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Bruce C. Waterman

Emerson M. Babb

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ALLOCATION OF ICE CREAM DISTRIBUTION COSTS

Bruce C. Waterman and Emerson M. Babb  
Department of Agricultural Economics

This report is intended to assist ice cream processors and distributors in measuring and controlling distribution costs. Substantial cost savings have been realized in other industries where the procedures to be discussed were applied. Specifically, it should help in answering questions such as:

- a. How much labor and costs are involved in servicing various kinds and sizes of customers with different services?
- b. What is the performance level of the deliveryman and work content of the route?
- c. How profitable is a particular customer or route?

Answers to these questions are needed if prices are to bear some relationship to cost of providing varying services to customers purchasing different volumes. They also become key elements in a management information system which identifies areas of poor performance and causes of results that do not measure up to standard.

Data for Distribution Cost Analysis

To answer the above questions, time and cost studies of ice cream distribution were made. The needed results from these studies are presented along with specific methods of analyzing operational questions.<sup>1</sup> The processor should thus be able to use the step-by-step methods illustrated by applying data presented in appendix tables (or comparable cost data from his own company).

Time Study Data

A time study was conducted with eight cooperating centers of ice cream distribution covering northern Indiana. The time study included all the tasks performed by the routeman in a normal workday, and exhausted all time from the driver's arrival for work in the morning until his departure from the plant at the end of the day.

The time study included 80 different routes with 1,397 observations of servicing wholesale customers. The time study was conducted during June, July, and August, 1966. The size of the eight operations varied greatly and thus provided a good cross-section of the ice cream distribution centers.

The results of the time study of ice cream distribution are used as labor standards. They provide a method of determining the amount of time required to service individual customers and the total time required to operate a particular route. Knowledge of the time requirements is essential in the structuring of routes and in the calculation of customer and route profitability.

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<sup>1</sup>For more detailed information on the time and cost studies, see Bruce C. Waterman and Emerson M. Babb, Analysis of Time Requirements for Distributing Ice Cream, Res. Progress Report 322, Indiana Agr. Exp. Sta., 1967. Helpful suggestions were made by J. C. Snyder and K. W. Kepner.

In the application of labor standards for ice cream delivery, accuracy is gained through increased complexity. The more accurate labor standards, the more laborious is the task of application. Class I, II, and III standards were named with respect to the degree of precision obtained through their use; i.e., Class I standards are the most accurate while Class III standards are the least accurate (Appendix Table 1). The advantage of the abbreviated standards is that the user may not desire, or cannot obtain the individual store characteristics required to use the Class I standards.

In addition to customer service, standards concerning driving and other route functions are required to analyze the overall route. (Appendix Table 2 and 3). With these standards and knowledge of the tasks performed, the work content of the route (required time at standard) and performance of the routeman (comparison of actual time worked and work content) can be determined. The proportion of income producing work (servicing customers) can be analyzed. As shown in Appendix Table 3, almost half of the driver's time is spent on functions other than servicing customers. Comparisons of performance levels for these factors among routes may point to sources of trouble.

#### Determination of Total Delivery Expense

A cost study was made of data from three ice cream processors regarding truck and labor cost from June 1965 to May 1966. It is not known to what extent the figures obtained were typical or average cost figures for the industry.

Total delivery expense was made up mainly of routemen's labor and fringe benefits, truck costs, and management or supervisory salaries. In addition to the three main items, expenses for company personnel who assist in loading delivery trucks and plant maintenance personnel who perform minor maintenance on delivery trucks were included. All cost data presented should be regarded as illustrative for the procedures proposed. Comparable data for your operation should be obtained and used. Such analyses may also prove valuable as indicators of sources of high costs.

#### Truck Cost

Truck cost data were obtained for 18 trucks and were divided into two major components -- fixed and variable costs. Fixed costs were those costs that occur regardless of the number of miles driven; i.e., depreciation of truck chassis and body, insurance, license plates, and property taxes. Variable costs were those costs directly associated with the number of miles driven; i.e., gasoline and oil, repairs and maintenance, and tires. Truck costs are summarized in Appendix Table 4.

