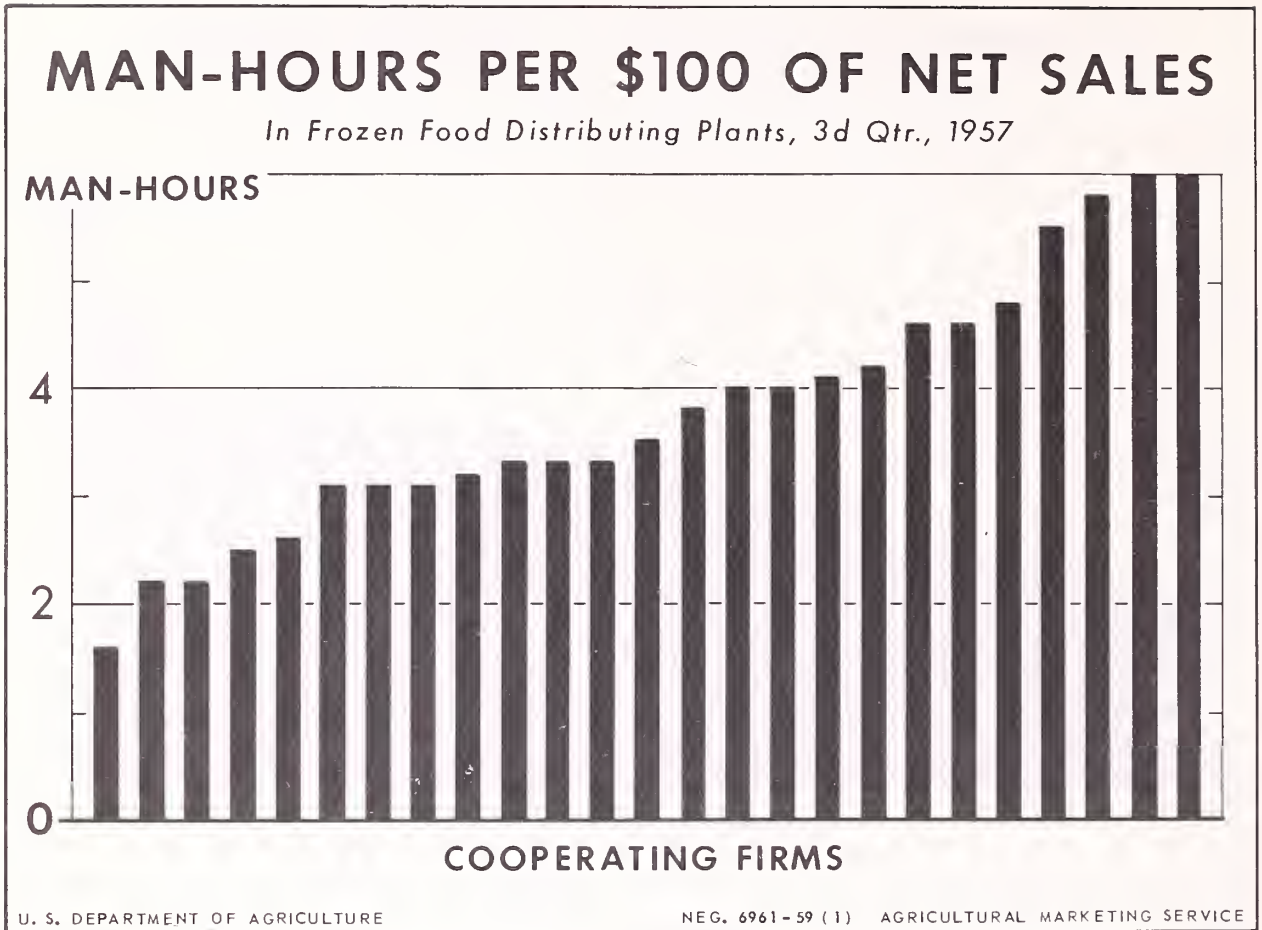


Figure 16

Man-hours per \$100 of sales as shown in figure 16 is a measurement of labor productivity in terms of man-hours instead of labor costs. Wage rate differences do not affect this index. Note the wide range in production per unit of labor. Are the firms with low man-hours per \$100 of sales the same ones having high average hourly wage rates in figure 15? This question is answered in table 9.

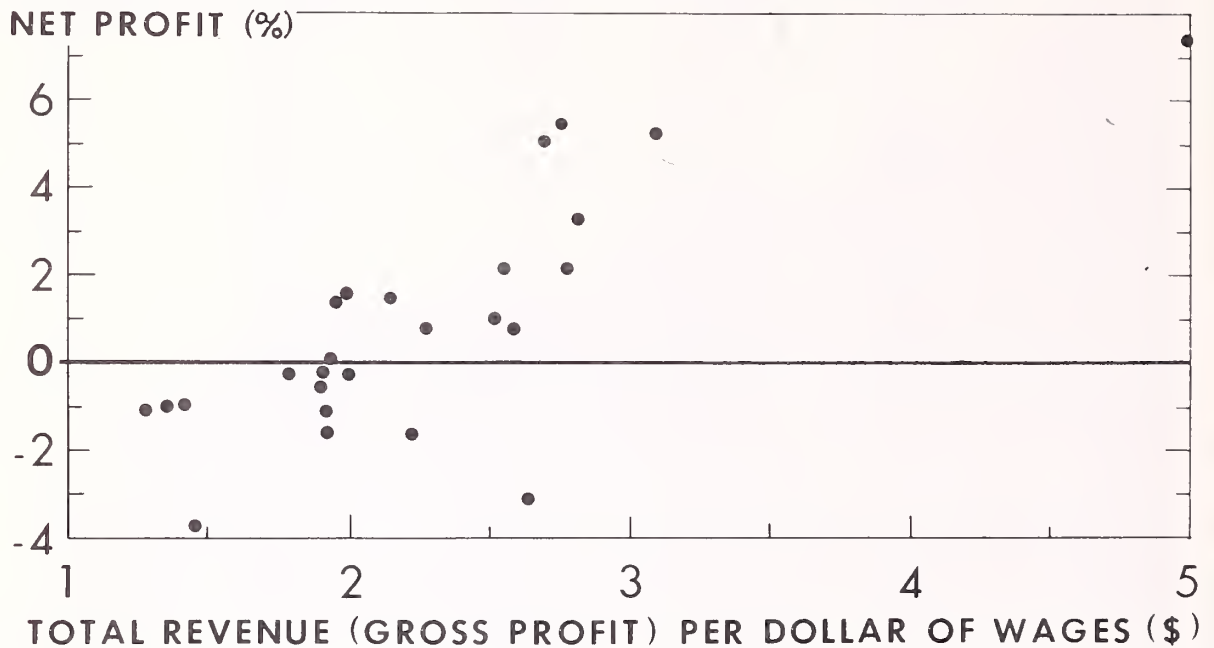
Table 9.--Average hourly wage rates, man-hours, and labor costs per \$100 sales

