SERIES OF LETTERS AND REPORTS ON WHOLESALE MILK DISTRIBUTION RESEARCH SENT TO DAIRY MANAGERS IN UPSTATE NEW YORK

by

R. D. Aplin
H. W. Ayres
J. C. Taber

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Prepared by R. D. Aplin, H. W. Ayres and J. C. Taber, Department of Agricultural Economics, Cornell University, Ithaca, New York 14853. Funds for this research were partially provided through the New York State Department of Agriculture and Markets from assessments collected under the Dairy Trade Practices Law.

NEW YORK STATE COLLEGE OF AGRICULTURE AND LIFE SCIENCES
A STATUTORY COLLEGE OF THE STATE UNIVERSITY
CORNELL UNIVERSITY
ITHACA, NEW YORK 14850

DEPARTMENT OF
AGRICULTURAL ECONOMICS
WARREN HALL

June 4, 1975

To: Dairy Managers in Upstate New York

During the past year, we have conducted a major research study of wholesale milk route operations.

The enclosed report provides some background to the study. For the next six weeks, you will receive a series of reports, which explore some of the results of our study.

A principal objective of our research is to provide industry people with approaches, techniques and standards to help them answer the following sorts of questions:

1. Can this route absorb 2 more customers?
2. Can we consolidate routes?
3. What does it cost to serve this specific type of customer?
4. How are delivery costs for a customer affected by:
   a. volume of product delivered,
   b. frequency of delivery,
   c. type of service provided to customer (e.g., platform drop vs. in-store delivery, routeman gets order vs. preorder, C.O.D. vs. office account, etc.),
   or d. type of delivery equipment used (e.g., liftgate, hand truck, dolly, etc.)?
5. What is a "profitable" customer? Or, more specifically, "How profitable is this account and how could it be made more profitable?"
6. How much of a discount can we justify giving this customer?
7. What will happen to our costs and profits if we make ceratin changes in our delivery practices?

These questions must be answered by each distributor individually. Therefore, we will not answer these questions for you in our reports. But we will provide you with the information and methods to use in answering such key questions for your own operations.

If you have any questions, please contact us.

Sincerely,

R. D. Aplin and H. W. Ayres

RDA:HWA:js
Enclosure

Report No. 1: INTRODUCTION & BACKGROUND INFORMATION

Rapidly rising costs of inputs, especially labor and fuel, combined with the changes in wholesale customers and the introduction of new equipment and methods, places increasing demands on dairy firm managers to continually analyze their distribution operations.

A substantial majority of industry people with whom we have worked think the job of managing distribution operations is even more challenging and demanding than that of managing plant operations. Delivery operations are not tied to equipment, whereas many of the processing operations are keyed to equipment. You cannot observe your routemen and route operations, at least nowhere nearly as easily as you can your plant operations. Moreover, you must manage delivery operations within some environmental conditions which cause difficulties. Environmental factors such as driving conditions, customer "demands" and provisions of the labor contract may place some limitations on changes that might be implemented to improve the efficiency and profitability of wholesale route operations.

During the next few weeks, we will issue a series of seven reports discussing some (but nowhere near all) of the critical factors involved in the wholesale distribution of milk in Upstate New York markets.

Our primary source of information is a study of 30 wholesale milk routes operated by four companies (six locations) in the Upstate area. The information is supplemented by data and experience gained from studying 59 wholesale milk routes operated by seven companies in the New York Metropolitan Area.

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Our research indicates that most of the basic factors in the delivery of dairy products are fairly similar in the Upstate and Metropolitan Areas. The principle physical differences between Upstate and Metropolitan wholesale route operations are driving conditions and the case size most commonly used. Of course, the costs of labor and some other inputs are significantly different. But, these cost differences are not central to the results we will be reporting to you by mail.

The major objective of this study is to develop and illustrate concepts, techniques and standards milk distributors can use to evaluate and improve the efficiency and profitability of their wholesale delivery route operations.

We will not attempt to report all the findings of our research. It would be neither feasible nor desirable to do so. Some of the findings and their application require two-way discussion. Cornell plans to conduct seminars this summer which will give industry people an opportunity to explore in depth and discuss the approaches and techniques we have developed. Meanwhile, these reports will give you a taste of some of the results.

An important phase of the research involved conducting time studies of 30 wholesale routes from participating companies. Thanks to the cooperation of management personnel and the routemen, four graduate students were able to ride on routes last summer. These students made stop watch readings for approximately 20 separate work tasks performed by routemen, beginning when the routemen left the plant in the morning and ending when they returned to the plant. The actual time required to perform each task was recorded in hundredths of a minute. In addition to the elapsed time, the distinguishing characteristics of each customer were noted. These characteristics included the type of customer (e.g., supermarket, Ma and Pa store, school, etc.), parking conditions at the stop, services provided by the routeman (e.g., product brought inside or left at door or curb), delivery methods at the stop (e.g., hand carry, hand truck or dolly used to move product) and the volume of product delivered to the customer.

The recorded times and descriptive information for each work task were inspected, analyzed, classified and eventually used to establish an average or normal time for each job performed on a route - a normal time which can be met by the typical routeman in the course of a normal day's work. These were designated as "standard times." The "standard times" developed in this study represent the average time required for a typical, fully qualified routeman, working at a normal pace to perform the given tasks on his route. An allowance is made in our standard times for fatigue, unavoidable delays and personal time.

The standard times were then tested. One test consisted of selecting a 15% random sample of actual times and conditions from the approximately 800 customer deliveries observed in the New York Metropolitan Area. The standard times were then used to estimate the time required to serve this large sample of customers. The actual time spent by routemen serving each of these customers was then compared to the time as estimated by the standard times. The results of the tests indicated that the error in predicting might be as high as 15% for a particular customer; but, when all types of customers were combined, the error was less than 1%. Thus, the standard times provide reliable estimates of the time required to perform the various tasks involved in delivery.

We did not test the standards for the Upstate area specifically, but we believe the results would be the same and that all of the standard times are equally reliable. The same procedures were used and the same time study personnel were involved in developing both sets of standards.

One primary use of the standard times is to enable management to reliably estimate the time required to serve a customer (after obtaining specific information about a customer from the routeman or route foreman). The time required to serve a customer is one of the key determinants - but by no means the only one - of the profitability of that customer. Many factors affect the time required for a delivery and consequently, the cost of serving that customer. These factors include:

1. volume of product delivered
2. type of ordering system (e.g., telephone preorder vs. driver obtains order)
3. method of collection (e.g., driver collects or "cash account" - vs. customer pays bill directly to company office - "office" or "ledger" account)
4. method of unloading (e.g., by hand or by hydraulic liftgate)
5. method of moving product from vehicle to delivery point (i.e., hand carry, hand truck, dolly or flat truck)
6. delivery point (e.g., product left next to truck, taken to door or taken inside)
7. location of empty cases (e.g., at delivery point or elsewhere)
8. type of customer (e.g., supermarket, Ma and Pa store, convenience store, restaurant, school, institution, and so on).

This report provides background information that supplements and supports the others. The second report deals with "fixed" time at a customer stop. By "fixed" time we mean the time to perform those tasks which require a constant amount of time regardless of the volume of product delivered or the distance that the routeman moves the product. Those tasks that require a fixed or constant amount of time - for a particular type of customer - include:

1. parking
2. preparing for delivery
3. having ticket checked
4. extending ticket & collecting (if done)
5. delays
6. leaving

Reports 3 and 4 deal with variable time components of the delivery operation:

1. selecting merchandise
2. unloading product - either by hand or by liftgate
3. moving product from unloading to delivery point - by hand carry, hand truck, dolly or flat truck
4. handling empty cases.

In the fifth report we combine all parts of the delivery function and arrive at the total time at a customer stop.

The sixth report considers the time routemen do not spend at customer locations (e.g., time spent driving, at the plant in the morning and afternoon, during meals, coffee breaks and personal time) which constitutes a significant part of a routeman's work day. We consider various bases for allocating non-at-stop time to all customers.

To factually determine the costs of serving customers one must, in effect, account for all the time a routeman spends in a work day - not just the time he spends at customer locations. The actual time spent at a customer stop (at-stop time) can rather objectively be assigned to that customer, but the other time must also be allocated among all customers. Different methods are available for allocating non-at-stop time to customers. Some of these methods include: 1) dividing the non-at-stop time equally among customers, 2) allocating it proportionally to each customer on the basis of at-stop time, or 3) allocating it on the basis of the number of cases delivered to that customer.

It is important to realize that our discussion of allocation methods in Report 6 deals with allocating direct delivery expenses (routemen's wages and fringe benefits and vehicle expenses). There are many other delivery, sales and distribution expenses (supervisors, clerical personnel, etc.) that must be considered to see the entire picture.

In the seventh report, we tie things together and mention some aspects of our research that have not been covered in previous reports.

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CORNELL UNIVERSITY
ITHACA, NEW YORK 14850

DEPARTMENT OF
AGRICULTURAL ECONOMICS
WARREN HALL

June 11, 1975

To: Dairy Managers in Upstate New York

This report considers fixed time at a customer stop. By "fixed" time we mean tasks requiring a constant amount of time regardless of the volume of product delivered or the distance the routeman moves the product. The tasks that require a fixed amount of time include:

1. parking
2. preparing for delivery
3. having ticket checked
4. extending ticket & collecting (if done)
5. delays
6. leaving

Although the time required to perform these tasks is fixed at a specific type of customer stop, it does vary somewhat depending on the type of customer (e.g., Ma and Pa store vs. supermarket).

Some highlights of our findings on fixed time at customer locations are as follows:

1. If an order is "preordered" by phone, instead of an unknown order (which means a routeman must obtain the order at the stop), the time saving varies from one-half minute to a minute and a half - depending upon the type of customer.

2. It takes the routeman an additional one to three minutes to collect at a stop - again depending on whether the customer is a Ma and Pa store, a supermarket, a restaurant, and so on (i.e., depending on the type of customer).

3. If a change is made, saving the routeman only four minutes at each of five stops on his route, the 20 minutes saved may represent nearly 10% of the total time a typical routeman actually has available to serve customers.

The enclosed report contains important information about fixed time at customer stops that resulted from our studies of 30 wholesale routes in Upstate New York Markets.

Sincerely,

R. D. Aplin and H. W. Ayres

RDA:HWA:js
Enclosure

Report No. 2: FIXED TIME AT CUSTOMER STOPS

One objective of this study was to develop standard times that indicate the time required by a typical, fully-qualified routeman, working at a normal pace, to perform various tasks involved in his route.

It is useful to break down a routeman's day into the following components:

1. Morning preparation work
2. Driving time
3. Time spent at customer locations
4. Personal time
5. Time at plant in afternoon

Our time studies focused on driving times and conditions, and on time spent at customer locations. The other components of a routeman's day - time spent at the plant or for personal needs - are necessary and important. However, we did not do time studies or develop standard times for at-plant work because these tasks and procedures vary significantly among plants. Therefore, we thought no meaningful standard times could be developed for these activities.

In this report and the next three, we focus on the time spent by a routeman at customer stops. The work tasks at customer locations are divided into two categories.

1. Fixed - tasks, like parking, preparing for delivery and collecting that require a constant amount of time to perform regardless of the volume of product delivered or the distance a routeman moves the product.

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2. Variable - tasks, like selecting merchandise, unloading product and moving product to delivery point, that require a different amount of time depending on the volume of product delivered or the distance a routeman moves the product.