#### Routeman's Labor Cost

Labor costs for 16 drivers were classified as fixed and variable costs. Fixed costs were those costs that occur regardless of the amount of product sold; i.e., base salary, insurance, and fringe benefits. Variable costs included commission on volume sold. Labor costs are summarized in Appendix Table 5.

#### Management, Route Supervision, and Loading Expense

In addition to truck and routemen's labor expense, the cost of management, route supervision, and plant labor used in assisting the driver to load his truck needs to be considered if the total delivery cost is to be determined. The individual company's delivery expense for management, route supervision, and loading assistance was estimated with the help of the management (Appendix Table 6).

## Procedure for Determining Customer and Route Profitability

Evaluation of the distribution cost of ice cream will involve consideration of labor standards and financial analysis. Through the use of the labor standards, the time required to service various types of customers can be estimated. The estimated time can be converted into a cost of servicing through the use of the financial analysis. Once the cost of servicing a particular customer or route is calculated, the profitability of that customer or route can be determined. The profit or loss per customer or route is the selling price of the ice cream minus the platform cost and cost of delivery.<sup>2</sup>

### Method of Budgeting Individual Customer Cost and Profitability

The routeman's time in servicing individual customers involves:

1. actual servicing of the stop,
2. driving time required by the stop, and
3. indirect work required by the stop.

It is assumed that the indirect work required by the routeman is directly proportional to the direct work on the route. Therefore, the allocation of the indirect work will be based on the percentage of time spent in indirect work by all routemen (Appendix Table 3) multiplied by the direct work required by the customer.

The four costs in servicing a customer consist of the following:

1. the routeman's time,
2. commission costs,
3. truck costs, and
4. the cost for management, route supervisors, and at plant loading assistance given the routeman.

The suggested method of allocation of distribution cost is outlined in the following procedure.

Step 1: Determine direct labor time in servicing stop. Given the individual customer's characteristics and volume, select and apply labor standards (Appendix Table 1) for full service or drop and partial drop service and estimate the total direct time required by the stop. The annual volume is multiplied by the respective time requirement (three dozen novelties are treated as one unit). The total direct time at the stop is obtained by adding the time required for each variable. The individual performing the analysis can obtain the customer information from the routeman.

Step 2: Determine the indirect work required by the stop. The indirect work is defined to include break time, delay, personal selling, and at plant tasks which comprise 23.29 per cent of the work day or 44.51 per cent of the direct time (Appendix Table 3).<sup>3</sup> (44.51%) (Total Direct Time) = (Total Indirect Time)

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<sup>2</sup>The platform cost includes the cost of labor and ingredients used in processing ice cream and transporting it to the plant loading dock.

We will first outline the method of budgeting individual customer cost and profitability and then the method of budgeting route costs and profitability.

$${}^344.51\% = \frac{\text{Percent of Indirect Time of Total Time}}{\text{Percent of Direct Time of Total Time}} \quad (100)$$

Step 3: Determine the amount of time required to drive to the stop (Appendix Table 2).  $(\text{Driving standard}) (\text{Mileage}) = (\text{Driving Time})$

Step 4: Determine total labor cost. Add the time required in Steps 1, 2, and 3 and multiply the total time required by the cost per minute of the routeman's time (Appendix Table 5). The actual cost of the routeman's time, if available, should be used instead of the standard of 3.29¢/minute.

Step 5: Determine commission costs for units delivered (Appendix Table 5).  $(\text{Units Delivered}) (\text{Commission Rate}) = (\text{Commission Cost})$ . The actual commission paid on units delivered should be used.

Step 6: Determine the truck cost for servicing the stop (Appendix Table 4).  $(\text{Mileage}) (\text{Cost per Mile}) = (\text{Truck Cost})$ . The actual cost per mile should be used.

Step 7: Determine the cost for management, route supervisors, and at-plant loading assistance given the routeman (Appendix Table 6).  $(\text{Units Delivered}) (\text{Cost per Unit}) = (\text{Management and Plant Loading Cost})$ .

Step 8: Determine the total delivery cost for the customer by adding the cost of Steps 4, 5, 6, and 7.