Firm	Average hourly wage rates	Per \$100 of sales			
		Man-hours		Labor costs	
	Dollars	Hours	Rank	Dollars	Rank
1-----	1.20	4.60	19	5.53	5
2-----	1.21	5.96	23	7.22	13
3-----	1.40	5.81	22	8.12	19
4-----	1.42	4.15	17	5.89	6
5-----	1.47	3.33	11	4.88	3
6-----	1.52	4.82	20	7.35	15
7-----	1.64	4.00	14	6.57	8
8-----	1.75	4.04	15	7.07	12
9-----	1.87	2.18	2	4.06	1
10-----	1.91	4.60	18	8.79	21
11-----	2.02	6.01	24	12.15	23
12-----	2.03	2.56	5	5.18	4
13-----	2.13	3.14	8	6.69	9
14-----	2.15	2.19	3	4.70	2
15-----	2.19	3.10	7	6.80	10
16-----	2.20	3.28	10	7.21	14
17-----	2.21	4.14	16	9.14	22
18-----	2.22	3.16	9	7.02	11
19-----	2.28	5.54	21	12.65	24
20-----	2.36	3.50	13	8.26	20
21-----	2.37	3.35	12	7.95	18
22-----	2.41	3.05	6	7.36	16
23-----	2.94	2.53	4	7.45	17
24-----	3.85	1.60	1	6.16	7
Average-----	2.03	--	--	7.26	--

What is the relationship between labor costs, total revenue, and net profits? Figure 17 shows this relationship.

NET PROFIT VS. GROSS PROFIT PER DOLLAR OF WAGES

In Frozen Food Distributing Plants, 3d Qtr., 1957



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Figure 17

Figure 17 shows that firms obtaining \$2.50 of gross profits for every dollar spent for wages, with one exception, were in a net profit position. This is what would be expected, since 50 percent of operating costs, on the average, consisted of labor costs (table 8). A firm having labor costs amounting to 50 percent of total operating costs would need \$2.00 in gross profits for each dollar of wages to break even. Similarly, a firm with labor costs accounting for 40 percent of its total operating costs would need \$2.50 of gross profits per dollar of labor costs to break even.

IMPLICATIONS TO INDIVIDUAL FIRMS

The overall analysis and summary of the cost information indicate that:

(1) Larger orders should help reduce total operating expenses per dollar of sales, (2) a reduction in man-hours per \$100 of sales tends to reduce total operating expenses, and (3) in order to meet higher wage rates and still hold the same competitive level as before, higher wage rates must be offset either by larger orders or less man-hours per \$100 of sales, or some combination of the two. Further, it was demonstrated that a reduction in the number of days required for collection and a reduction in inventories should help to increase net profit on the owner's invested capital. These are all important management considerations which the individual operator recognizes. How can the management guides developed in this study assist the individual operator beyond what he might gain from reviewing his own records?

By examining operating costs of his own firm, an individual operator would know his own operating costs. However, if operating costs are to be reduced, it is helpful to know where they are high. In order to know where operating costs are high, a manager needs to compare the cost of each operation with those of other frozen food distributors with similar operations, or develop some other yardstick for measuring efficiency.

If cost comparisons with other firms are to be meaningful, the cost information from each firm must be reported on a uniform basis. To make this procedure practical, a simple device is needed for bringing to attention each operation where costs appear high or low in relation to those of other firms. It should serve as a guide in day-to-day operation, as well as in planning the direction of adjustments for the future. It should also reflect changes occurring in the marketing system. The cost signal system for management as developed in this study was designed to meet these needs.

Cost Signals for Management

Actual data from one of the quarterly reports are used to demonstrate how an individual firm may use cost information as a management guide for reducing costs and increasing efficiency.