The fixed components at a customer stop are:

1. Park and Leave - we observed two situations - parking on the street or in a lot. If parking occurred in a lot, two further distinctions were made - backing up or parking directly.
2. Prepare for Delivery - includes getting out of truck, moving from side of truck to back, getting the order (if necessary), opening truck doors, getting hand truck out or positioning hydraulic liftgate, doing paper work related to order (other than price extension), waiting for customer personnel (or any other delays inherent in the type of stop), and preparing to leave.
3. Check Ticket - the delivery ticket is checked and signed by the store manager or personnel.
4. Extend Ticket and Collect - (this does not always occur) - prices are added to the delivery ticket and the routeman collects. The time includes any delay while waiting to collect.
5. Get Into Truck

The time studies indicate that each of these tasks take a fixed amount of time, regardless of the volume of product delivered or the distance the product is moved. The time required to perform these tasks is fixed at a specific type of customer stop, but it does vary somewhat between different types of customer stops. In other words, the time to perform fixed activities at a Ma and Pa store is constant among Ma and Pa stores, but varies from the time required for the same activities at a "newer" supermarket or convenience store.

The above fixed activities - except park and leave - can be grouped together for a particular type of customer and a particular type of ordering system. The following types of customers are used:

1. Supermarket (two types)
   a. So-called "newer" supermarket - generally larger store with convenient unloading area (not necessarily a dock).
   b. So-called "older" supermarket - smaller with delivery conditions somewhat more difficult. Corporate chain stores do not necessarily fall into the "newer" category. There may be many that are classified by delivery conditions as "older" supermarkets.

2. Convenience Store - These are usually modern, but small, limited line grocery stores. Delivery is typically made to a walk-in cooler.

3. Fast Food/Luncheonette - "Fast Food" refers to a more modern restaurant, where food may be eaten on the premises or taken out (e.g., McDonald's). "Luncheonette" refers to an eating place where the main serving area is a counter. Luncheonettes are usually small and frequently old.

4. Restaurant - (includes most diners) - Eating establishments in which customers are typically served at a table instead of a window.

5. Institution/Factory - Office cafeterias, hospitals, nursing homes, schools, prisons, day care centers, caterers and the like fall into this category.

6. "Other Customers" - The main "type" in this category is the Ma and Pa store, which was the most frequently observed. Also included are smaller groceries, meat markets, fruit stands, delicatessens and bakeries.

The types of ordering systems observed are:

1. Unknown - routeman does not know what the customer needs when he arrives and determines the order himself or waits while customer personnel order.
2. Ready on Arrival - order is written or planned ahead and routeman does not spend a great deal of time obtaining it from store personnel (as often occurs with "unknown" orders).
3. Predeveloped* - routeman consults the store manager or store personnel to get the order for the next delivery.
4. Preordered by Phone (or Standing Order) - routeman does not spend any time obtaining order.

* We did not observe any "predeveloped" orders on the Upstate Area routes that we rode, but we believe (based on experience in the Metropolitan Area) that a predeveloped order takes from .5 to 1.0 minutes less than an unknown order. On the other hand, since the routeman takes time during the delivery to get the order for his next delivery, the predeveloped system requires more time than the preordered system.

To illustrate the time a typical routeman spends performing basic tasks requiring a fixed amount of time - as well as to illustrate how this time is affected by the type of ordering system - let's look at a "newer" supermarket.

Table 1. FIXED TIME at a NEWER SUPERMARKET

Work Task	Type of Ordering System	
	Unknown	Preordered
	----minutes per delivery-----	
Park in a lot, back up and leave	1.5	1.5
Prepare for delivery	6.4	4.8
Check ticket	1.3	1.3
Get into truck	.4	.4
Total fixed time when routeman does not collect	9.6	8.0
Extend ticket and collect	2.4	*
Total fixed time when routeman collects	12.0	-

* Indicates a standard time was not established. This situation does not occur frequently or sufficient useable information was not gathered in our observation of routes and customers.

The figures above indicate that it takes a typical routeman about 4 minutes (12.0-8.0=4.0) more to serve a supermarket at which he obtains the order and collects, than it does to serve a supermarket that has preordered by phone and is a "ledger" or "office" account.

Assume a routeman has 5 supermarket accounts on his route, at each he must get the order and collect. If these 5 stops could be "preordered" by phone and billed, we would expect the routeman could save about 20 minutes of his routeday, time which could be used in some other way, perhaps used to serve another customer(s).

An Important Interruption

This is an appropriate time for an important observation. At various times in these reports we say such things as, "If you make such and such a change in your delivery operations, it will save so much of a routeman's time." When reading such a statement, please keep several things in mind. We are not telling you what you should or should not do. We're not in a position to make recommendations for changes in your route operations. There are other considerations and trade-offs. We only encourage you to take inventory of your route operations and the tasks involved in serving customers. We believe the results of our research provide some tools to assist you in appraising your present operations and evaluating possible changes.

This is also an appropriate time to stress our belief that the most meaningful common denominator of distribution costs is time. In the distribution of dairy products, as in most other service functions, the costs of the service bear a direct relationship to the time required. This is true in spite of commission pay plans for routemen and the irregularity of the hours worked by routemen. Additional customers, additional services performed, or the same services rendered to more customers, eventually require more routes, more routemen, and more costs.

One more thing while we're on this important interruption. Is the saving of, say, 20 minutes significant? Our answer is a very definite "yes," 20 minutes represent a very significant part of the total time a routeman has available to deliver products and serve customers. Let's explain. Let's assume a normal work day is 8 hours or 480 minutes. Further assume that only about 55% of our hypothetical routeman's day - or about 265 minutes each day - is actually available to serve customers. In other words, assume the routeman spends 215 minutes on a typical day at the plant, driving and taking care of personal needs. If a change is made that saves 4 minutes at each of 5 stops - totalling 20 minutes each day, it represents a saving of nearly 10% of the time available to serve customers. Thus, a saving of 20 minutes of a routeman's time is significant.

The fixed time required at a typical Ma and Pa store is shown below:

Table 2. FIXED TIME at a MA AND PA STORE

Work Task	Type of Ordering System Unknown
Park on street and leave	.5 minutes per delivery
Prepare for delivery	3.6
Check ticket	.8
Get into truck	.4
Total fixed time when routeman does not collect	5.3
Extend ticket and collect	1.9
Total fixed time when routeman collects	7.2

APPENDIX TO REPORT #2

The following are the time requirements for the fixed components at a customer stop for some types of customers and ordering systems not discussed in the body of this report.

Important Note These times are only for so-called fixed tasks. Routemen perform other activities at a stop, such as selecting merchandise, unloading, moving product to delivery point - which are not reflected - so these are by no means the total time at the stop.

Work Task	Restaurant Order Unknown	Convenience Store Order Unknown	Supermarket Predeveloped Order
	minutes per delivery		
Park and leave - on street	.5	-	-
in a lot, direct	-	1.1	1.1
Prepare for delivery	2.2	2.5	4.0
Check ticket	.5	.8	.9
Get into truck	.4	.4	.4
Total fixed time when routeman does not collect	3.6	4.8	6.4
Extend ticket and collect	1.2	2.5	3.0
Total fixed time when routeman collects	4.8	7.3	9.4

Work Task	Institution Preordered Order	Fast Food/Luncheonette Order Unknown
	minutes per delivery	
Park and leave - on street	-	.5
in a lot, direct	1.1	-
Prepare for delivery	1.8	2.5
Check ticket	.7	.8
Get into truck	.4	.4
Total fixed time when routeman does not collect	4.0	4.2
Extend ticket and collect	*	1.6
Total fixed time when routeman collects	-	5.8

* Indicates a standard time was not established. This situation does not occur frequently or sufficient useable information was not gathered in our observation of routes and customers.

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CORNELL UNIVERSITY
ITHACA, NEW YORK 14850

DEPARTMENT OF
AGRICULTURAL ECONOMICS
WARREN HALL

June 26, 1975

To: Dairy Managers in Upstate New York

This week's report deals with the variable time at customer stops. We consider those tasks that require a different amount of time, depending on the volume of product delivered or the distance that the routeman moves the product.

Tasks requiring varying amounts of time include:

1. Selecting merchandise
2. Unloading product
3. Moving product from unloading to delivery point
4. Handling empty cases

The enclosed report explores the first three tasks - handling empty cases will be considered next week.

The effect of using a hydraulic liftgate is analyzed. Drop deliveries are considered, along with four methods of moving the product to a final delivery point - hand carry, hand truck, dolly and flat truck.

A few of the conclusions drawn in this week's report are:

1. The case - rather than the quart or point - is the most useful unit for measuring the volume taken by a customer. The case is the unit the routeman handles and around which his time revolves. And remember that our research indicates that the most meaningful common denominator of many delivery costs is time.

2. The use of a liftgate saves more time at a stop where the routeman moves the product into the store than at a drop delivery:

Cases per Delivery	Time Saved by Use of Liftgate: Drop Delivery	Time Saved by Use of Liftgate: Product Moved 100 Feet to Delivery Point
30	.4 min./del.	1.9 min./del.
50	.6	3.1
100	1.2	6.3

3. If, instead of unloading by hand and moving the product 100 feet with a hand truck, the routeman uses a liftgate to unload and merely leaves the product at the unloading point (drop delivery); the time saving at a 30 case stop would be about 8 minutes, at a 50 case stop - 13 minutes, and at a 100 case stop - 26 minutes.

4. The time required to select merchandise is significantly different for different types of customers. However, the time per case to select merchandise decreases with increased volume at all types of customers.

Sincerely,

R. D. Aplin & H. W. Ayres

RDA:HWA:js
Enclosures

Report No. 3: VARIABLE TIME AT CUSTOMER STOPS

Selecting Merchandise * Unloading * Moving Product to Delivery Point

This report considers some of the tasks performed by a routeman that require varying amounts of time depending on:

1. the volume of product delivered and/or
2. the distance that the routeman moves the product.

The specific work tasks discussed are:

1. selecting merchandise
2. unloading product, and
3. moving product to the delivery point.

Selecting Merchandise is the task of choosing cases of product to unload and moving them to a convenient location near the door of the truck or on to the hydraulic liftgate. Selecting merchandise includes handling full cases as well as "picking" individual items and putting them in a container suitable for delivery.

Unloading Product is done by hand or with a hydraulic liftgate. The time to unload by hand varies with the type of delivery device being used (hand truck, hand carry, dolly or flat truck). But, the time to unload with a hydraulic liftgate is essentially the same regardless of the delivery device being used.

Moving Products to the Delivery Point (to-be-called Deliver) is the task of moving the product from the unloading point to its final destination. The delivery element includes the time required to return to the truck. Standard times for delivery do not include time to handle or load empty cases - which will be considered in next week's report.

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The following delivery methods and devices are considered:

1. drop delivery - product left at unloading point
2. hand carry - product carried by routeman to delivery point
3. hand truck - product wheeled on two-wheeled device holding 5 cases.

In our studies of the 30 routes, we observed some limited use made of dollies and flat trucks for moving products from the unloading point to the delivery point. We do have standard times for delivering with dollies and flat trucks. Later in the report we will comment briefly on the effect of using dollies or flat trucks instead of hand trucks.

The times required to select merchandise, unload and deliver for a number of different types of stops and delivery conditions are shown in the tables appended to this report. Let's concentrate on comparing the total times to select merchandise, unload an deliver for various volumes and specific situations. From these comparisons we will analyze:

1. effect of using a liftgate instead of unloading by hand, and
2. time saved by a drop delivery.

It is important to keep in mind the following:

1. The times given in this report are for only three of the tasks performed by a routeman at a stop: select merchandise, unload and deliver. For practical purposes, these are the only activities that need to be considered in examining the effects of using a liftgate and of a drop delivery. However, there are many other tasks performed at a customer stop, some of which were discussed last week (fixed time at a customer stop) and handling empty cases (to be discussed next week).

2. We use cases as the unit for measuring various size stops, rather than quarts or sales points. The case is the unit the routeman handles and is therefore the unit around which his time revolves. It takes approximately the same amount of time to select, unload and deliver a case whether it contains 4 gallons, 16 quarts or 9 half-gallons. NOTE: We could calculate the time per case for each of the situations considered in this report - but it would not be meaningful because the information presented in this report represents only part of the at-stop activities. We will include time per case in Report No.5, when total at-stop time is illustrated.