The four costs and the eight steps in allocating distribution costs are best illustrated in the calculation of delivery cost for a hypothetical customer. The following example is meant only to illustrate the above procedure. Let us assume a hypothetical customer with the following characteristics:

1. Combination (type of customer which purchases ice cream in both bulk and packages)
2. Slight store congestion at the time of delivery
3. Routeman marks price on packaged items
4. Annual Volume purchased
  - A. 1,870 gallons in bulk containers
  - B. 940 gallons in one gallon packages
  - C. 2,496 gallons in one-half gallon packages
  - D. 468 gallons in quart packages
  - E. 624 gallons in pint packages
  - F. 3,120 dozen of novelties (1,040 units, 3 dozen = 1 unit)
5. Average per customer driving time on route of 4 miles of in-town congested traffic to service stop.

Let us further assume that the customer is serviced three times a week for a total of 156 stops by the routeman. The calculation of the annual delivery cost for the full-service stop is as follows:



Step 1: Determine direct labor, time in servicing stop (minutes).

<u>Variable</u>	<u>Standard</u>	<u>Occurrence</u>	<u>Time Required</u>
Fixed time per customer	9.78	156	1,525.68
Combination	4.22	156	658.32
Mark price	4.37	156	681.72
Bulk	.130	1,870	243.10
One-gallons	.290	940	272.60
One-half gallons	.268	2,496	668.93
Quarts	.666	468	311.69
Pints	.367	624	229.01
Novelties	.621	1,040	645.84
<b>Total Direct Time at Stop</b>			<b>5,236.89</b>

Step 2. Determine the indirect time required by stop (minutes)

<u>Indirect Work As a percentage of Direct Work</u>	<u>Direct Work Required</u>	<u>Total Indirect Work Required</u>
44.51	5,236.89	2,330.94

Step 3: Determine the driving time to stop (minutes)

<u>Variable</u>	<u>Standard</u>	<u>Miles to Service Stop</u>	<u>Time Required</u>
In Town Congested Traffic	3.70	(4) (156)	2,308.80

Step 4: Determine total labor costs.

<u>Total Time Required</u>	<u>Cost Per Minute</u>	<u>Cost Per Stop</u>
9,876.63 min.	3.29¢/min.	\$324.94

Step 5: Determine commission cost for units delivered.

<u>Units Delivered</u>	<u>Cost per Unit</u>
7,438	3.04¢.....\$226.12

Step 6: Determine truck cost for servicing stop.

<u>Miles to Service Stop</u>	<u>Cost per Mile</u>
(4) (156)	13.56¢.....\$ 84.61

Step 7: Determine cost for management, route supervisor, and at plant loading assistance.

<u>Volume Delivered</u>	<u>Cost per Unit</u>
7,438	2.15¢..... \$159.92

Step 8: Determine total delivery cost for stop..... \$795.59

The total annual delivery cost for the stop was \$795.59. If drop or partial drop was used instead of full service the same general procedure would be used; however the labor standards for drop and partial drop service would be substituted for the full-service labor standards.

If excess capacity were present in the delivery operation, the added cost of servicing the same customer would be the routeman's variable cost of \$226.12 plus the variable truck cost of 8.99¢ per mile multiplied by the mileage of 624 miles for a variable truck cost of \$56.10.<sup>4</sup> The added cost of servicing the customer is \$282.22, which is only 35.5 per cent of the total cost. Thus, the hypothetical example demonstrates the need for the route to operate near full capacity because of the high fixed cost of ice cream delivery.

The profitability of the individual customer is determined by the selling price, platform cost and cost of delivery. The margin available for servicing an individual customer is determined by subtracting the platform and delivery cost from the selling price. The ice cream products have differing total delivery cost per unit because they require a different amount of time in delivery.

The procedure used to determine the per unit delivery cost for the different products and the delivery cost for the average unit delivered for the hypothetical customer is illustrated in Table 1 and is shown below.