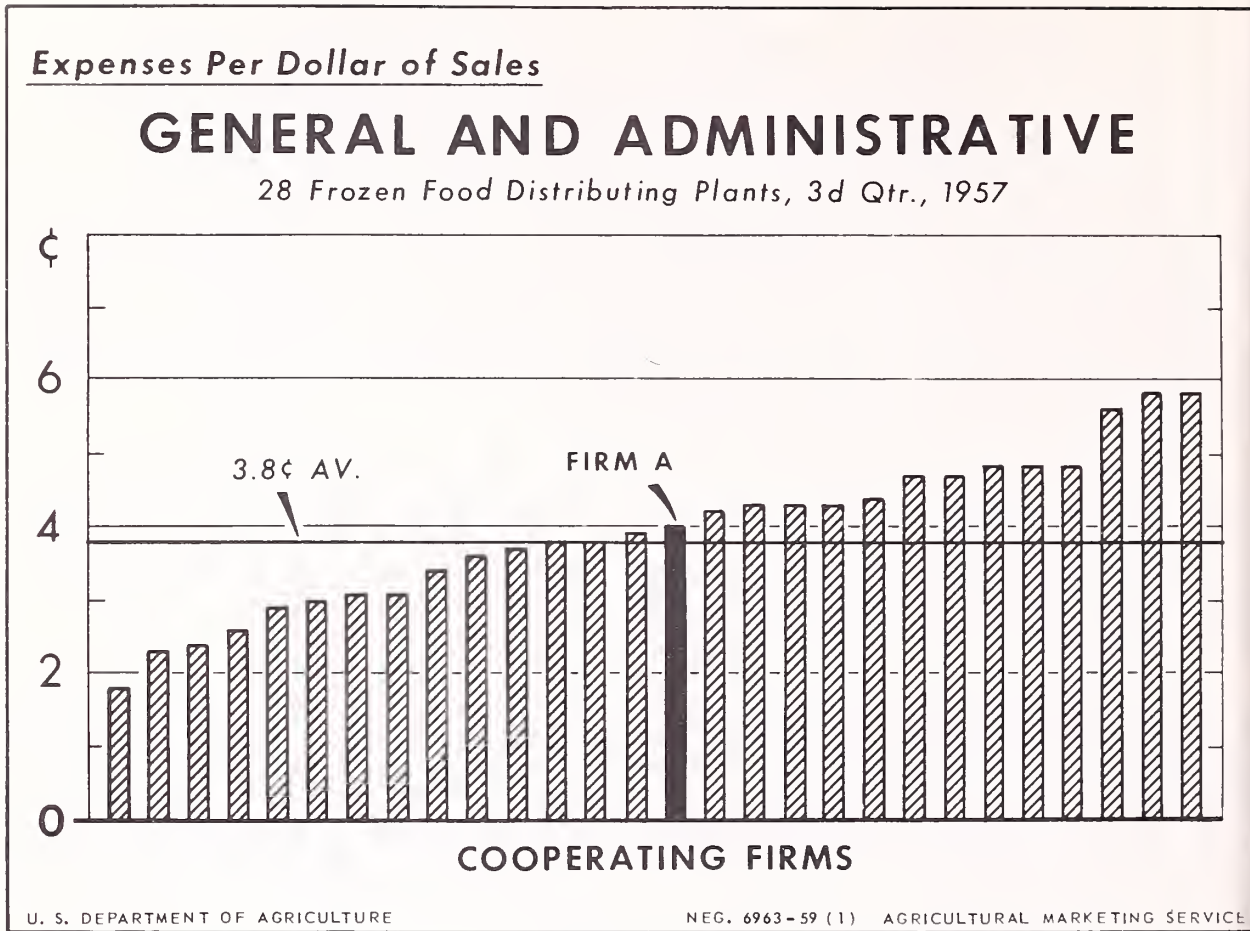


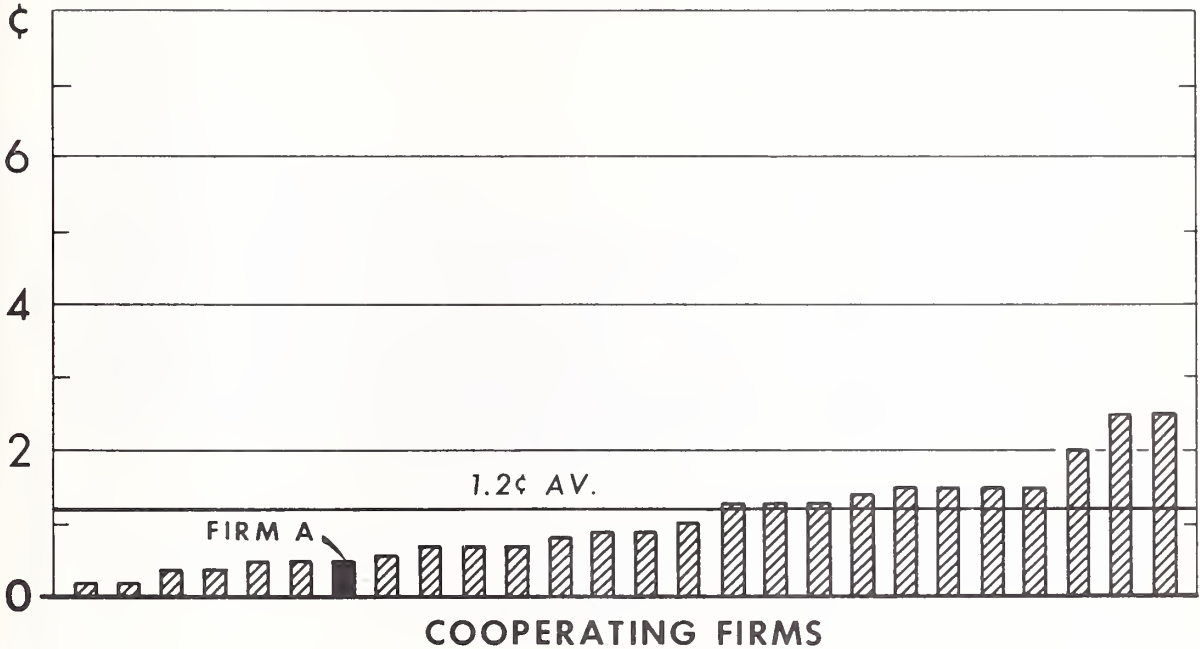
Figure 18

Figure 18 shows the average cost and range for the general and administrative expenses account. In this figure and in the following figures showing the cost accounts which make up the total operating expenses, each bar represents an individual reporting firm. The height of the bar indicates the level of cost per dollar of sales. The darkened bar in each figure represents "Imaginary Joe's" firm. The average administrative expense per dollar of sales is 3.8 cents for all the firms reporting. Joe's costs are slightly above the average line. It might be concluded that Joe is doing all right in this area, although there are a number of firms with lower administrative expenses per dollar of sales.

Expenses Per Dollar of Sales

STORAGE

28 Frozen Food Distributing Plants, 3d Qtr., 1957



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Figure 19

Figure 19 shows storage expenses per dollar of sales. Storage costs averaged 1.2 cents per dollar of sales. They are approximately 1/3 as large as the general and administrative expenses in figure 18. Note that Joe's costs are below average, which means that he apparently is doing a good job in moving frozen food inventories. This is borne out by his position in figure 20, showing the number of days' sales in inventory.