Effect of Using Liftgate on Time Requirements

The time saved by using a hydraulic liftgate to unload instead of unloading by hand for various size deliveries to a supermarket is shown in Tables 1 and 2. The time saved by using a liftgate is less if it's a drop delivery (Table 1) than if the routeman moves the product into the store after unloading (Table 2).

Table 1. Effect of Using a Hydraulic LIFTGATE to Unload for DROP DELIVERY at a Newer Supermarket

Cases per Delivery	Total Time to Select Merchandise & Unload: Unloaded by Hand [a/]	Unloaded by Liftgate [b/]	Time Saved by Use of Liftgate
	minutes per delivery		
20	5.2	4.8	.4
30	6.4	6.0	.4
40	7.7	7.2	.5
50	8.9	8.3	.6
75	12.1	11.2	.9
100	15.3	14.1	1.2

a/ for details, see Table B in the Appendix
b/ for details, see Table A in the Appendix

Table 2. Effect of Using a Hydraulic LIFTGATE to Unload When PRODUCT IS MOVED 100 FEET One-way Distance WITH HAND TRUCK to Delivery Point at a Newer Supermarket

Cases per Delivery	Total Time to Select Merchandise, Unload & Deliver: Unloaded by Hand [a/]	Unloaded by Liftgate [b/]	Time Saved by Use of Liftgate
	minutes per delivery		
20	10.1	8.9	1.2
30	14.0	12.1	1.9
40	17.8	15.3	2.5
50	21.6	18.5	3.1
75	31.3	26.4	4.9
100	40.7	34.4	6.3

a/ for details, see Table D in the Appendix
b/ for details, see Table C in the Appendix

NOTE: Difference between Tables 1 and 2 - Table 1 is for a drop delivery; Table 2 is for a situation where the product is moved 100 feet into the store.

Some conclusions as to the effect on time requirements of using a liftgate:

1. The distance the product is moved to the delivery point and the type of account do not affect the saving from using a liftgate. The only things that affect the time saved by the use of a liftgate are the volume delivered and whether or not it's a drop delivery. Note that more time is saved by using a liftgate when the product is moved into the store.

2. For a drop delivery, regardless of the type of account, the use of a liftgate saves approximately .5 minutes at a 40 case stop and 1 minute at a 100 case stop (see right-hand column Table 1).

3. If the product is moved into the customer's premises with a hand truck, the use of a liftgate saves approximately 2 minutes at a 30 case stop, 3 minutes at a 50 case stop and 6 minutes at a 100 case stop (see right-hand column Table 2).

Time Saved by Drop Delivery

The time saved by leaving the product at the unloading point (i.e., a drop delivery) instead of moving the product by hand truck to a delivery point inside a supermarket is shown in Table 3 for two delivery distances. The saving of making a drop delivery, instead of moving the product to a cooler 100 feet from the unloading point, is approximately 5 minutes at a 20 case supermarket, 13 minutes at a 50 case stop and 25 minutes at a 100 case stop. And recall that 10 minutes may be approximately 4% of the total time a typical routeman actually has available at all customer stops.

Table 3. TIME SAVED By a DROP DELIVERY at a Supermarket Instead of DELIVERING 50 Feet and 100 Feet with a HAND TRUCK (assumes product is unloaded by hand*)

Cases per Delivery	Time Saved by Drop Delivery Instead of Moving Product into a Cooler: 50 Feet From Truck	100 Feet From Truck
	minutes per delivery	
5	.8	1.2
10	1.7	2.4
15	2.7	3.8
20	3.4	4.9
30	5.3	7.6
40	7.0	10.1
50	8.9	12.7
75	13.5	19.2
100	17.8	25.4

* Time saved by drop delivery if liftgate is used is slightly less for a given situation

The time saved by a drop delivery at other types of accounts (e.g., institutions, fast food and restaurants) is essentially the same as shown for supermarkets.

Hand Carry vs. Hand Truck at Small Stops

A comparison of the time required for a routeman to select merchandise, unload by hand and move the product 50 feet into a Ma and Pa store is shown in Table 4 for two delivery methods: 1. hand carry and 2. hand truck. Again we stress that the times in these tables are only for these three work tasks - select merchandise, unload and deliver. The routeman performs other activities at a stop, including the tasks having a fixed time requirement, as well as handling empty cases.

The time required for hand carry at a 1 or 2 case stop is nearly the same as for a hand truck delivery. But, the use of a hand truck saves time at stops taking more than 2 cases.

Table 4. Time required to Select Merchandise, Unload and Deliver 50 Feet One-way Distance at a MA AND PA STORE: HAND CARRY vs. HAND TRUCK

Cases per Delivery	Total Time to Select Merchandise, Unload and Deliver	
	If hand carry a/	If hand truck b/
	minutes per delivery	
1	2.4	2.4
2	2.6	2.6
5	4.4	3.1
10	-	4.6
15	-	6.1

a/ assumes 2 cases per trip, for details see Table E in the Appendix
b/ for details, see Table F in the Appendix

Dollies and Flat Trucks vs. Hand Trucks

The use of flat trucks was observed at both supermarkets and institutions. By a flat truck, we refer to a 4-wheeled vehicle with a handle and a solid bottom, which usually measures 2 by 3 cases and will hold 24 cases if stacked 4 cases high. This device is provided by the customer.

For volumes of 20 or more cases the flat truck is faster than using a hand truck. See Table G in the Appendix. The time saved by using a flat truck varied from approximately 4 minutes at a 20 case stop to 14 minutes at a 75 case stop.

By a dolly, we refer to a 4-wheeled device with an open bottom which is also provided by the customer. The dollies "measured" 1 by 2 (or 3) cases and held 10 (or 15) cases if stacked 5 cases high.

Dollies were observed primarily at supermarket accounts. Using a dolly is faster than using a hand truck but not as fast as using a flat truck. The time saved by using a dolly instead of a hand truck varied from approximately 1 minute at a 20 case stop to 6 minutes at a 100 case stop. For details, see Table G in the Appendix.

APPENDIX TO REPORT No. 3

Each of the following tables shows the standard times required to perform the select merchandise, unload and deliver (if it occurs) tasks, under the given volumes and conditions.

NOTE: The times are only for these 3 tasks. The routeman performs other activities at a stop which are not reflected, so these are not the total time required at the stop.

Table A. Time Required to SELECT MERCHANDISE & UNLOAD WITH LIFTGATE for DROP DELIVERY at a Newer SUPERMARKET

Cases per Delivery	Select Merchandise	Unload with a Liftgate for Drop Delivery	Total Time for Select Merchandise & Unload
	minutes per delivery		
20	3.9	.9	4.8
30	4.6	1.4	6.0
40	5.3	1.9	7.2
50	6.0	2.3	8.3
75	7.8	3.4	11.2
100	9.5	4.6	14.1

Table B. Time Required to SELECT MERCHANDISE & UNLOAD BY HAND for DROP DELIVERY at a Newer SUPERMARKET

This situation differs from the one in Table A in that the unloading is done by hand not by liftgate.

Cases per Delivery	Select Merchandise	Unload by Hand for Drop Delivery	Total Time for Select Merchandise & Unload
	minutes per delivery		
10	3.2	.7	3.9
15	3.6	.9	4.5
20	3.9	1.3	5.2
30	4.6	1.8	6.4
40	5.3	2.4	7.7
50	6.0	2.9	8.9
75	7.8	4.3	12.1
100	9.5	5.8	15.3

Table C. Time Required to SELECT MERCHANDISE, UNLOAD WITH LIFTGATE & DELIVER 100 FEET One-way Distance at a Newer SUPERMARKET

This illustration differs from that in Table A in that the product is moved 100 feet into the store by hand truck.

Cases per Delivery	Select Merchandise	Unload with a Liftgate	Deliver with a Hand Truck, 100'	Total Time for Select Merchandise, Unload & Deliver
	minutes per delivery			
20	3.9	.9	4.0	8.9
30	4.6	1.4	6.1	12.1
40	5.3	1.8	8.1	15.3
50	6.0	2.3	10.1	18.5
75	7.8	3.4	15.2	26.4
100	9.5	4.5	20.2	34.4

Table D. Time Required to SELECT MERCHANDISE, UNLOAD BY HAND & DELIVER 100 FEET One-way Distance at a Newer SUPERMARKET

This differs from Table C in that unloading is done by hand instead of a liftgate.

Cases per Delivery	Select Merchandise	Unload by Hand	Deliver with a Hand Truck, 100'	Total Time for Select Merchandise, Unload & Deliver
	minutes per delivery			
10	3.2	1.1	2.0	6.3
15	3.6	1.7	3.0	8.3
20	3.9	2.2	4.0	10.1
30	4.6	3.3	6.1	14.0
40	5.3	4.4	8.1	17.8
50	6.0	5.5	10.1	21.6
75	7.8	8.3	15.2	31.3
100	9.5	11.0	20.2	40.7

Table E. Time Required to SELECT MERCHANDISE, UNLOAD BY HAND & HAND CARRY 50 FEET One-way Distance at a MA AND PA STORE

Cases per Delivery	Select Merchandise	Unload by Hand	Hand Carry* 50'	Total Time for Select Merchandise, Unload & Deliver
	minutes per delivery			
1	1.7	.1	.6	2.4
2	1.8	.2	.6	2.6
5	2.1	.4	1.9	4.4

* assumes that routeman can hand carry two cases per trip, but this may not be true for the larger 24-quart case.

Table F. Time Required to SELECT MERCHANDISE, UNLOAD BY HAND & DELIVER 50 FEET One-Way Distance at a MA AND PA STORE

This table differs from Table E in that a hand truck is used for delivery, rather tha a hand carry.

Cases per Delivery	Select Merchandise	Unload by Hand	Deliver with a Hand Truck, 50'	Total Time for Select Merchandise, Unload & Deliver
	minutes per delivery			
1	1.7	.1	.6	2.4
2	1.8	.2	.6	2.6
5	2.1	.4	.6	3.1
10	2.6	.7	1.3	4.6
15	3.1	1.1	1.9	6.1
20	3.6	1.5	2.5	7.0

Table G. Time Required to SELECT MERCHANDISE, UNLOAD WITH LIFTGATE & DELIVER 100 FEET One-way Distance with a HAND TRUCK, DOLLY AND FLAT TRUCK at a Newer SUPERMARKET

Cases per Delivery	Total Time for Select Merchandise, Unload & Deliver 100'		
	Hand Truck	Dolly	Flat Truck
	minutes per delivery		
20	8.9	7.7	6.3
30	12.1	10.3	9.0
40	15.3	12.9	10.1
50	18.5	15.5	11.3
75	26.4	22.6	15.7
100	34.4	28.4	20.1

Table H. Time Required to SELECT MERCHANDISE, UNLOAD BY HAND & DELIVER 100 FEET One-Way Distance with HAND TRUCK at an INSTITUTION (schools, hospitals, nursing homes, factories, etc.)

Cases per Delivery	Select Merchandise	Unload by Hand	Deliver with a Hand Truck, 100'	Total Time for Select Merchandise, Unload & Deliver
	minutes per delivery			
5	1.6	.4	1.0	3.0
10	2.1	.7	2.0	4.8
15	2.5	1.1	3.0	6.6
20	3.0	1.5	4.0	8.5
30	4.0	2.2	6.1	12.3
40	4.9	2.9	8.1	15.9
50	5.9	3.7	10.1	19.7
75	6.8	5.5	15.2	27.5
100	12.0	7.3	20.2	39.5

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A STATUTORY COLLEGE OF THE STATE UNIVERSITY
CORNELL UNIVERSITY
ITHACA, NEW YORK 14850

DEPARTMENT OF
AGRICULTURAL ECONOMICS
WARREN HALL

July 8, 1975

To: Dairy Managers in Upstate New York

In this week's report, we consider the handling of empty cases, as it affects the time required for a routeman to serve an account.