The procedure used in calculating the per unit delivery costs for bulk ice cream for the example is:

Step 1: Calculate the individual product share of the direct time in servicing the stop.

$$\text{Step 1} = \frac{\text{Individual Product's Time}}{\text{Total Variable Direct Time at Stop}}$$

The total variable direct time at the stop is the time required for the individual products; i.e., bulk time =

$$.103 = \frac{243.10 \text{ min.}}{2,371.17 \text{ min.}}$$

Step 2: Calculate the cost of the total direct time in the servicing of the stop.

$$\begin{aligned} \text{Step 2} &= (\text{Total Direct Time at Stop}) (\text{Cost per minute}) \\ \$172.29 &= (5,236.89 \text{ minutes}) (3.29¢/\text{minute}) \end{aligned}$$

Step 3: Calculate the product share of the cost of the total direct time in servicing the stop.

$$\begin{aligned} \text{Step 3} &= (\text{Step 1}) (\text{Step 2}) \\ \$17.75 &= (.103) (\$172.29) \end{aligned}$$

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<sup>4</sup>This assumes that the marginal and average mileage of the customers are equal; i.e., that the mileage added to the route resulting from the additional customer is equal to the total route mileage divided by the number of customers. The average mileage per customer was used because the mileage to service each customer is dependent upon the route organization.

Table 1. Calculation of individual product distribution cost using a hypothetical customer and Class I labor standards.

Step Number	Step #1	Step #2	Step #3	Step #4	Step #5	Step #6
Product Delivered	Product Share of Delivery Time	Cost of Direct Time	Product Share of Direct Time	Per Unit Cost of Direct Time	Common Cost Per Unit of Products	Total Per Unit Delivery Cost
Bulk	.103	\$172.29	\$ 17.75	0.949¢	8.380¢	9.329¢
One Gallons	.115	172.29	19.81	2.107	8.380	10.487
One-Half Gallons	.282	172.29	48.59	1.947	8.380	10.327
Quarts	.131	172.29	22.57	4.823	8.380	13.203
Pints	.097	172.29	16.71	2.678	8.380	11.058
Novelties	.272	172.29	46.86	4.506	8.380	12.886
All Products	1.000	\$172.29	\$172.29	2.316¢	8.380¢	10.696¢

$$\text{Step \#1} = \frac{\text{Individual Product's Time}}{\text{Total Variable Direct Time at Stop}} \qquad \text{Step \#4} = \frac{\text{Step \#3}}{\text{Units of Product Delivered}}$$

$$\text{Step \#2} = (\text{Total Direct Time at Stop})(\text{Cost/Min.}) \qquad \text{Step \#5} = \frac{\text{Total Common Delivery Cost}}{\text{Total Number of Units Delivered}}$$

$$\text{Step \#3} = (\text{Step \#1}) (\text{Step \#2}) \qquad \text{Step \#6} = \text{Step \#4} + \text{Step \#5}$$

Step 4: Calculate per unit cost of total direct time.

$$\text{Step 4} = \frac{\text{Step 3}}{\text{Units of Product Delivered}}$$

$$.949¢ = \frac{\$17.75}{1,870}$$

Step 5: Calculate the per unit common delivery cost.<sup>5</sup>

$$\text{Step 5} = \frac{\text{Total Common Delivery Cost}}{\text{Total Number of Units Delivered}}$$

The total common delivery cost is composed of all cost except the cost for the direct time.

$$\text{Total Common Delivery Cost} = \text{Total Cost} - \text{Direct Time Cost}$$

$$\$623.30 = \$795.59 - \$172.29$$

$$8.380¢/\text{Unit} = \frac{\$623.30}{7,438 \text{ Units}}$$

Step 6: Calculate the total per unit delivery cost.

$$\text{Step 6} = \text{Step 4} + \text{Step 5}$$

$$9.329¢ = .949¢ + 8.380¢$$

<sup>5</sup>Units are defined as before; packages in terms of gallons with one gallon equal to one unit and three dozen novelties equal to one unit.



Table 2. Procedure to evaluate the per unit margin of different ice cream products and all products combined in servicing an illustrative customer.<sup>a</sup>

Type of Packaging	Selling Price	Platform Cost	Delivery Cost	Margin <sup>b</sup>
Bulk	\$1.55	\$0.735	\$.093	\$.722
Gallons	1.04	0.713	.105	.222
Half-gallons	1.58	0.829	.103	.648
Quarts	1.70	0.868	.132	.700
Pints	1.80	0.902	.111	.787
Novelties	2.75	1.755	.129	.866
All Products <sup>c</sup>	\$1.694	\$0.929	\$.107	\$.658

<sup>a</sup>"Delivery cost" is from Table 17, the "selling price" and "platform cost" data are hypothetical. This table could be transferred into a break-even analysis to determine profitability at various sales levels.