NUMBER OF DAYS' SALES IN INVENTORY OF FROZEN FOOD PLANTS

3d Quarter, 1957

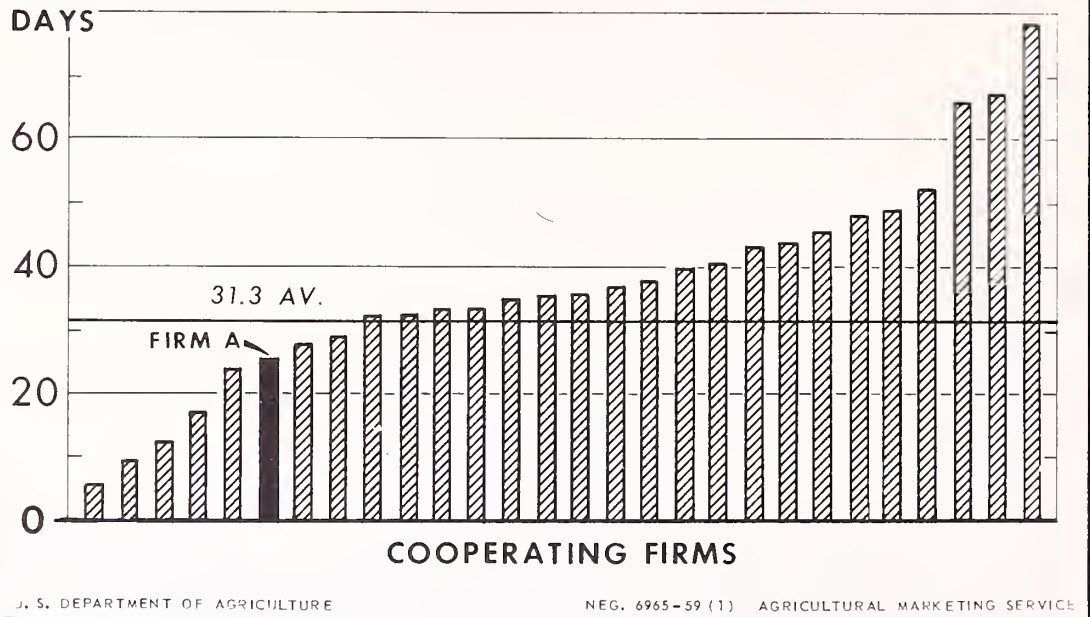


Figure 20

Expenses Per Dollar of Sales

ORDER ASSEMBLY

28 Frozen Food Distributing Plants, 3d Qtr., 1957

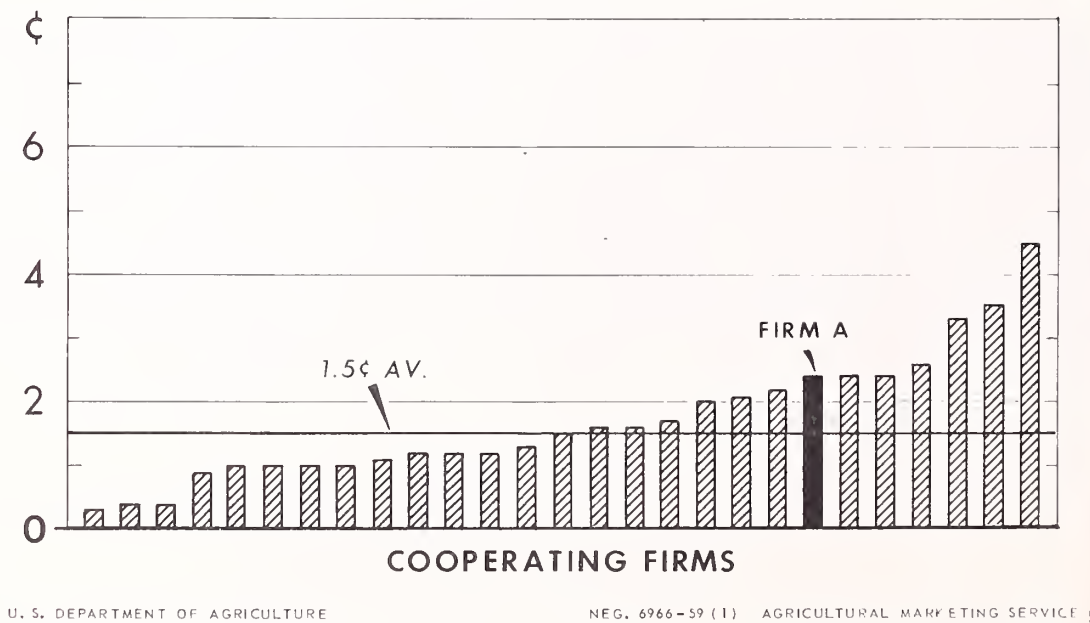


Figure 21

Figure 20 shows that Joe has only 22 days' sales tied up in inventory, while the group average is 31 days. If this quarter is typical for the year, then an inventory level of 22 days' sales means that each dollar Joe has invested in frozen food inventory has a turnover of 16.6 times a year, compared with the group average of 11.8. Joe is unusually strong in this area.

This chart shows a wide range in inventory turnover. Even disregarding the 4 lowest and 4 highest firms, the range in turnover is still greater than 2 to 1. Some of this variation may be due to speculative buying.

Figure 21 provides a picture of the order assembly expenses per dollar of sales. The average assembly expense is 1.5 cents per dollar of sales. Joe's position in this figure indicates that he is weak in this operation. His costs are above average and he could improve his efficiency and lower total operating costs if order assembly costs were lowered to the average level of the group.

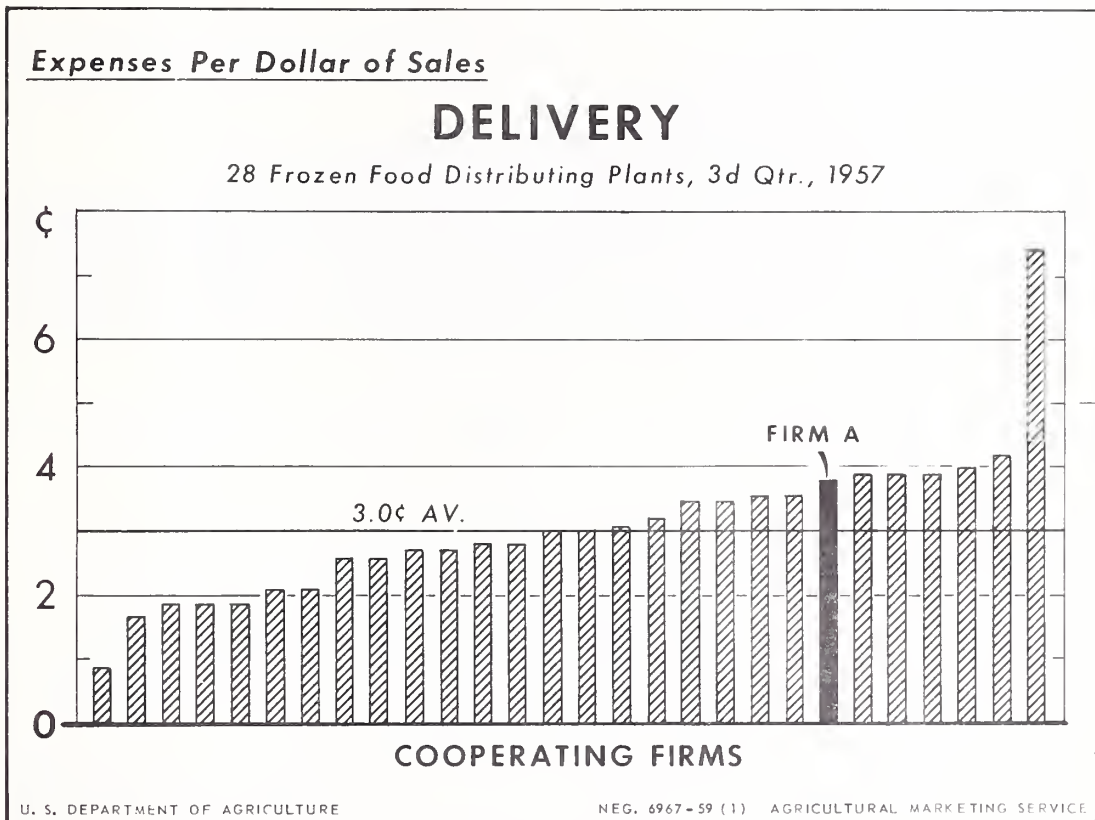
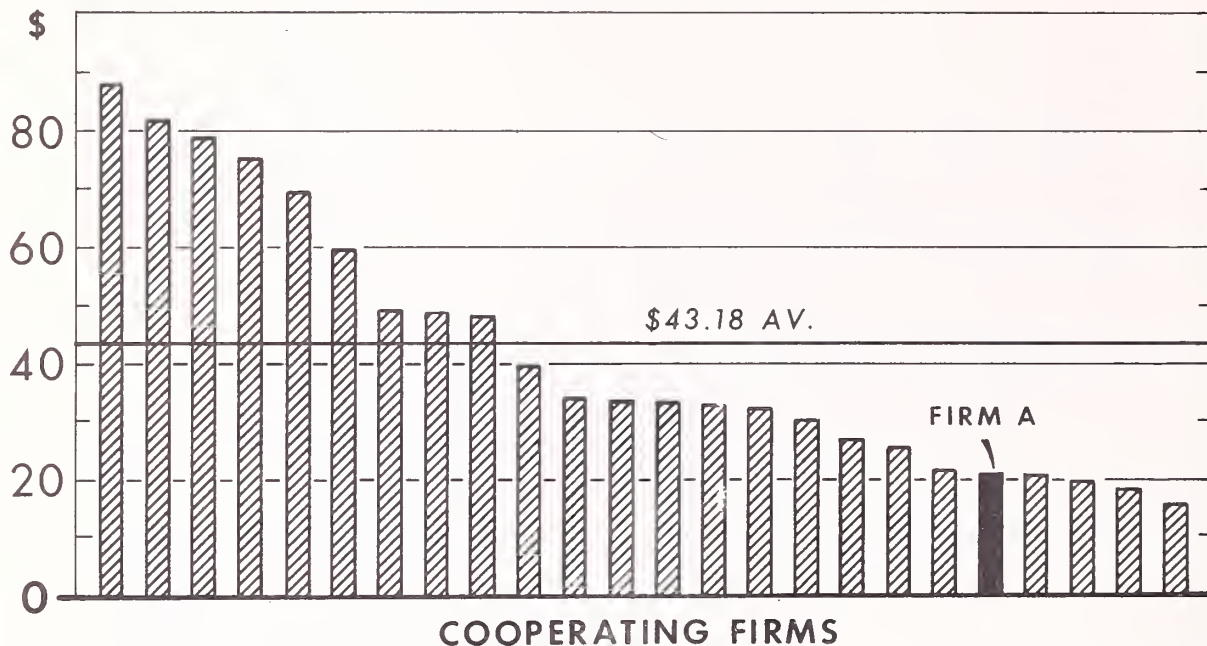


Figure 22

Figure 22 shows delivery expense per dollar of sales. Again, Joe's costs are above the group average of 3.0 cents. There is room for improvement here. Is there anything unusual about Joe's operations which might help to explain his high delivery and order assembly costs? Could average size of order be a factor? This relationship is shown in figure 23.