With this week's report, we finish our examination of the individual tasks performed by the routeman at customer stops:

Tasks Requiring a Constant Amount of Time

1. parking
2. preparing for delivery
3. having ticket checked
4. extending ticket & collecting (if done)
5. delays
6. leaving

Tasks Requiring Varying Amounts of Time*

1. selecting merchandise
2. unloading product
3. moving product from unloading to delivery point
4. handling empty cases

In next week's report, we will put the pieces together and examine the total time required at the stop for various types of customers, for various volumes of product delivered and for different delivery conditions.

Sincerely,

R. D. Aplin and H. W. Ayres

RDA:HWA:js
Enclosure

* These tasks require varying amounts of time depending on volume, equipment used, and distance routeman moves product.

Report No. 4: HANDLING EMPTY CASES

This report considers handling empty cases as it affects the time required for a routeman to serve an account, and, in turn, as it affects the cost of delivery.

We observed three basic situations occurring in the handling of empty cases while riding 30 wholesale routes in the Upstate New York Area last summer:

1. The empty cases are at the unloading point, neatly stacked; and, the routeman simply puts the empties into the truck

2. The empty cases are at the delivery point and the routeman can bring them back to the truck on his return trip, after delivering product.

3. The empty cases are at a third location - neither the unloading nor the delivery point and a special trip is needed to get the empties and return them to the truck. In this third situation, the routemen's procedures differed: some would return only 5 empties per trip, others nested them and consequently returned more than 5 - some as many as 10 - cases per trip.

The location of the empty cases affects the time it takes a routeman to serve an account. Empties found at the unloading point require the least time and empties at a location different than the unloading point or delivery point require the most time. Tables 1 and 2 present information on the time required for a typical routeman to arrange empty cases, place them on a hand truck, move them to the vehicle, and load them for two types of customers - a supermarket and a Ma and Pa store.

Table 1. Time Required to HANDLE EMPTY CASES at a Newer SUPERMARKET

Cases per Delivery	Situation 1 Empties at Unloading Point	Situation 2* Empties at Delivery Point	Situation 3 Empties at Different Location, 50 Feet from Vehicle	
			5 Empties per Trip	10 Empties per Trip
	minutes per delivery			
5	.1	.2	.6	.6
10	.2	.4	1.3	.8
15	.3	.6	1.9	1.5
20	.4	.8	2.5	1.7
30	.6	1.2	3.8	2.5
40	.8	1.6	5.0	3.3
50	1.0	2.0	6.3	4.2
75	1.5	3.0	9.5	6.4
100	2.0	4.0	12.6	8.3

Table 2. Time Required to HANDLE EMPTY CASES at a MA AND PA STORE

Cases per Delivery	Situation 1 Empties at Unloading Point	Situation 2* Empties at Delivery Point	Situation 3 Empties at Different Loaction, 50 Feet from Vehicle 5 Empties per Trip
	minutes per delivery		
5	.2	.5	.9
10	.5	.9	1.8
15	.7	1.4	2.7
20	.9	1.8	3.5

* NOTE: The time reported includes only the time to handle empty cases. It does not include time to return to truck because this time has already been included in delivery time.

The following conclusions about the time required to handle empty cases can be deduced from these Tables:

1. At a supermarket, if the empties are at the unloading point, instead of the delivery point, it saves approximately ½ minute at a 30 case stop and 2 minutes at a 100 case stop.

2. If the empties are at a location other than the unloading or delivery point and 50 feet from the truck, it takes 2 to 3 minutes longer to serve a 30 case supermarket account than if the empties were at the unloading point and about 1 to 3 minutes longer than if the empties were at the delivery point.

A saving of only 2 or 3 minutes at a certain stop may not seem very significant. But remember, that if such a saving were possible at only 10 stops on a route, the total time saved, and thus available for other productive work, probably amounts to about 10% of the total time a typical routeman has available at customer locations.

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A STATUTORY COLLEGE OF THE STATE UNIVERSITY
CORNELL UNIVERSITY
ITHACA, NEW YORK 14850

DEPARTMENT OF
AGRICULTURAL ECONOMICS
WARREN HALL

July 15, 1975

To: Dairy Managers in Upstate New York

Report No. 5 (enclosed) deals with total time at customer stops. We combine all the tasks we have discussed in Reports 2, 3 and 4 (i.e., fixed time, selecting merchandise, unloading, delivering and handling empty cases). The fixed and variable components, total time, and time per case are presented for three types of customers: a convenience store, a newer supermarket and a Ma and Pa store.

Some highlights from this week's report are:

1. The single largest factor affecting total delivery time is volume of product delivered. But, other characteristics of a customer stop (i.e., type of service provided, unloading procedures, delivery methods, delivery distances, etc.) also importantly affect the time requirements.

2. Here's an example of using our standard times to determine total time for a particular customer: you consult your route foreman or routeman for the characteristics of the stop. He tells you:

a. it's a Ma and Pa store
b. the order is unknown
c. he collects
d. product is unloaded by hand
e. he moves the product 50 feet (one-way) by hand truck
f. empties are not at the truck and not at the delivery point, but 75 feet from the truck.

Application of our standard times to a stop with these characteristics indicates the total at-stop time for a 5 case stop is approximately 2.2 minutes per case; for a 10 case stop - 1.4 minutes per case; and for a 15 case stop - 1.1 minutes per case.

3. The total at-stop times are also estimated for a supermarket and a convenience store, using the standard times.

4. We also illustrate making a change in the existing delivery practices at a stop. Presently the routeman is unloading by liftgate and using a hand truck to move product 50 feet into a supermarket. If this were changed to a drop delivery (where product is not moved from the unloading point), it would save the routeman .13 minutes per case or 13 minutes at a 100 case stop.

Sincerely,

R. D. Aplin and H. W. Ayres

RDA:HWA:js
Enclosure

Report No. 5: TOTAL TIME AT CUSTOMER STOPS

Previous reports have considered the job of a routeman serving a customer account on a piecemeal basis. We looked at the time it takes the average routeman to perform tasks at a stop that do not vary with the volume of product delivered - the fixed components - tasks such as parking, preparing for delivery, checking ticket, collecting (if done), leaving the stop and so on. The last two reports dealt with the time required to perform tasks requiring varying amounts of time depending on the volume delivered, equipment used and other characteristics of the delivery. This latter group of activities - the so-called variable elements of delivery - include selecting merchandise, unloading, moving product to the delivery point and handling empty cases. In this report, we put the pieces together and examine total time required at the stop for various types of customers, for various volumes of product and various delivery conditions.

An Important Caution

Before going into detail, we'd like to underscore the fact that this report deals only with the at-stop time. To determine the total time associated with serving a customer, we must account for time that a routeman spends doing tasks away from customer locations. In other words, a routeman spends a significant part of his day at the plant before and after his route, driving and taking care of personal needs (coffee breaks and meals). We did not time study the at-plant activities. However, we suspect it may be common for these tasks to take 40 to 50% of a routeman's total day. Time the routeman spends at the plant and driving, as well as personal time, is essential and is incurred to support his whole route - putting him in the position to serve all the customers on his route. When we reach the point of determining the total time involved in delivering product to and serving a customer we need to take into account these non-at-stop activities. But that's the subject of next week's report. This report deals only with the total at-stop time of serving accounts.

Prepared by R. D. Aplin & H. W. Ayres, Department of Agricultural Economics, Cornell University, Ithaca, New York 14853. Funds for this research partially provided through the New York State Department of Agriculture & Markets from assessments collected under the Dairy Trade Practices Law.

To illustrate using standard times to determine the total at-stop time required to serve a customer, we have arbitrarily chosen delivery to a supermarket, a convenience store and a Ma and Pa store. In each of the illustrative accounts we vary the volume of product delivered, the service provided and the conditions of the delivery. We might have chosen other types of customers (as, restaurants, luncheonettes, hospitals, etc.) or other combinations of service and customer conditions. There are an infinite number of situations from which to choose our illustrations. But we hope the ones we've chosen will be of interest.

Time Required to Serve a Convenience Store

Let's assume we want to determine the time required to serve a convenience store on one of our routes or one that we may acquire as a new customer. This customer is in an area currently being served by one of our routes. Most customers on the route are Ma and Pa stores with a few luncheonettes and a couple of supermarkets. The subject convenience store has a small parking lot and the routeman must back up to the unloading area. The delivery point is a walk-in cooler, 50 feet from the truck.

Standard times enable us to estimate the time it will take an average routeman to serve this convenience store. All we need is limited information about the customer that the routeman, rider or supervisor should be able to provide. Assume the routeman provides the following information about the particular convenience store:

1. He consults store personnel each day to get the order - unknown order.
2. He has ticket checked by store personnel but does not extend ticket or collect. Customer is an "office" or "ledger" account.
3. He parks in a lot, backs up to unloading point.
4. Product is unloaded by liftgate.
5. He uses a hand truck.
6. He leaves product in cooler located 50 feet from unloading point.
7. Empty cases are at unloading point.

We don't want information on volume of product delivered because we want to determine how volume affects the time required. Above is all the information needed to use our standard times to estimate the at-stop time required to serve this convenience store. Wouldn't you agree that the routeman could readily supply this information? Results are shown in Table 1.

Table 1. Time Required AT-STOP to Serve a CONVENIENCE STORE, where: unknown order, no collection, unload with liftgate, move product 50 feet with hand truck to delivery point, empty cases at unloading point.

Cases per Delivery	Fixed Time*	Select Merchandise	Unload by Liftgate	Deliver With Hand Truck	Handle Empties	Total At-Stop Time	Minutes Per Case
	minutes per delivery						
20	6.2	3.4	1.2	2.5	.7	14.0	.70
25	6.2	3.9	1.5	3.2	.9	15.7	.63
30	6.2	4.3	1.8	3.8	1.1	17.2	.57
40	6.2	5.2	2.4	5.0	1.4	20.2	.51
50	6.2	6.1	3.1	6.3	1.8	23.5	.47
75	6.2	8.2	4.6	9.5	2.6	31.1	.41
100	6.2	10.4	6.1	12.6	3.5	38.8	.39

* Fixed time includes time to park, prepare for delivery, get ticket checked, prepare to leave and leave.

The estimated total at-stop time enables us to make some interesting comparisons. For example, it takes a routeman approximately 14 minutes (or .70 minutes per case) at a 20 case convenience store stop - under the specific circumstances assumed in our example. Whereas it takes 24 minutes (or .47 minutes per case) at a 50 case convenience store stop.

Using standard times, we can determine how the time required to serve the account would differ with different conditions of delivery. For example, we could determine how total at-stop time would differ if a liftgate were not used, if dollies were used, if the delivery point were different, if the order had been preordered, and the like.

Limited Service to a Newer Supermarket

Let's look at delivery to a newer supermarket. A so-called "newer" supermarket differs from the convenience store stop just discussed in that a newer supermarket is generally larger with a more convenient unloading area (not necessarily a dock) than the convenience store. For our illustration, let's assume the following conditions of delivery:

1. Preordered by telephone.
2. Ticket checked by store personnel but no collection.
3. Product unloaded with liftgate.
4. Product moved 50 feet by hand truck to delivery point.
5. Empty cases at unloading point.

Although this hypothetical customer is not a drop delivery, it is a very limited service delivery. Applying our standard times we can estimate the total at-stop time for this type of supermarket. Results are shown in Table 2.

Table 2. Time Required AT-STOP to Serve a NEWER SUPERMARKET, where: preordered, no collection, unload with liftgate, move product 50 feet with hand truck to delivery point, empty cases at unloading point.

Cases per Delivery	Fixed Time*	Select Merchandise	Unload by Liftgate	Deliver With Hand Truck	Handle Empties	Total At-Stop Time	Minutes Per Case
	minutes per delivery						
20	8.5	3.9	.9	2.5	.4	16.2	.81
25	8.5	4.3	1.1	3.2	.5	17.6	.70
30	8.5	4.7	1.4	3.8	.6	19.0	.63
40	8.5	5.4	1.8	5.0	.8	21.5	.54
50	8.5	6.1	2.3	6.3	1.0	24.2	.48
75	8.5	7.9	3.4	9.5	1.5	30.8	.41
100	8.5	9.7	4.5	12.6	2.0	37.3	.37

* Fixed time includes time to park, prepare for delivery, get ticket checked, prepare to leave and leave.