<sup>b</sup>The term "all products" consists of a weighted average in which the selling price and the platform cost of all products delivered is multiplied by the volume of each individual product, the sums added, and then divided by the total number of units delivered.

<sup>c</sup>The term "margin" does not imply profit, but the margin to recover the cost of administration, sales expense including advertising, operation and maintenance of plant refrigeration, cost of capital, and volume discounts.

The margin available to cover expenses of other than platform cost and delivery expense for the hypothetical customer is presented in Table 2. Hypothetical data were used for the selling price and the platform cost, while the delivery cost was obtained from Table 1. The margin was obtained by subtracting the per unit platform cost and the delivery cost of the ice cream from the selling price.

#### Method of Budgeting Route Costs and Profitability

The most accurate analysis of the three approaches in the determination of route cost and profitability is the use of the Class I labor standards. The procedure to determine the amount of time required and profitability of a given route is very similar to the procedure presented for the individual customer. The route time requirements and profitability are calculated for individual customers and then summed.

The Class II standards can be applied where complete customer information is not available or a simplified analysis will provide the needed accuracy. The following procedure outlines a method by which the route time requirements and profitability can be calculated using Class II standards.

#### Step 1: Determine routeman's annual direct time requirements.

- A. Obtain the number of customers and number of times serviced for the four categories.
  1. full service -- price marked
  2. full service -- price not marked
  3. drop and partial drop service -- price marked
  4. drop and partial drop service -- price not marked
  
- B. Obtain the volume delivered for the two types of service.
  1. full service
  2. drop and partial drop service

The individual performing the route analysis can obtain the above information from the routeman along with the names of the accounts.

C. Apply Class II labor standards (Appendix Table 1).

Step 2: Determine the indirect work required by the route (Appendix Table 3).  
 $(44.51\%) \text{ (Total Direct Time)} = \text{(Total Indirect Time)}$

Step 3: Determine the amount of time required in driving (Appendix Table 2). The annual mileage for the three types of driving conditions is multiplied by the appropriate time standard and the products summed to obtain the total annual driving time. If the annual mileage is not available, have mileage recorded for a week and multiply by 52.

Step 4: Determine total labor cost. Add the time required in steps 1, 2, and 3 and multiply the total time required by the cost per minute of the routeman's time. The actual cost of the routeman's time, if available, should be used instead of the standard of 3.29¢/minute.

Step 5: Determine the routeman's commission cost for units delivered (Appendix Table 5).  $\text{(Units Delivered)} \text{(Commission Rate)} = \text{(Commission Cost)}$  The actual commission paid on units delivered should be used.

Step 6: Determine the truck cost for servicing the route (Appendix Table 4).  $\text{(Mileage)} \text{(Cost per Mile)} = \text{(Truck Cost)}$  The actual cost per mile should be used.

Step 7: Determine the cost for management, route supervisor, and at-plant loading assistance (Appendix Table 6).  $\text{(Units Delivered)} \text{(Cost per Unit)} = \text{(Management and Plant Loading Cost)}$

Step 8: Determine the total route cost by adding the costs of Steps 4, 5, 6, and 7.

The four costs and the eight steps of budgeting route cost are best illustrated in the calculation of a hypothetical route. The following example, is meant only to illustrate the above procedure. Let us assume a hypothetical route composed of the following characteristics:

1. 60 full service customers serviced weekly of which
  - A. 20--price is marked
  - B. 40--price is not marked
2. 15 drop and partial drop service customers serviced weekly of which
  - A. 3--price is marked
  - B. 12--price is not marked
3. Volume purchased under full service
  - A. 20,177 gallons in bulk containers
  - B. 12,698 gallons in one-gallon packages
  - C. 17,203 gallons in one-half gallon packages
  - D. 1,342 gallons in quart packages
  - E. 2,272 gallons in pint packages
  - F. 33,555 dozen of novelties (11,185 units, 3 dozen = 1 unit)
4. 35,123 units purchased under drop and partial drop service.
5. A total of 22,631 miles are driven annually to service the route.