AVERAGE SIZE OF ORDER SOLD BY DISTRIBUTORS

Frozen Food Distributing Plants, 3d Qtr., 1957



U. S. DEPARTMENT OF AGRICULTURE

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Figure 23

Figure 23 shows the average size of order for each of the firms reporting. From Joe's position in this figure, it appears that his average size of order was about half the group average. His orders averaged \$21 and the group average was \$43. Perhaps this may help to explain his high order assembly costs and delivery costs. The overall analysis of factors affecting operating costs indicates that a \$10 increase in average size of order should reduce total operating costs by 0.47 cent per dollar of sales. If Joe's average size of order were increased to \$43, his total operating costs should be reduced by 1.0 cent per dollar of sales. Joe's order assembly costs were 0.7 cent above the group average and his delivery expenses were 0.8 cent above the group average. It appears that the small order size might account for a large part of Joe's higher order assembly and delivery costs. Is there anything unusual about Joe's customers which might cause his average size of orders to be small?

The predominant type of customer served by a frozen food distributor affects his average size of order. Table 10 gives the average size of order by type of customer (retail chain stores, independent stores, and institutional and other outlets) for each quarter during 1956 and 1957.

Table 10.--Average size of order, by type of customer, 1956-57

1956				1957					
Quarter	No. of firms reported	Type of customer : Chain : Independent	Institutional	Quarter	No. of firms reported	Type of customer : Chain : Independent	Institutional		
First---	20	\$69.10	\$36.52	\$32.78	First---	25	\$74.10	\$39.00	\$32.69
Second--	17	79.18	34.68	35.75	Second--	21	74.98	39.66	30.47
Third---	22	87.42	37.70	30.38	Third---	19	77.12	40.19	30.39
Fourth--	23	66.48	39.37	30.61	Fourth--	15	87.99	46.16	30.18
Average--	20	75.54	37.07	32.38	Average--	20	78.55	41.25	30.93

Table 11 gives the percentage of total sales accounted for by these same three types of outlets during 1956 and 1957.

Table 11.--Percent of total sales, by type of customer, 1956-57

1956				1957					
Quarter	Firms reported	Type of customer : Chain : Independent	Institutional	Quarter	Firms reported	Type of customer : Chain : Independent	Institutional		
	Number	Per cent	Per cent		Number	Per cent	Per cent		
First---	20	12.9	65.3	21.8	First---	25	14.2	59.0	26.8
Second--	17	10.3	65.0	24.7	Second--	21	18.2	50.6	31.2
Third---	22	11.7	62.9	25.4	Third---	19	18.7	46.9	34.4
Fourth--	23	14.0	60.3	25.7	Fourth--	15	21.0	49.5	29.5
Average--	20	12.2	63.4	24.4	Average--	20	18.0	51.5	30.5

In checking his quarterly report, Joe could find that almost half of his sales were to restaurants. According to table 10, restaurant or institutional orders averaged less than half the average size of those made to chain stores and about three-fourths as large as the orders of independent retail stores. Even so, Joe's orders to all 3 types of customers averaged only \$21, while the group average sales to restaurants and other institutional customers was around \$31. It would appear that here was another area where improvement was needed. Without the benefit of such comparisons with other firms, Joe would be at a loss in evaluating his own data.