Again the above information on estimated at-stop time for a limited service supermarket account enables us to make interesting and useful comparisons. For example, it takes the typical routeman approximately 19 minutes to deliver 30 cases (or .63 minutes per case) to this type of account. It takes him about 37 minutes to deliver 100 cases (or .37 minutes per case). We can determine how the

time required at the stop would differ if conditions of the delivery differed. For example, suppose it were a drop delivery (instead of moving product by hand truck 50 feet). We determine the time saving of a drop delivery by looking at the minutes shown in column "Deliver With Hand Truck." We see that a routeman would save approximately 4 minutes at a 30 case supermarket account and about 12 or 13 minutes at a 100 case stop.

Time Required to Serve a Ma and Pa Store

Let's look at delivery to a Ma and Pa store, a common and important type of customer. Assume the following conditions for the Ma and Pa store:

1. Order unknown.
2. Routeman extends ticket and collects.
3. Routeman parks in street.
4. Product unloaded by hand.
5. Hand carry with 1-3 case volume, hand truck for 4 or more cases.
6. Product left in front of dairy display case, 50 feet from truck.
7. Empty cases at a location in store different than delivery point and 75 feet from truck.

The time it takes the typical routeman to deliver various volumes of product under these conditions at a Ma and Pa store is shown in Table 3.

Table 3. Time Required AT-STOP to Serve MA AND PA STORE, where: unknown order, collection unload by hand, hand carry or hand truck (as indicated), delivery point 50 feet from vehicle, empty cases 75 feet from vehicle.

Cases per Delivery	Fixed Time*	Select Merchandise	Unload by Hand	Deliver	Handle Empties	Total At-Stop Time	Minutes per Case
	minutes per delivery						
				Hand Carry			
1	7.0	1.7	.1	.6	.7	10.1	10.10
2	7.0	1.8	.2	.6	.8	10.4	5.20
3	7.0	1.9	.3	1.2	1.6	12.0	4.00
				Hand Truck			
4	7.0	2.0	.3	.6	1.0	10.9	2.73
5	7.0	2.1	.4	.6	1.1	11.2	2.24
6	7.0	2.2	.4	1.2	1.8	12.6	2.10
7	7.0	2.3	.5	1.2	1.9	12.9	1.84
8	7.0	2.4	.6	1.2	2.0	13.2	1.65
9	7.0	2.5	.7	1.2	2.1	13.5	1.50
10	7.0	2.6	.7	1.2	2.2	13.7	1.37
15	7.0	3.1	1.1	1.9	3.3	16.4	1.09
20	7.0	3.6	1.5	2.5	4.4	19.0	.95
25	7.0	4.1	1.8	3.2	5.5	21.6	.86

* Fixed time includes time to park, prepare for delivery, get ticket checked, collect, prepare to leave and leave.

In this report we have shown total times at the stop and time per case for different types of customers and varying conditions.

The next report looks at similar customers, but also considers allocating the non-at-stop time. We will discuss alternative bases for allocating driving time, at-plant time and personal time to each customer.

NEW YORK STATE COLLEGE OF AGRICULTURE AND LIFE SCIENCES
A STATUTORY COLLEGE OF THE STATE UNIVERSITY
CORNELL UNIVERSITY
ITHACA, NEW YORK 14850

DEPARTMENT OF
AGRICULTURAL ECONOMICS
WARREN HALL

July 22, 1975

To: Dairy Managers in Upstate New York

This report presents the "total" picture - with a discussion of total time on the route. We have previously discussed only the total time at customer locations and the various tasks that make up "at-stop" time.

We also address the question of how to allocate the joint supportive time among all customers on a route.

We propose that there are three primary methods for allocating supportive time to individual customers. These three allocation methods are:

1. Proportionally on the basis of the time spent at the customer stop.

2. Equally per customer.

3. Proportionally on the basis of volume - number of cases delivered.

The enclosed report presents a hypothetical route, complete with customers. We then apply each of these allocation bases to demonstrate how total time associated with a customer will differ depending on the method used to allocate the joint supportive time.

This week's report is slightly different than previous ones in the sense that it offers merely fruit for thought rather than somewhat definitive answers. However, we feel the ideas presented in the report are essential for meaningful route management.

Sincerely,

R. D. Aplin and H. W. Ayres

RDA:HWA:js
Enclosure

Report No. 6: ACCOUNTING FOR TOTAL TIME ON A ROUTE - NOT JUST THE TIME AT CUSTOMER STOPS

In our study, we have divided a routeman's workday into six parts:

1. Time spent at the plant in the morning preparing for the route.
2. Stem driving time - consists of time required to drive from plant to first customer and from last customer back to plant.
3. Time spent driving between customers once routeman is in general delivery area.
4. Time spent at customer locations.
5. Time spent for coffee breaks, eating lunch and taking care of personal needs.
6. Time spent at plant following return from route doing such things as handling returns, getting gasoline, parking, cashing in and doing route settlement.

Time spent at customer locations has been the focus of our previous reports. Last week we suggested a method for using our research results to determine the total time required at a customer stop, assuming various characteristics of the stop are known. Time a routeman spends at customer locations is, perhaps, the most important part of his day. However, the other five components of his day may represent from 40 to 50% of the total time he works each day. Time a routeman spends performing these supportive activities is not clearly traceable to individual customers, since it is time he spends to put him in the position to deliver product and to serve <u>all</u> the customers on his route.

Management needs to take into account the routeman's total day - not just the at-stop time - for many planning and control purposes. Taking a realistic, longer run viewpoint, additional customers, additional services performed, or the same services rendered to more customers, eventually require more routes, and consequently, more routemen, each of whom must perform at-plant activities, drive to and from the

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Prepared by R. D. Aplin and H. W. Ayres, Department of Agricultural Economics, Cornell University, Ithaca, New York 14853. Funds for this research were partially provided through the New York State Department of Agriculture & Markets from assessments collected under the Dairy Trade Practices Law.

delivery area and the like. An important and difficult question that arises when doing some analyses is, "How much of the overhead, supportive part of a routeman's time do we allocate to a particular type of customer?" Or, "How do we assign at-plant time, driving time and other overhead time to individual customers?"

There are several possible answers to these questions. There is more than one way to allocate the so-called supportive or non-at-stop time to individual customer stops. It should be no surprise that these different ways of allocating the non-at-stop time to customers can lead to significantly different amounts of total time being associated with serving a particular type of customer or with providing certain services to customers. Although certain allocation bases may appear to be superior to others, generally speaking, there is no pat answer for the best method for allocating the joint overhead time. The most reasonable and most meaningful allocation basis depends on the circumstances and the purpose of the analysis.

This report considers three possible methods of allocating the time spent performing supportive activities. We want to stimulate thinking, rather than give you definitive answers.

Before we move to these three methods of allocation, let's examine in more detail the five components which comprise the so-called joint supportive or non-at-stop time:

1. Morning Preparation Work - includes time spent getting routebook in the driver's room, doing paper work, walking to truck, checking load, starting motor, unhitching electrical plug-ins and the like.

2. Stem Driving Time - includes time required to drive to and from the general delivery area.

3. Breaks, Meals and Personal Time

4. Time Spent Driving Between Customer Stops in the Delivery Area

5. Time Spent at Plant After Route - includes waiting in line, handling product returns, unloading empty cases, gassing truck, parking truck, walking to driver's room, making out next day's order, cashing in and doing routebook settlement. At some plants, the routeman helps load his truck.

As we mentioned before, the work represented by all five of these components of a routeman's day is done to serve all customers on a route. The time required to perform these five activities is not significantly affected by the size of the load, the number of customers served or the size of individual deliveries. There are only two partial exceptions to this important generalization. Generally speaking, the time required for some at-plant activities in the afternoon (for example, route settlement) and the total time spent driving between customers are somewhat affected by the number of customers served. But, even the time required for these two aspects of a routeman's day are only partially influenced by the number of customers he serves and other factors are probably a more important determinant of the time spent performing afternoon at-plant work or driving between customers.

In short, a significant portion of a routeman's total day involves necessary tasks away from customer locations - work done for all customers on the route. There are a number of different ways we can allocate this time - but, in particular, there are three allocation bases which merit our consideration: 1) on the basis of time spent at customer locations, 2) equally among customers, and 3) on the basis of the number of cases delivered.

Allocating on the Basis of Time Spent At Stop

Supportive time can be assigned to customers proportionally to the time spent at the customer stop. Using this approach, each customer is assigned a portion of non-at-stop time proportional to the at-stop time required to serve him. For example, if a routeman spends 10% of his at-stop time serving Customer X, then Customer X is assigned 10% of the total overhead supportive time. If the total supportive time were 200 minutes per route day, 20 minutes would be added to Customer X's at-stop time to arrive at an estimated total time required to serve Customer X.

Allocating Equally Among Customers

Supportive time can be allocated equally per customer. The supportive time on a route is divided by the number of customers served and an equal share of supportive time is assigned to each customer. For example, if the total supportive time were 200 minutes per route day and there were 20 customers on the route, each customer would then be assigned 10 minutes of non-at-stop time.

Allocating on the Basis of Number of Cases Delivered

Supportive time can be allocated proportionally to the number of cases delivered to each customer. For example, if there are 200 cases delivered on an entire route and Customer Y receives 50, Y would be assigned 25% of the total supportive time. If supportive time were 200 minutes per route day, Customer Y would be assigned 50 minutes of this overhead time.

An Example

The following example may help to clarify the different methods of assigning joint time spent by the routeman to individual customers. We will use hypothetical times for the supportive activities in our example. Unlike previous reports, these supportive times are not standard times - they are realistic hypothetical times for each task, for illustration.

First, this list of assumed times indicates how our hypothetical routeman might spend a typical day:

Activities on Hypothetical Route XXX	Assumed Time (minutes per route day)
Morning preparation work at plant	30
Stem driving	40
Driving between customer stops in route area	60
Coffee break, lunch and personal time	60
Work at plant following route	60
TOTAL OVERHEAD SUPPORTIVE TIME	250
At-stop time - delivering product and serving customers	265
TOTAL ASSUMED WORK DAY	515

There are, of course, some hypothetical customers on our hypothetical route. Below is a list of only 8 of the customers on our illustrative route, together with the volume of product delivered to each and the estimated time required at each stop. Remember that any similarity to a real customer or an actual route is purely coincidental. These examples are for illustration only.

8 Selected Customers on Hypothetical Route XXX

Customer	Number of Cases Delivered	% of Total Route Volume	Estimated Time At Stop (minutes)	% of Total Route At-Stop Time
1. P&A Supermarket #1	50	19.8	29.9	11.3
4. Alpha's Luncheonette	4	1.6	9.2	3.5
5. Beta's Restaurant	4	1.6	6.7	2.5
8. Excelsior Superette	17	6.7	13.6	5.1
9. Frank's Store	12	4.7	15.7	5.9
11. Hal's Hash House	6	2.4	7.1	2.7
17. National Markets	3	1.2	12.5	4.7
19. Pop's Deli	12	4.7	12.4	4.7
TOTAL ROUTE[a/]	253	100.0	265.0	100.0

a/ Our hypothetical route has 19 customers in total, only 8 are shown here.

Table 1 illustrates the amount of supportive time assigned to the selected customers on our hypothetical route, using each of the three allocation methods we've discussed.

Table 1. Amount of SUPPORTIVE TIME or Non-at-Stop Time ASSIGNED to Selected HYPOTHETICAL Customers Using THREE ALLOCATION BASES

Customer	Number of Cases Delivered	Estimated Time At Stop	Supportive Time Based On: Time Spent At Stop	Equally Per Customer	Number of Cases Delivered
			minutes		
1. P&A Supermarket #1	50	29.9	28.3	13.2	49.5
4. Alpha's Luncheonette	4	9.2	8.8	13.2	4.0
5. Beta's Restaurant	4	6.7	6.3	13.2	4.0
8. Excelsior Superette	17	13.6	12.8	13.2	16.8
9. Frank's Store	12	15.7	14.8	13.2	11.8
11. Hal's Hash House	6	7.1	6.8	13.2	6.0
17. National Markets	3	12.5	11.8	13.2	3.0
19. Pop's Deli	12	12.4	11.8	13.2	11.8

In Table 2 we add at-stop time to the supportive time assigned using each method in Table 1 to arrive at total time for each customer.