The calculations of the annual delivery cost for the route is as follows:

Step 1: Determine routeman's annual direct time requirements (minutes).

(Full Service)

<u>Variable</u>	<u>Standard</u>	<u>Occurrence</u>	<u>Time Required</u>
Fixed Time per			
Customer	8.19	(60)(52)	27,799.20
Mark Price	5.19	(21)(52)	5,667.48
Bulk	.164	20,177	3,309.03
One Gallons	.298	12,698	3,784.00
One-half Gallons	.273	17,203	4,696.42
Quarts	.668	1,342	896.46
Pints	.509	2,272	1,156.45
Novelties	.610	11,185	6,822.85

(Drop and Partial Drop)

Fixed Time per			
Customer	5.61	(15)(52)	4,375.80
Mark Price	15.55	(3)(52)	2,425.80
Volume	.172	35,123	6,041.16
Total Direct Time for Route.....			66,974.65

Step 2: Determine indirect time required by route (minutes).

<u>Indirect Work As a Percentage of Direct Work</u>	<u>Direct Work Required</u>	<u>Total Indirect Work Required</u>
44.51	66,974.65 .....	29,810.42

Step 3: Determine driving time of route (minutes).

<u>Variable</u>	<u>Standard</u>	<u>Mileage</u>	<u>Time Required</u>
Open Highway	1.63	16,521	26,929.23
In Town			
Little Traffic	2.90	5,205	15,094.50
In Town			
Congested Traffic	3.70	905	3,348.50
Total Driving Time of Route .....			45,372.23

Step 4: Determine total labor cost.

<u>Total Time Required</u>	<u>Cost Per Minute</u>	<u>Cost for Route</u>
142,157.30	3.29¢/min.	\$4,676.98

Step 5: Determine commission cost for units delivered.

<u>Units Delivered</u>	<u>Cost Per Unit</u>	
100,000	3.04¢	3,040.00

Step 6: Determine truck cost for servicing the route

<u>Miles to Service Route</u>	<u>Cost per Mile</u>	
22,631	13.56¢	3,068.90

Step 7: Determine cost for management, route supervisor, and at-plant loading.

Assistance

<u>Volume Delivered</u>	<u>Cost per Unit</u>	
100,000	2.15¢	<u>2,150.00</u>

Step 8: Determine total delivery cost for route..... \$12,935.88

The Class III labor standards could be used for a more simplified approach. Only the number of full service and drop and partial drop service customers and the units delivered to the two types of service are required to calculate the direct labor cost.

The determination of the margin available is the same as that presented for the individual customer. However, the margin for the individual products cannot be calculated because the individual products are combined in the drop and partial drop standards. The margin available for the hypothetical route is \$.595 per unit delivered.<sup>6</sup>

If changes in the route are made because of seasonality, then a summer and winter analysis should be made. The summer and winter analysis would follow exactly the same procedure as outlined in the annual analysis and would reflect the cost differences that resulted from seasonality.

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$${}^6 \text{Per Unit Delivery Cost} = \frac{\text{Total Delivery Cost}}{\text{Unit Delivered}}$$

$$$.129 = \frac{\$12,935.88}{100,000 \text{ units}}$$

$$\text{Per Unit Margin} = \text{Weighted Average Selling Price} - \text{Weighted Average Platform Cost} - \text{Per Unit Delivery Cost}$$