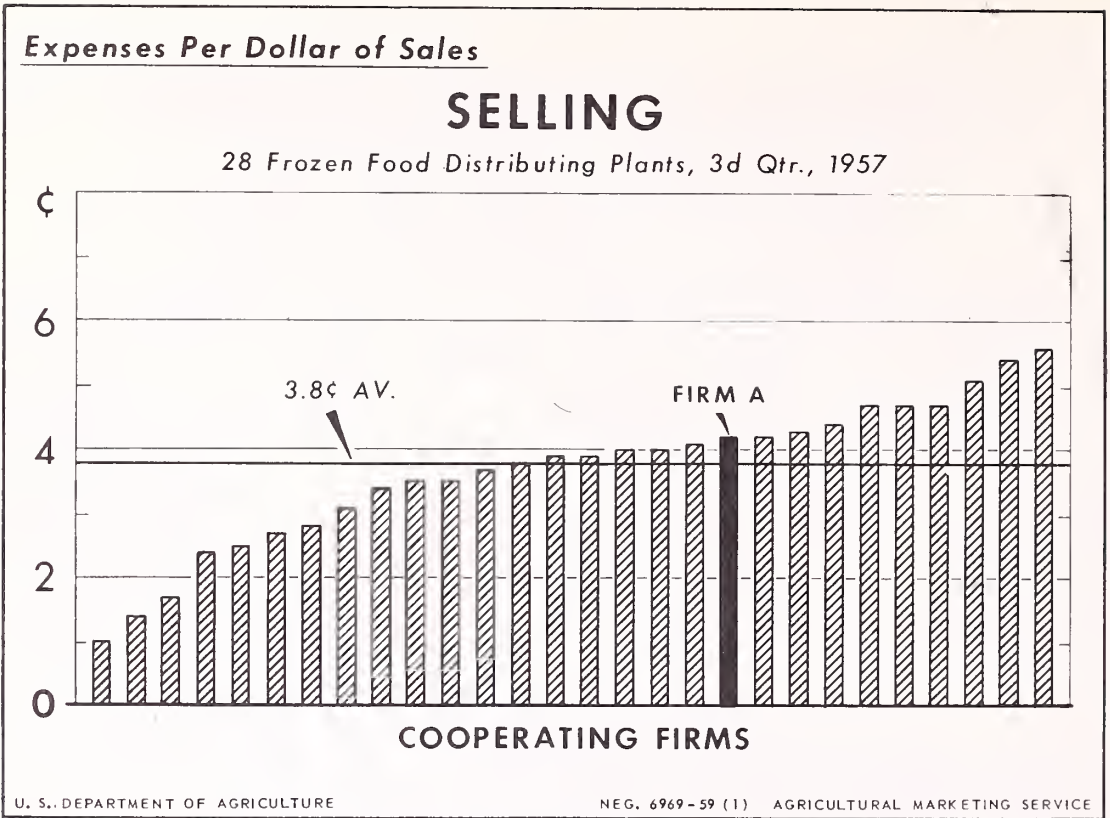


Figure 24

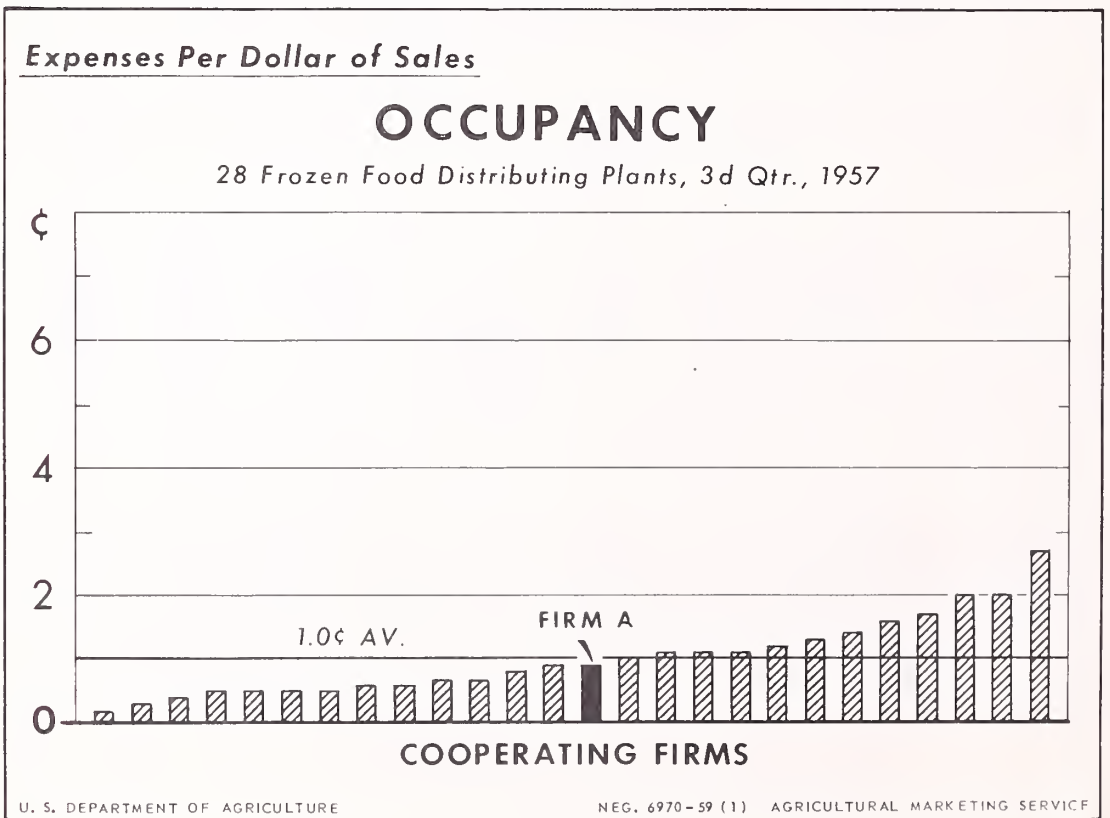


Figure 25

Figure 24 shows that Joe's selling expenses were slightly higher than the group average of 3.8 cents per dollar of sales. Perhaps Joe has a campaign under way this quarter to expand total sales as well as number of customers. This he would take into consideration in evaluating his position in figure 24.

Figure 25 shows the occupancy expenses per dollar of sales. This category accounts for only 7 percent of the total operating costs. Joe is average, so he does not need to be so concerned with this factor as with others.

From these charts it has been possible to signal to management each operation which appears to be high or low in relation to others.

Practically every firm showed some area of strength and weakness. These charts, based upon current operating costs, should help management estimate the potential savings which might be realized. Management can then decide whether to attempt to improve the situation itself or have an engineering study made of its plant operations.

In either event, the uniform cost accounting records should pinpoint the areas where the study would be most helpful.

When reviewing the charts and tables, one should keep in mind that each firm's operations are somewhat different from the others. Many factors influence costs. Review of these factors may show that certain operations are necessarily high-cost because of a particular situation. For example, it may be profitable for a firm to provide additional services which increase its operating costs.

Operating costs are a firm's best guide to efficiency and increasing future profits. Competition usually sets a frozen food distributor's selling price and he has little control over the price level. It is not difficult for a warehouseman or chain store operator or food broker to take over part or all of the distributor's operations if it appears that it might be profitable to do so. The fact that this has been done should be evidence that competition is keen. ^{15/} For this reason, the area where management can exercise most influence is that of operating costs.

^{15/} As the frozen food industry has grown, chain stores which purchase directly from food packers have been distributing increasing quantities from chain distribution warehouses. Under this procedure, the frozen food distributor is bypassed. The order assembly operation otherwise performed by the distributor is handled by the warehouse; a trucking organization may provide the delivery service; the member stores take over the job of stocking the frozen food cabinets, price marking the merchandise, and arranging the displays. In other cases where the retail buying organization does not use its own distribution warehouse, a frozen food distributor may provide (1) the order assembly operation, or (2) the drayage (delivery) service, or (3) both of these. There appears to be no fixed pattern in the industry.

Operating costs become increasingly important when more intense competition enters a market. The firm with the lowest operating costs for a given set of services is most likely to succeed. It is essential, however, that costs be related to services for valid comparisons.

Many other useful comparisons can be made from a uniform cost accounting system. Average collection periods, orders per hour of labor, and ratios of current assets to current liabilities, of inventory to working capital, of current debt to net worth, and of net income to net worth are a few of the factors that can be compared.

Have you held your own? Have you reversed the industry trend? Did you backslide? Another area where the frozen food distributor's uniform cost accounting program can be of use to management is in the establishment of trends. It requires a complete year of data from the accounting study to establish a tentative seasonal pattern for the industry. A firm having a year's records can check its current quarterly sales against its own records for the corresponding quarter of the previous year, and also can compare its score with that of the industry. Similar comparisons can be made of the costs of performing each operation, of gross and net profits, and of sales by category of items. Such information is useful to management in locating reasons for trends in costs.

Comparisons Between Individual Firms

The statement sometimes is made that an individual firm's cost comparison with the industry average may not be as useful as it should be because the firm's market is unusual. There may be some truth in this statement, despite the fact that two-thirds of the variation in operating costs between individual firms can be explained by differences in (1) average size of orders, (2) man-hours per \$100 of sales, and (3) average hourly wage rates.

It has been observed that the amount of services provided is closely related to the type of customer served. The amount of services provided by frozen food distributors is an important factor affecting operating costs. In this study, there appeared to be no practical way of separating costs by specific services performed, because many distributors' operations are not big enough to justify such detailed record keeping. Rather, operating costs were allocated according to functions and major cost categories. Since services appear to be related to type of customers served, a more practical approach would be to group the reporting firms into three categories, those selling predominantly to: (1) The smaller independent retail stores, (2) chain and independent supermarkets, and (3) restaurants and other institutions. Among these three groupings ^{16/} there is a distinct difference in average size of order (table 10). The information on average size of order by type of customer was obtained for each of the cooperating firms.

^{16/} See appendix, Schedule 3, p. 52, for allocation of expense items.

Table 12 shows a difference among types of customers served with respect to operating costs per dollar of sales. Since operating cost information could not be separated by type of customer for each distributor, the firms were grouped according to the predominant type of customer. The number of firms in this study having sales predominantly to chain stores and institutions was insufficient to assure representativeness in comparisons of operating costs for these specific types of customers. However, the differences shown in table 12 are in the direction of what common sense and a knowledge of the industry would suggest. As additional firms are added to the accounting program, the reliability of this type of customer comparisons should improve. However, this does not reduce the advantage of comparing operating costs between individual firms having similar customers.