Table 2. TOTAL TIME for Selected HYPOTHETICAL Customers - Combining At-Stop Time and Supportive Time, Using Three Allocation Bases

Customer	TOTAL TIME - Supportive Time Allocation Based On: Time Spent At Stop	Equally Per Customer	Number of Cases Delivered
	minutes		
1. P&A Supermarket #1	58.2	43.1	79.4
4. Alpha's Luncheonette	18.0	22.4	13.2
5. Beta's Restaurant	13.0	19.9	10.7
8. Excelsior Superette	26.4	26.8	30.4
9. Frank's Store	30.5	28.9	27.5
11. Hal's Hash House	13.9	20.3	13.1
17. National Markets	24.3	25.7	15.5
19. Pop's Deli	24.2	25.6	24.2

Using any of these three allocation methods one can assign the routeman's whole day to all his customers. In other words, the total of any of the columns in Table 2, if all 19 customers on the hypothetical route were included, would equal the total time the routeman worked.

It should be clear from our example, that the total time assigned to a customer can be strikingly different depending on the method used to allocate the supportive time. Our assumptions and our research rest on the premise that "Time is Cost." That is, that the cost of serving a customer, being it delivering product or providing other service, bears a direct relationship to the time required. Therefore, it is important to realize that the different allocation methods we've presented may result in quite different time requirements being assigned to a particular customer and will eventually result in quite different costs being associated with him.

In closing this week's report, let's remember that there are no pat answers for allocating at-plant time, driving time and other overhead time on a route to individual customers. Moreover, we should point out that our discussion of allocation bases focused on only three methods and on allocating all the supportive time using the same method. It could well be, at least for some purposes, that you would want to allocate some of the overhead supportive time on a route using one method and allocate the rest of the overhead time using another method. For example, you might allocate the time spent driving between customers equally among customers and allocate at-plant time, stem driving time and other overhead time on the basis of time spent at customer locations.

NEW YORK STATE COLLEGE OF AGRICULTURE AND LIFE SCIENCES
A STATUTORY COLLEGE OF THE STATE UNIVERSITY
CORNELL UNIVERSITY
ITHACA, NEW YORK 14850

DEPARTMENT OF
AGRICULTURAL ECONOMICS
WARREN HALL

August 19, 1975

To: Dairy Managers in Upstate New York

In this report, our seventh, we explore the supportive, non-at-stop time (which is a substantial portion of the routeman's workday). Primarily, we address the problem of estimating driving time for a route. We consider briefly at-plant time and a routeman's personal time. Once all these times have been estimated, management has all the pieces of the puzzle, so to speak, and can estimate the total time needed to operate a given route.

This brings us to the next report and rather than give you this week's highlights, let's look ahead to what's coming up next. This preview will give you a chance to reflect on the material presented so far, before we attempt to fit it all together in Report No. 8.

In the newest phase of our research, we have been putting our standard times into a format that is practical for management to use as an aid to decision making in their own operations. We realize that management faces an array of decisions, some calling for very detailed information and some calling for only a limited amount of information. In other words, we believe that managers should have a flexible information system, capable of giving them the right degree of detail for the decision at hand. For this reason, we've developed three sets of standard times. One set gives you very detailed information; one set, only a limited amount of information; and the other is inbetween.

At the same time, we believe that applying the standards, regardless of the amount of detail desired should require a minimum of management's scarce time. And, we have developed several, easy-to-use forms, making it possible to quickly estimate the time needed to operate a route or serve a customer.

In our next report we will illustrate the use of some of these forms. We will also demonstrate the flexible nature of our three types of standards by showing you how different management questions call for the use of different types of standards.

Sincerely,

R. D. Aplin

RDA:js
Enclosure

Report No. 7: DRIVING TIME ON ROUTES

Our reports have focused on only one important phase of our study, developing standard times. The standard times let us determine the time required for the average routeman, fully qualified and working at a normal pace, to perform tasks involved on his route. We've shown how the standard times can be used to estimate how long it takes to serve a customer, once we know the volume delivered, service provided and conditions at the stop.

But, there are activities other than those at customer stops, and these make up a substantial part of the routeman's workday. This report focuses on the routeman's activities which occur away from customer stops - driving time, at-plant time and personal time.

Driving Time

We have developed standard times for driving under various conditions. The application of our driving standards requires some subjective judgment on the part of management. But by working with the routeman or someone else familiar with the route, this subjectivity and the resulting error can be kept at a minimum.

To estimate driving time on a route you need to know two things: first, each type of driving condition on the route must be identified, and second, the mileage driven under each type of driving condition must be determined.

The primary factor used to distinguish each different driving condition is the "attainable speed." We define "attainable speed" as the highest speed that can be reached and maintained by the delivery vehicle (for at least a short period of time) on a street or road. It is important to note that attainable speed is not an average speed, but rather a "top speed" concept. For example, the attainable speed on a limited-access highway might be 55 m.p.h. (the speed limit), while the attainable speed on a city street might be only 15 m.p.h.

Prepared by R. D. Aplin & H. W. Ayres, Department of Agricultural Economics, Cornell University, Ithaca, New York 14853. Funds for this research were partially provided through the New York State Department of Agriculture & Markets from assessments collected under the Dairy Trade Practices Law.

Two major factors affect the so-called attainable speed - the type of road or street (i.e., narrow and hilly vs. wide and flat) and the flow of traffic (i.e., free flowing vs. congested).

Please note that attainable speed is the overriding factor used to determine the driving condition. The type of road and/or flow of traffic are only considered if and when they affect the attainable speed.

Driving conditions on the same road may change, depending on the time of day. For example, driving on a city street early in the morning may be considered "suburban" driving, but would be "city" driving later in the day as traffic increases and the flow of traffic slows down.

Driving Conditions

The following descriptions are a guide for determining the type of driving condition:

1. City - Roads and streets on which the highest attainable speed is 15-20 m.p.h. Typically, traffic is slow with frequent delays for traffic signals, congestion, intersections and the like. The standard time for city driving conditions in Upstate New York is 3.7 minutes per mile, reflecting an average speed of 16 miles per hour.

2. Suburban - Roads and highways on which the top attainable speed is 20-35 m.p.h. Typically there are some delays due to stop signs, intersections and possibly traffic. The standard time for suburban driving conditions is 2.1 minutes per mile (which reflects an average speed of 28 miles per hour).

3. Highway - Roads (including limited-access highways) on which a top speed of 55 m.p.h. can be attained. Typically there is a free flow of traffic with few delays, if any. The standard time for highway driving conditions is 1.6 minutes per mile, reflecting an average speed of approximately 37 miles per hour.

Determining Mileages

To use our driving standards, you need to determine the number of miles travelled under each driving condition on the route (i.e., a total of X miles in highway conditions, Y suburban miles and Z city miles). There are several possible methods for determining the needed mileage information - two methods we believe are practical for management are: 1) tracing the route on a map, or 2) keeping a driving log.

1. The route is traced and measured on a detailed map. Someone who knows the route indicates the driving conditions that apply to each driving segment of the route.

2. The routeman keeps a record of mileage and driving conditions for each driving segment of his route. Since an average or typical condition is the most useful, we recommend that the driving log be kept for several days.

Applying the proper standard time for each mile under each driving condition, you can estimate the total driving time for a route.

An Example Illustrating Use of Driving Standards

Let's assume the following sequence of driving conditions and corresponding mileages for a hypothetical route:

1.0 miles of city driving
12.0 miles of highway driving
4.5 miles of suburban driving
2.0 miles of city driving
6.0 miles of suburban driving
14.0 miles of highway driving
1.0 miles of city driving

With the above information we determine the driving time on the route:

Driving Condition	Number of Miles	x	Driving Standard	=	Driving Minutes
City	4.0 miles	x	3.7 min./mile	=	17.8 minutes
Suburban	10.5 miles	x	2.1 min./mile	=	22.1 minutes
Highway	26.0 miles	x	1.6 min./mile	=	41.6 minutes
	Estimated total driving time on route			=	78.5 minutes

At-Plant and Personal Time

Because of different company procedures and policies regarding these times, we did not attempt to develop standard times for them. The time a routeman spends at the plant preparing for his route and completing route work at the end of the day can easily be determined by observation. Time spent for coffee breaks, meals and other personal needs are likely a matter of policy (i.e., certain allotments for each activity, predetermined by management decision or union contract).

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A STATUTORY COLLEGE OF THE STATE UNIVERSITY
CORNELL UNIVERSITY
ITHACA, NEW YORK 14850

DEPARTMENT OF
AGRICULTURAL ECONOMICS
WARREN HALL

March 9, 1976

To: Dairy Managers in Upstate New York

It's been a long time since we last sent you some results of our research on wholesale milk distribution. We regret the time lapse between this report and the last one.

You should have received recently an announcement of a two-day workshop on April 22 and 23 in Syracuse. In the workshop, we'll discuss the entire results of of our research - not just the work on time standards and utilization of routemen's time (on which the series of reports you've received in the mail have focused) - but also work we did this summer and fall on developing customer and route profit and loss statements. We certainly hope you'll consider participating in the workshop. Another workshop announcement is enclosed.

Since a major objective of our work is to develop some standards, some tools and some viewpoints that busy managers can apply to their own real-life problems and situations, we appreciate the importance of developing tools that are practical.

After reading our series of letters and reports last summer you are probably thinking, "All this research, all the facts and figures are fine, but how can I use them?" "Are there any practical results from all of this that I can actually use in my own business?" And, these are important questions.

This past summer and fall we had the opportunity to test the practicality of management's applying the forms and techniques we've developed to analyze their customers and routes. The results were very encouraging. Our standards and forms seem to bear up well to the ultimate test of practicality and usefulness.

The enclosed report, Report No. 8, describes and illustrates the use of our standards and forms as a management aid to decision making. Note we underlined "aid." The best we can hope to do is offer some tools for management. In no way can these tools be a substitute for experience, imagination, hard work and good judgement. But, they can help you plan and control your operations and can give you a better basis for applying your experience and judgement.

Specifically in this report, we examine a hypothetical newer supermarket stop. We demonstrate how to easily estimate the time a routeman spends at the stop. We show how to determine the time implications of changing the delivery conditions at the stop or the amount of service the customer receives. We also discuss which of our three sets of standards will provide insights to answer such questions as:

1. How much time will it take to serve this new customer?
2. How should we realign our routes as our customers change?

Sincerely,

R. D. Aplin and J. C. Taber

RDA:JCT:js
Enclosures

Report No. 8: HOW MANAGEMENT CAN USE OUR RESEARCH RESULTS

A major objective of our wholesale milk distribution research is to provide managers with techniques and standards they can apply to their own customers and routes. Our first seven reports were designed to familiarize you with the study and the components of a routeman's workday as we analyzed them. In this report, the eighth, we explain how all the pieces fit together, pointing out the mechanical steps for using our stnadards and the possible uses of this type of analysis. In short we address the question that many of you have probably been asking, "How can I use the results of the Cornell study?"

Managers face a variety of decisions, some calling for very detailed information and some only a limited amount. We believe managers should have a flexible information system, capable of generating the right degree of detail for the purpose at hand. Therefore, we've developed three sets of standard times. One set provides very detailed information; one set, only a limited amount; and the other is in between.

This report examines some of the common questions we believe our standards and techniques can help you answer when coupled with your experience, knowledge and judgement. You have decisions, such as, "Should I have liftgates on some of my trucks?" or, "How should we realign our routes as our customers change?" and for each of these, as well as other, questions we suggest which of the three types of standards should be used - illustrating their flexible nature.