$$$.595 = \$1.697 - \$0.973 - \$0.129$$

Appendix Table 1. Recommended labor standards for ice cream delivery<sup>a</sup>

<u>Class I Standards</u>			
<u>Full Service</u>		<u>Drop and Partial Drop Service</u>	
Variable	Time (minutes)	Variable	Time (minutes)
Fixed time per customer	9.78	Fixed time per customer	6.17
Drugstore and restaurant	-1.84	Drugstore and restaurant	-1.50
Combination	4.22	mark price	14.98
Other	-3.69	More than 100 feet	1.10
None	-2.31	Volume <sup>b</sup>	.165
High	4.45		
Mark price	4.38		
Bulk	.130		
Gallons	.290		
Half-gallons	.268		
Quarts	.666		
Pints	.368		
Novelties	.621		
<u>Class II Standards</u>			
Fixed time per customer	8.91	Fixed time per customer	5.61
Mark price	5.19	Mark price	15.55
Bulk	.164	Volume	.172
Gallons	.298		
Half-gallons	.273		
Quarts	.668		
Pints	.509		
Novelties	.610		
<u>Class III Standards</u>			
Fixed time per customer	10.89	Fixed time per customer	5.58
Volume	.349	Volume	.191

<sup>a</sup>The standards do not account for the time consumed in break time, delay, and personal selling.

The time standards for drugstore and restaurant, combination, and other provide the relative time difference from servicing a retail store. Combination refers to a customer who purchases both packaged and bulk ice cream. Other refers to customers such as amusement parks, hospitals, and concession stands. None and high are time standards for the amount of store congestion present at the time of delivery. The time standard, more than 100 feet, is to be applied when the delivery truck is more than 100 feet from the point of delivery.

<sup>b</sup>The volume is composed of total gallons delivered with three dozen of novelties treated as one gallon in Class I, II, and III standards.



Appendix Table 2. Driving time standards for ice cream delivery

Type of Driving	Minutes Per Mile
Open highway	1.63
In town little traffic	2.90
In town congested traffic	3.70

Appendix Table 3. Analysis of time spent on functions other than direct servicing of individual customers (time in minutes).

Work functions	Average for workday	Percentage of workday
Break time	36.56	5.45
Delay	31.22	4.65
Total <sup>a</sup>	67.78	10.10
Personal selling	12.16	1.81
Check-out	7.35	1.10
Load truck	23.81	3.55
Rearrange truck	10.05	1.50
Servicing truck	7.45	1.11
Check-in	27.72	4.13
Total	76.38	11.39
Driving time	163.66	24.39
Grand total	319.98	47.69

<sup>a</sup>The time from the individual stops and the daily route sheets were added together to obtain the total time spent in break time and delay.

Appendix Table 4. Summary of truck costs of ice cream delivery.

Item	High <sup>a</sup>	Low <sup>a</sup>	Average
<u>Average truck</u>			
Fixed cost	\$1,603.72	\$ 587.55	\$1,035.58
Variable cost	4,127.60	431.94	2,033.43
Total cost	\$5,641.64	\$1,131.19	\$3,069.01
Miles driven	51,340	3,867	22,631
<u>Cost per mile</u>			
Fixed	27.40¢	2.78	4.58¢
Variable	19.33	5.86	8.99
Total	38.57¢	9.61	13.57¢

<sup>a</sup>High and low columns indicate the range among firms for specified cost items. These columns do not necessarily sum up to the total or average figure since the same firm is not usually high or low in all items.

Appendix Table 5. Summary of labor expense of ice cream delivery.

Item	High <sup>a</sup>	Low <sup>a</sup>	Average
<u>Cost per unit</u>			
<u>Sold</u>			
Fixed	11.29¢	3.30	5.56¢
Commission	4.27	0.00	3.04
Total	11.68	6.56	8.60¢
Fixed cost per minute	4.41¢	2.91	3.29¢

<sup>a</sup>High and low columns indicate the range among firms for specified cost items. These columns do not necessarily sum up to the total or average figure since the same firm is not usually high or low in all items.

Appendix Table 6. Management, route supervision, and loading costs of ice cream delivery.

Item	High <sup>a</sup>	Low <sup>a</sup>	Average
Management	\$ 3,500	\$1,900	\$ 8,200
Route supervisors	7,500	4,000	16,000
Assistance in loading	2,900	1,500	6,300
Total	\$13,200	\$7,400	\$30,500
Total unit sold	635,642	278,004	1,420,666
Total cost per unit	2.66¢	1.95¢	2.15¢

<sup>a</sup>High and low columns indicate the range among firms for specified cost items. These columns do not necessarily sum up to the total or average figure since the same firm is not usually high or low in all items.