Table 12.-- Average operating cost per dollar of gross sales, by type of customer, 1956-57

1956				1957			
Quarter	Type of customer 1/			Quarter	Type of customer 1/		
	Chain	Inde- pendent	Insti- tutional		Chain	Inde- pendent	Insti- tutional
	Cents	Cents	Cents		Cents	Cents	Cents
First---	7.8	12.7	14.2	First---	10.2	14.0	16.5
Second--	8.1	13.5	14.2	Second--	8.0	13.9	13.8
Third---	9.8	15.3	14.0	Third---	9.1	14.9	14.8
Fourth--	13.7	14.2	13.5	Fourth--	11.7	14.3	15.6
Average-	9.8	13.9	14.0	Average-	9.8	14.3	15.2

1/ Includes only those distributors who sold over 50 percent of their total sales to this type of customer.

Any two firms having similar business characteristics may be able to increase the value of the cost signal system greatly through a paired comparison of costs. To illustrate, two of the reporting firms have been selected which were similar with respect to size of business, type of customer, operating costs per dollar of sales, and geographical location. Both firms were better than average operators.

Table 13 shows the relative cost advantage which one firm appears to have over the other for each of the expense categories.

Table 13.--Potential gains from acquiring the cost advantages of the more efficient firm, cents per dollar of sales

Expense categories	Firms	
	A	B
	<u>Cents</u> <u>1/</u>	<u>Cents</u> <u>1/</u>
General and administrative-----	--	0.90
Order assembly-----	0.40	--
Delivery-----	0.70	--
Selling-----	--	0.70
Occupancy-----	--	0.30
Storage-----	--	0.90
Total gain-----	1.10	2.80

1/ Figures rounded to nearest tenth of a cent.

The potential gains listed for firms A and B are not intended as an exact measurement of practical goals for reducing operating costs. Rather, they serve as guides to management in identifying the more fruitful areas for reducing costs. Even a small improvement can represent a significant accomplishment in terms of annual cost savings. For example, if either firm could achieve as much as half of the cost advantage of the more efficient operations shown in table 13, the potential savings would exceed either firm's net profits currently realized during any one quarter of the year.

IMPLICATIONS TO THE INDUSTRY

The analysis of the cost information collected on a uniform accounting basis revealed that considerable variation in operating costs does exist between firms supplying different types of customers. The figures indicate that, if an overall industry average were used as a gross profit ceiling during a national emergency, certain firms could become bankrupt if they did not eliminate some of the services they are now providing, while others would realize excessive profits.

This study provides the industry with information needed to group firms according to types of customers served. The study also shows that medium-sized firms have been able to achieve efficiencies in operation so that they can compete successfully with larger companies.

Chain stores and independent supermarkets stand ready either to shift their buying from one distributor to another or to take over the functions of frozen food distributors if they suspect that this might lower distribution costs. Therefore, efficiency in operation and flexibility in the services offered to different types of customers are the distributor's best weapons in

this competitive situation. A knowledge of costs in relation to services provided is essential in providing flexibility in services offered. The comparison of information on operating costs between firms grouped according to types of customers should contribute to increasing the frozen food distributor's efficiency and reducing his costs. When operating costs are reported on a uniform basis and are separated as to functions--such as order assembly, delivery, and selling--the distributor has a basis for comparing his costs with those of other organizations not performing all of the functions ordinarily performed by a frozen food distributor.

The uniform cost accounting data furnish each individual distributor with a scorecard showing his cost position relative to those of other distributors for each specific function or expense category. This scorecard signals to management the areas where efforts should be directed toward reducing operating costs. Aided by this management guide, each distributor must work out his own destiny within the framework of (1) type of customers served, (2) market locality and available plant facilities, (3) competitive position, (4) local labor supply, and (5) bargaining ability in buying and selling frozen foods.

APPENDIX

WHOLESALE FROZEN FOOD DISTRIBUTORS

CONDENSED STATEMENT OF INCOME FROM OPERATIONS

FROZEN FOOD ONLY

FOR THE THREE MONTHS ENDED _____

IMPORTANT:		Amount (Omit Cents)	% to Net Sales
If your gross sales of frozen food constitute at least 85% of your total gross sales of all products, you are not required to segregate the frozen food transactions. In this event the figures reported hereon will be for all products, and a check mark (✓) will be inserted here _____ .		A	B
1	Gross sales		
2	Less: Return sales		
3	Sales allowances		
4	Sales discounts		
5	Total Deductions from Gross Sales		
6	Net sales		100.00
7	Cost of sales before purchase discounts		
8	Gross profit before purchase discounts		
9	Plus: Purchase discounts		
10	Gross profit		
	Operating Expenses (per Schedule 1)		
11	General and administrative expense		
12	Storage expense		
13	Order assembly expense		
14	Delivery expense		
15	Selling Expense		
16	Occupancy expense		
17	Total Operating Expenses		
18	Net income from operations		
	Supplementary Data		
19	Total number of orders filled		
20	Number of labor hours, excluding executive (Note 1)		
	General and administrative department		
21	Storage department		
22	Order assembly department		
23	Delivery department		
24	Selling department		
25	Occupancy department		
	Total All Departments		

Note 1 - If it is not practicable to report actual figures for the departmental breakdown of labor hours, members are requested to furnish estimated figures. The total labor hours should be on an actual basis.

MEMBER CODE NO. _____

STATEMENT B-1

WHOLESALE FROZEN FOOD DISTRIBUTORS
INTERIM BALANCE SHEET ITEMS
AS AT SEPTEMBER 30, 1956

1. Receivables

2. Inventory

WHOLESALE FROZEN FOOD DISTRIBUTORS
 SCHEDULE OF OPERATING EXPENSES
 FROZEN FOOD ONLY

FOR THE THREE MONTHS ENDED _____

	Natural Expense Classification	AMOUNTS (Omit Cents)						
		Totals	General and Administrative Expense	Storage Expense	Order Assembly Expense	Delivery Expense	Selling Expense	Occupancy Expense
		A	B	C	D	E	F	G
1	Executive Salaries			XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
2	Supervision Salaries and Wages							
3	All other Salaries and Wages							
4	Supplies							
5	Payroll Taxes			XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
6	All other Taxes except Federal Income			XXXXXX	XXXXXX			
7	Depreciation and Amortization							
8	Insurance			XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
9	Rents							
10	Purchased Power, Light, Heat and Water		XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	
11	Repair and Maintenance Expenses							
12	Other Occupancy Expenses		XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	
13	Maintenance Expense Clearing Account (credit)		XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	
14	Advertising and Sales Promotion		XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
15	Outside Storage or Delivery Expense		XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
16	Freight and Express other than on Mdse. Purchases			XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
17	Entertainment Expenses			XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
18	Traveling Expenses			XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
19	Telephone, Telegraph and Cables			XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
20	Postage			XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
21	Dues and Subscriptions			XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
22	Charitable Donations			XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
23	Credit and Collection Expenses			XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
24	Provision for Bad Debts			XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
25	Professional Services			XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
26	Pensions and Other Employees' Benefit Expenses			XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
27	Bank Charges			XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
28	Miscellaneous Other Expenses			XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
29	Total Operating Expenses							

MEMBER CODE NO. _____

SCHEDULE 2

WHOLESALE FROZEN FOOD DISTRIBUTORS

SCHEDULE OF GROSS SALES AND INVENTORY

FOR THE THREE MONTHS ENDED _____

		Amounts and Percentages		Number of Dozen (Note 1)	
		Gross Sales		Gross Sales	Closing Inventory
		Amount (Omit Cents)	% to Total Frozen Food		
		Estimated _____ or Actual _____		Estimated _____	Estimated _____
		A	B	C	D
	<u>Frozen Food</u>				
1	Fruits				
2	Vegetables				
3	Concentrates				
4	Meat				
5	Fish				
6	Poultry				
7	Prepared Foods				
8	Other Frozen Food				
9	Total Frozen Food		100.00		
	<u>Other Products (Note 2)</u>				
10	A				
11	B				
12	C				
13	D Sundry Other Products				
14	Total Other Products				
15	Grand Totals				

Note 1 - If it is not practicable to report actual figures of gross sales and closing inventory in dozen (Columns C and D), members are requested to furnish estimated data.