Prepared by J. C. Taber and R. D. Aplin, Department of Agricultural Economics, Cornell University, Ithaca, New York 14853. Funds for this research were partially provided through the New York State Department of Agriculture & Markets from assessments collected under the Dairy Trade Practices Law.

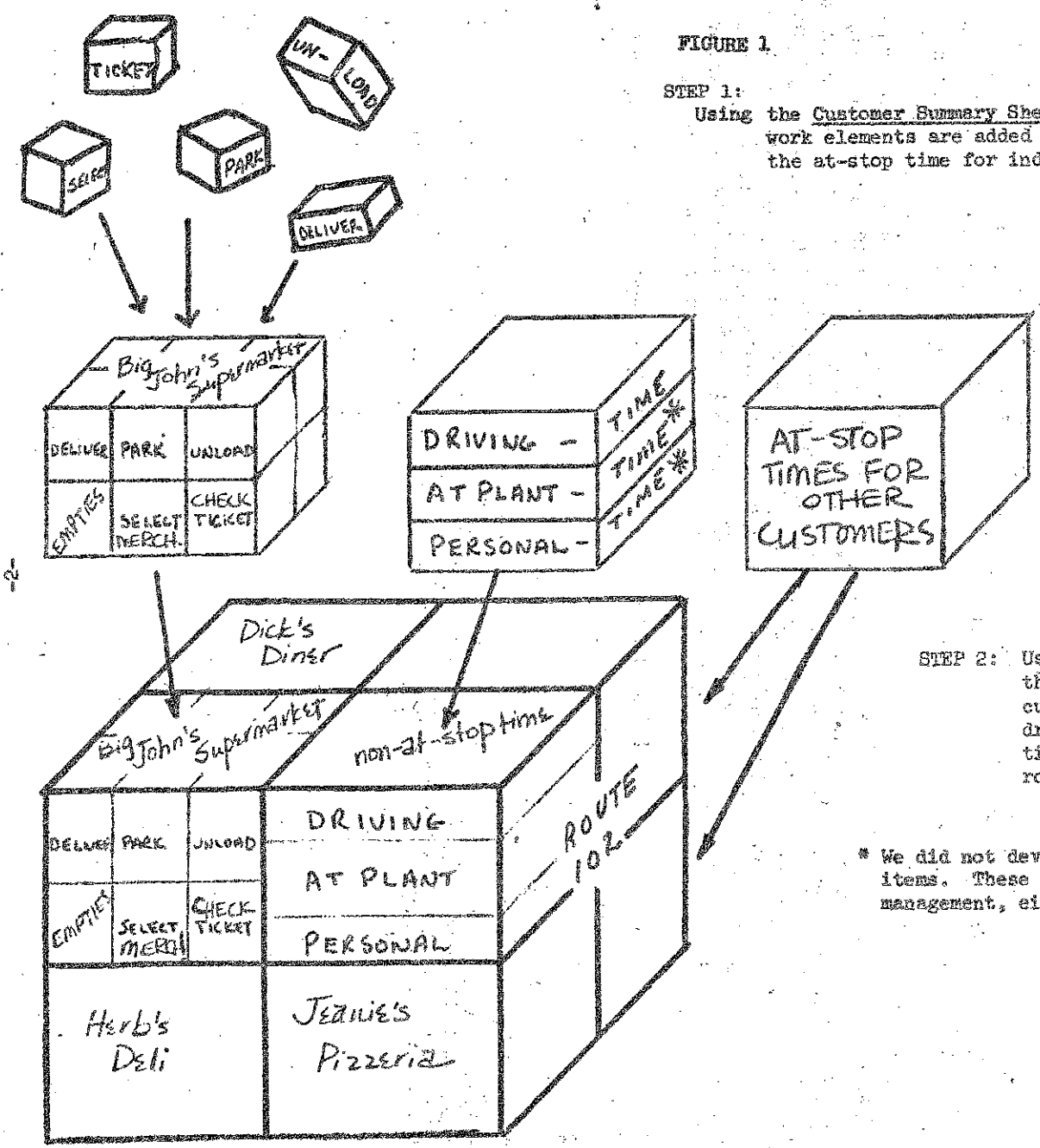

FIGURE 1

STEP 1: Using the Customer Summary Sheet, times for separate work elements are added together to estimate the at-stop time for individual customers.

STEP 2: Using the Route Work Content Sheet, the estimated at-stop times for each customer are added along with driving, at-plant* and driver personal times* to give an estimate of total route time.

* We did not develop standard times for these items. These times must be determined by management, either by observation or by policy.

Mechanics of Applying Standards

Applying our standards, regardless of the amount of detail desired, should require only a minimum of management's scarce time. We have developed several, easy-to-use forms to make the mechanics of estimating the time spent at a customer stop a practical matter. Our experience with a few companies in applying them convinces us that they are practical.

Let's put things in perspective by looking at the overall procedure and fitting the pieces together. Figure 1 is a schematic representation of how the time required to serve a customer and the time required to operate a route are estimated using our standard times. We mention two forms, the Customer Summary Sheet and the Route Work Content Sheet - an explanation of each follows:

The Customer Summary Sheet: Estimating the Time to Serve a Customer

As we mentioned, we have developed three sets of standards, and each set has a different Customer Summary Sheet. We will show you the Customer Summary Sheet for two types of standards, Type 3 (very limited detail) and Type 1 (extremely detailed).

For illustrative purposes, let's consider a hypothetical customer, Big John's Supermarket. Assume the following information about Big John's is obtained from the route foreman, salesman or someone familiar with the stop:

1. Customer receives a delivery six times a week.
2. Type of customer: supermarket.
3. Volume per delivery is 80 cases on Monday through Friday, the Saturday volume is 100 cases.
4. Routeman moves the milk and other products into the store (i.e., it is not a drop delivery).
5. Account is billed through the office (i.e., routeman does not collect).

This is all the information needed to estimate the time required to serve the account if we use the Type 3 (least detailed) standard times.

Let's use the Customer Summary Sheet for Type 3 standards to estimate the time to serve Big John's. Figure 2 is the Customer Summary Sheet for Type 3 standards. Big John's is a supermarket - we select a Customer Summary Sheet for a supermarket. [NOTE: Standards vary with the type of stop under consideration and each type of customer has its own Summary Sheet.]

The routeman does not collect at this stop, therefore we do not add any time for collection. Eighty cases are delivered by hand truck (not dropped), so we simply put 80 into the appropriate slot and do the calculations. Estimated time for Big John's, using the Type 3 standards, turns out to be approximately 44 minutes for the Monday through Friday deliveries. Using a 100 case volume, we find the estimated time is approximately 52 minutes for Saturday.

Clearly, the Type 3 standards calculations are quick and require only limited information. We examine their accuracy and application in a later section.

FIGURE 2.

UPSTATE CUSTOMER SUMMARY SHEET

SUPERMARKET

TYPE 3

Customer Big John's on Route X

	Day of Week						
	MON	TUES	WED	THURS	FRI	SAT	
CONSTANT TIME PER CUSTOMER STOP	11.9	11.9	11.9	11.9	11.9	11.9	min.
Add 2.0 minutes if Collection occurs	—	—	—	—	—	—	min.
VARIABLE TIME PER CUSTOMER STOP							
If not drop delivery:							
80 cases x .40 minutes/case (100 (Sat.))	32	32	32	32	32	40	min.
If drop delivery:							
____ cases x .20 minutes/case	—	—	—	—	—	—	min.
TOTAL ESTIMATED AT-STOP TIME	43.9	43.9	43.9	43.9	43.9	51.9	min.

Now for some purposes (as discussed later), management may want a more detailed analysis of the time to serve some accounts. In such a case, our Type 1 standards are more helpful. To use the Type 1 standard times, we need more information about the stop. Assume the following information about Big John's Supermarket is known:

1. Type of store: supermarket.
2. Parking: in a lot, backing up is necessary.
3. Type of order: preordered by phone.
4. The account is billed through the office (no collection, a ledger account).
5. Manager checks delivery ticket.
6. No liftgate on truck.
7. Volume per delivery is 80 cases (Monday-Friday) and 100 cases on Saturday.
8. Routeman delivers milk approximately 70 feet into a cooler by hand truck (5 cases per trip).
9. Empties are at the cooler (delivery point).
10. No "packing out" of dairy case.
11. Driver rotates the stock in the cooler.

This is quite detailed information, but we have found it's available (from the route foreman, rider or routeman himself). And, only Type 1 standards require this kind of detail. As we've seen, Type 3 standards, on the other hand, require much less - items 1, 4, 7 and 8 are the only details needed to use Type 3.

Now turn to Figure 3, the Customer Summary Sheet for a supermarket, Type 1. As before, we simply put the information into the appropriate slots and perform the calculations to estimate the time required to serve Big John's. Using the detailed Type 1 standards, we arrive at an estimated time of 42 minutes.* Obviously, the amount of information and time necessary to compute estimated at-stop times using Type 1 standards is much greater than for Type 3. But, we feel that in some situation the extra effort needed for Type 1 may be worthwhile. We discuss this later in the report.

* 42 minutes for Monday-Friday; 49 minutes for Saturday.

Page 3.

WYSDATE CUSTOMER SUMMARY SHEET (TYPE 1)

SUPERMARKET Telm's
Customer 24 on Route X

MON-FRI SAT

CONSTANT TIME ELEMENT PER CUSTOMER STOP

(A) Park truck upon arrival and leave property

1. Parking lot - Direct 1.10 min.
Back up 1.50 min. ← 1.5 min. 1.5
2. On Street .50 min.

(B) Fixed time per stop (includes get out of truck, get order, delay inherent to type of customer, make out order, check ticket, open truck body door, get hand truck out, get into truck, prepare to leave)

TYPE OF ORDER	Collection	Without Collection		
Unknown	8.8 min.	6.8 min.		
Predeveloped	9.5 min.	6.5 min.		
Preordered	--	5.5 min. ←	5.5 min.	5.5
If manager checks ticket add: Unknown		1.3 min.		
Predeveloped		.9 min.		
Preordered		1.5 min.	1.5 min.	1.5

VARIABLE TIME ELEMENT PER CUSTOMER STOP

(A) Select merchandise, arrange load, unload full cases and load empty cases — 2.7 min. — 2.7

1. no liftgate

(a) drop delivery: ____ number of cases x .15 min./case = ____ min.
(b) flat truck, dolly, or hand carry:

____ number of cases x .17 min./case = ____ min.

(c) hand truck: 80 number of cases x .20 min./case = 16.0 min. ← 20.0

2. with liftgate 100 (Sat.)

____ number of cases x .14 min./case = ____ min.

(B) Deliver and Return (use one-way distance)

1. with hand truck:

70 ft. x .0061 min./ft. = .4 + .3 min. = .7 x 16 trips = 11.2 min. ← 14.0
Sat. (20)

2. with dolly:

____ ft. x .0096 min./ft. = ____ + .4 min. = ____ x ____ trips = ____ min.

3. with flat truck:

____ ft. x .0063 min./ft. = ____ + .7 min. = ____ x ____ trips = ____ min.

4. with hand carry:

____ ft. x .007 min./ft. = ____ + .3 min. = ____ x ____ trips = ____ min.

(C) Return Empty Cases to Truck (if not done in conjunction with Deliver)

____ ft. x .008 min./ft. = ____ x ____ trips = ____ min.

(D) Handle Empty Cases (if not at unloading point)

80 cases x .03 min./case = 2.4 min. ← 3.0
100 (Sat.)

(E) Service Display Case

____ number of units x .025 min. = ____ + .3 min. = ____ min.

(F) Rotate Product in Cooler (if done) .7 min = .7 min. .7

____ min.

TOTAL = 41.5 min. 48.9 min

Summing up, the important points concerning the use of the Customer Summary Sheet to estimate at-customer time are:

1. There is a Customer Summary Sheet for each type of customer, because of inherent time differences between types of customers, and we have a sheet for each of the following types:
   a. supermarket
   b. convenience store/modern fruit stand
   c. restaurant/diner
   d. fast food/luncheonette
   e. institution/factory
   f. ma and pa/deli/other stores

2. There are three versions of each Customer Summary Sheet, one for each type of standard: Type 1, Type 2 and Type 3. Each requires a different amount of detail and time to complete.