Note 2 - Members are requested to furnish either an actual or estimated analysis by major commodity categories of gross sales of other (non-frozen food) products if possible. In any event the total gross sales of such other products must be reported.

MEMBER CODE NO. _____

SCHEDULE 3

WHOLESALE FROZEN FOOD DISTRIBUTORS

SCHEDULE OF SALES, ORDERS, AND OPERATING EXPENSES BY TYPE OF OUTLET

FROZEN FOOD ONLY

FOR THE THREE MONTHS ENDED _____

	Check Proper Column	AMOUNTS (Omit Cents)					All Other Outlets					
		Totals		Independent Retail Stores	Chain Stores	Institutions						
		Estimated	Actual					A	B	C	D	E
1	Gross Sales - Amount (Note 1)											
2	Gross Sales - % to Total					100.00						
3	Number of Sales Orders Filled											
4	Operating Expenses (Note 1)											
	General and Administrative											
5	Storage											
6	Order Assembly											
7	Delivery											
8	Selling											
9	Occupancy											
10	Total Operating Expenses											

Note 1 - The Total Gross Sales and Operating Expenses shown hereon must agree with the respective totals shown on Statement A.

General Note 2 - Members are required to report the percent of sales to each type of outlet to the Total Sales (Line 2). It is recognized that the remaining data called for on this schedule (gross sales, number of sales orders, and operating expenses, all by type of outlet), may be difficult to obtain, but members are requested to furnish this data, at least on an estimated basis, if it is at all possible to do so.

Table 14.--Net influence of man-hours per \$100 of sales, average size of order, and hourly wage rates on frozen food distributors' operating costs per dollar of sales, 1957

Observation quarter	a	b 12.34	b 13.24	b 14.23	R 1.234
First-----	6.7	1.45	-0.04	1.77	0.74
Second-----	9.0	1.39	-0.05	0.82	0.81
Third-----	9.9	1.24	-0.05	0.95	0.80
Average $\frac{1}{3}$ -----	8.5	1.36	-0.047	1.18	0.78

$\frac{1}{3}$ The fourth quarter has been omitted because it contains final year-end adjustments which may vary from firm to firm.

The formula for estimating total operating costs per dollar of sales is as follows: $X_1 = a + b_{12.34} X_2 + b_{13.24} X_3 + b_{14.23} X_4$.

Where X_2 represents man-hours per \$100 of sales, X_3 represents average size of order in dollars, and X_4 represents average hourly wage rates.

Table 15.--The standard errors for the estimate shown in table 14.

Observation quarter	σ a	σ b 12.34	σ b 13.24	σ b 14.23
First-----	2.84	.5344	.0197	.9288
Second-----	2.50	.4487	.0202	.8154
Third-----	2.55	.4489	.0200	.8046

The standard errors shown in table 15 indicate that the estimates for the individual quarters shown in table 14 do not differ significantly. Therefore, the use of the 3-quarter average for the estimating formula is applicable for any one of the 3 quarters.

Table 16.--Analysis of variance of operating costs per dollar of sales by frozen food distributors, third quarter, 1957

Source of variation	Degrees of freedom	Sum of squares	Mean square
Total-----	24	167.2333	--
Regression (3 variates)-----	3	108.09578	36.03193
Regression (X_3 only)-----	1	83.97492	83.97492
Residual-----	23	83.25842	3.61993
Added regression due to $X_2 + X_4$ -----	2	24.12086	12.06043
Error-----	21	59.13756	2.81018

Variation in operating costs explained by $R^2_{1.234} = \frac{108.09578}{167.2333} = .65$

Variation in operating costs explained by X_3 (size of order) $R^2_{1.3} = \frac{83.97492}{167.2333} = .50$

Additional variation explained by X_2 (man-hours per \$100 of sales) and X_4 (average hourly wage rate) $= \frac{24.12086}{167.2333} = .14$

Test of Significance for X_3

$F = \frac{83.97492}{3.61993} = 27.$

The expected F ratio for 1 variable with 23 degrees of freedom is 7.8 at the 1-percent level, which is less than 27. Therefore, $V_{1.3}$ is highly significant. Did the addition of X_2 and X_4 , accounting for .14 in the estimating equation, make a significant contribution?

Test of Significance for X_2 and X_4

The addition of X_2 and X_4 was a significant contribution to the variance explained by X_3 as shown by the following F test.

$F = \frac{12.06043}{2.81018} = 4.29$

The expected F ratio for 2 variables and 21 degrees of freedom is 3.44 at the 5-percent level and 5.7 at the 1-percent level. Therefore, the addition of X_2 and X_4 , accounting for .14 in the estimating equation, is significant at the 5-percent level.

Table 17.--Analysis of variance of average hourly wage rates in the North and in the South, third quarter, 1957

Source of variation	Degrees of freedom	Sum of squares	Mean square
Total-----	23	7.7720	--
Between regions-----	1	1.0442	1.0442
Between firms-----	22	6.7278	0.3058

$$F = \frac{1.0442}{0.3058} = 3.41$$

For the degrees of freedom involved in tables 17-20, the expected F ratio at the 5-percent point is equal to approximately 4.30, and at the 1-percent point is approximately 7.94.

The average hourly wage rate variation between firms located in the North and those located in the South, based on the third quarter of 1957, is not significant at the 5-percent level.

Table 18 --Analysis of variance of man-hours per \$100 of sales in the North and in the South, third quarter, 1957

Source of variation	Degrees of freedom	Sum of squares	Mean square
Total-----	23	35.156647	--
Between regions-----	1	0.946408	0.946408
Between firms-----	22	34.210239	1.555011

$$F = \frac{0.946408}{1.555011} = 0.6086$$

The variation in man-hours per \$100 of sales between firms in the North and in the South is not significant.

Table 19 --Analysis of variance of average size of order in the North and in the South, third quarter, 1957

Source of variation	Degrees of freedom	Sum of squares	Mean square
Total-----	23	11509.9048	--
Between regions-----	1	861.2296	861.2296
Between firms-----	22	10648.6752	484.0307

$$F = \frac{861.2296}{484.0307} = 1.78$$

The variation of average size of order between firms in the North and in the South is not significant.

Table 20.--Analysis of variance of total operating costs per dollar of sales in the North and in the South, third quarter, 1957

Source of variation	Degrees of freedom	Sum of squares	Mean square
Total-----	23	167.23	--
Between regions-----	1	11.21	11.21
Between firms-----	22	156.02	7.09

$$F = \frac{11.21}{7.09} = 1.58$$

The variation in total operating costs per dollar of sales between firms in the North and in the South is not significant.