The Route Work Content Sheet: Estimating the Time to Serve a Route

After the times at customer stops on a route are estimated, the time spent on the route itself is relatively easily estimated. Let's look at the Route Work Content Sheet, the form we use to estimate route time. Consider hypothetical Route X, which has the following customers and characteristics:

1. Customers on Route X

	Estimated At-Stop Time					
	Mon	Tues	Wed	Thurs	Fri	Sat
Big John's	44	44	44	44	44	52
Pa's Deli	9		8		9	
P&A	17	17	17	17	17	20
Big Shop	33	33	33	33	33	57
Pop's Deli		6		6		7
Dad's Deli		11		11		14
Ma's Deli	8		8		10	
11-7	14	14	14	14	14	22
C&P	23	23	23	23	23	26
Shop Big	22		22		23	
Mom's Deli		15		15		17
School	15	15	15	15	30	
Bakery	8	8		8	9	

2. Driving: Determined as we explained in our last report

   Daily driving is: 16 miles of highway driving
   8 miles of suburban driving
   36 miles of city driving

3. Other Time

Lunch and personal	60 minutes
At-plant prior to route	25 minutes
At-plant after return from route	45 minutes

Using this information, we simply fill out the Route Work Content Sheet (see Figure 4). Part A is used to total the time required to serve customers. Route X is an actual route which has been disguised. Because of the different frequencies of delivery, we have shown the estimated times for each customer for each day of the week. If the route structure were such that all customers were served each day, an average time (based on an average volume) could probably have been used.

FIGURE 4.

ROUTE WORK CONTENT SHEET

Upstate Area

Route X

Part A. Time to Serve Customers - using estimated time from the Customer Summary Sheets.

Customer Identification	Mon	Tues	Wed	Thurs	Fri	Sat
1 Big John's	44	44	44	44	44	52 min.
2 Pa's Deli	9		8		9	
3 P&A	17	17	17	17	17	20
4 Big Shop	33	33	33	33	33	57
5 Pop's Deli		6		6		7
6 Dad's Deli		11		11		14
7 Ma's Deli	8		8		10	
8 11-7	14	14	14	14	14	22
9 C&P	23	23	23	23	23	26
10 Shop Big	22		22		23	
11 Mom's Deli		15		15		17
12 School	15	15	15	15	30	
13 Bakery	8	8		8	9	
14						
15						
16						
17						
18						
19						
20						
TOTAL TIME TO SERVE CUSTOMERS	193	186	184	156	212	215 min.

ROUTE WORK CONTENT SHEET (continued) Route X

Part B. Driving Time (includes both driving to and from route area and between stops)

Condition	Mon miles	Mon min	Tues miles	Tues min	Wed miles	Wed min	Thurs miles	Thurs min	Fri miles	Fri min	Sat miles	Sat min
Highway Std.: 1.6 min/mi	16	26	16	26	16	26	16	26	16	26	16	26
Suburban Std.: 2.1 min/mi	8	17	8	17	8	17	8	17	8	17	8	17
City Std.: 3.7 min/mi	36	133	36	133	36	133	36	133	36	133	36	133
Total Miles	60		60		60		60		60		60	
Total Driving Time		176		176		176		176		176		176

Total Miles for Route: 360 miles per week

Part C. Routeman's Other Time (time which is not derived from Cornell standards)

1. Time spent at plant prior to route 25 min. per day
2. Personal and overhead time (meals, delays, etc.) 60
3. Time spent at plant following route 45

Total Other Time = 130 min. per day

Part D.

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Total Week
	Total Route Time						
A Total Time to Serve Customers	193	186	184	186	212	215	1176
B Total Driving Time	176	176	176	176	176	176	1056
C Routeman's Other Time	130	130	130	130	130	130	780
D Total Route Standard Time	499	492	490	492	518	521	3012
Std. Time in Hours	8.3	8.2	8.2	8.2	8.6	8.7	50.2

Part B is used to compute total driving time on the route. Here we enter the number of miles for each driving condition (refer to Report No. 7) and multiply by the corresponding standard time. We find Route X has approximately 60 minutes of driving per day. For simplicity, we've assumed that Route X has the same driving routine each day, even though different customers are served each day.

In Part C we add the other time that makes up the routeman's day. Again we simply fill in the blanks with the appropriate number of minutes for at-plant and personal time.

Total time for Route X is estimated as approximately 3,012 minutes per week (which is approximately 50 hours for a six-day week).

We have only looked at the mechanics for completing these forms. We have saved the more interesting aspects until now. One last word about the forms - we believe they are basically easy and quick, providing management with a simple tool to estimate customer service and total route time. Next, we look at the types of questions that we believe can be more effectively answered when the standard times are available to managers.

Important Distribution Questions: A Flexible Approach

Many questions confront the active route and distribution manager on a regular basis. Some of these questions can be more effectively answered if the manager is aware of the time element involved. Our standards can supply the manager with that information.

We think the following types of questions are those for which the manager needs to be aware of the time dimension:

1. How much time will it take to serve this new customer?
2. What route can absorb this new customer?
3. Can a specific route handle an additional customer(s)?
4. How should we realign our routes as our customers change?
5. How much time will we save by changing the service provided a customer?
6. Should I replace this vehicle with a larger one?
7. Is it wise to convert to liftgates?

Each of these questions involves time. With a way to measure the time involved management can more effectively answer them.

Although these questions all require information about time, they do not require the same amount of detail. This is why we developed three types of standards. The flexible feature of our approach is illustrated by looking at some of these questions and suggesting which standards are appropriate. [NOTE: We only consider Type 1 and Type 3 here.]

Type 3 Standards: Realignment Questions

Type 3 standards were conceived using typical situations. We avoided the detail needed for Type 1 standards in Type 3 by assuming a typical delivery distance, a typical parking situation, etc. for each type of stop. Since no one stop is likely to be "typical," the Type 3 standards are not as accurate as Type 1 in estimating the time needed to serve an individual customer. However, when used to

estimate the time necessary on a whole route, Type 3 standards have been shown to be very accurate (since the high estimates and low estimates tend to cancel each other out when dealing with several customers). Therefore, Type 3 standards are ideal for answering questions about changes in route alignment. Relatively little detail about each customer is needed and accuracy is assured by the number of customers considered.

Essentially, the Type 3 standards offer management the quickest way to measure the time element when little detail about individual customers is needed or when more detailed information is not available.

Type 1 Standards: Service Changes

Unlike Type 3 standards, Type 1 are not based on typical situations for each customer. Every customer's time is estimated, so to speak, from scratch in a very specific manner. The use of Type 1 standards requires a great deal more information about a customer and more calculation than Type 3. We think this extra effort is justified if management wants to examine questions about changes in service to a customer or group of customers.

Let's see how Type 1 standards estimate changes in time requirements when we change service or delivery methods at a stop. Suppose we want to increase the efficiency of our routes by reducing the time at customer stops. We decide to look at Big John's again (refer to Figure 3) to see how much time we can save by reducing the service Big John's now receives. How much time can be saved if these changes can be affected?

1. Drop delivery instead of moving product into cooler.
2. Empties at the unloading point rather than the cooler.
3. Driver no longer rotates product in the cooler.

To estimate the time savings, we fill out a new Type 1 Customer Summary Sheet for Big John's, reflecting the changes. This is done in Figure 5. The time required to serve Big John's currently is approximately 42 minutes (see Figure 3). The new time estimated for Big John's is 23 minutes, a savings of approximately 19 minutes (a 45% reduction in service time). These figures are for the Monday-Friday deliveries.*

Of course, many other considerations would enter into the decision to change the service provided the customer. Can the reduced service level be worked out agreeably with the customer? Would reduced service mean a lower price - if so, how much? And so on. In other words, our tools provide only part of the information needed to determine whether it is desirable to consider such a change in service provided customers. But, the tools provide some of the important information needed. Namely, you can estimate how much time the proposed changes would make available for your routeman to serve other customers, either new ones or ones from another route that is being realigned. The time saving can then be weighed against other considerations.

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* Times savings for Saturday are 49-26=23 minutes (a 47% reduction in service time).

PAGE 2.

UPSTATE CUSTOMER SUMMARY SHEET (TYPE 1)

Customer SUPERMARKET Big Johnnie's on Route X

Mon - Fri. Sat

1. CONSTANT TIME ELEMENT PER CUSTOMER STOP

(A) Park truck upon arrival and leave property

1. Parking lot - Direct 1.10 min.
   Back up 1.50 min.
2. On Street .50 min.

Same as before → 1.5 min. 1.5

(B) Fixed time per stop (includes get out of truck, get order, delay inherent to type of customer, make out order, check ticket, open truck body door, get hand truck out, get into truck, prepare to leave)

TYPE OF ORDER	Collection	Without Collection
Unknown	8.8 min.	6.8 min.
Predeveloped	9.5 min.	6.5 min.
Preordered	—	5.5 min.

Same as before → 5.5 min. 5.5

If manager checks ticket add:

Unknown	1.3 min.
Predeveloped	.9 min.
Preordered	1.5 min.

Same as before → 1.5 min. 1.5

2. VARIABLE TIME ELEMENT PER CUSTOMER STOP

(A) Select merchandise, arrange load, unload full cases and load empty cases — 2.7 min. 2.7

1. no liftgate

Service change →

(a) drop delivery: 80 (Sat) 107 number of cases x .15 min./case = 12.0 min. 15.0

(b) flat truck, dolly, or hand carry:
_____ number of cases x .17 min./case = _____ min.

(c) hand truck: _____ number of cases x .20 min./case = _____ min.

2. with liftgate
_____ number of cases x .14 min./case = _____ min.

(B) Deliver and Return (use one-way distance)

Service change →

1. with hand truck:
_____ ft. x .0061 min./ft. = _____ + .3 min. = _____ x _____ trips = 0 min. 0

2. with dolly:
_____ ft. x .0096 min./ft. = _____ + .4 min. = _____ x _____ trips = _____ min.

3. with flat truck:
_____ ft. x .0063 min./ft. = _____ + .7 min. = _____ x _____ trips = _____ min.

4. with hand carry:
_____ ft. x .007 min./ft. = _____ + .3 min. = _____ x _____ trips = _____ min.

(C) Return Empty Cases to Truck (if not done in conjunction with Deliver)
_____ ft. x .008 min./ft. = _____ x _____ trips = _____ min.

(D) Handle Empty Cases (if not at unloading point)

Service change →

cases x .03 min./case = 0 min. 0

(E) Service Display Case

Service change →

_____ number of units x .025 min. = _____ + .3 min. = _____ min.

(F) Rotate Product in Cooler (if done) .7 min = 0 min. 0

_____ min.

TOTAL = 23.2 min. 26.2

This illustration should point out the real value of these standard times. A manager can sit in his office, try any different combination of services and route alignments, and have a better basis to help him choose the one he believes will be the best. The use of the standard times to compare alternative changes before actually implementing them will provide a better basis to make a judgement and reduce the disruptive effects of introducing route and service changes. Much of the trial and error will occur in the manager's office, not on the route.

To summarize, we have developed tools to help management answer some of their route questions. The fact there are three sets of standards adds flexibility, letting the manager choose the degree of detail he desires and saving time that might be spent generating unwanted detail. We conclude by suggesting how management could introduce our standards into their operations. We also explain the need for caution when applying the standards.

Conclusion

Introducing the Standard Times

Obviously there is a large amount of time and work involved in introducing and using the standard times on a regular basis. But, we are not suggesting that they should be used continually on a regular, say monthly, basis. Rather, management would use the techniques and standards first to evaluate present distribution operations to obtain a clearer, more accurate overall picture, and to recognize the factors affecting delivery operations. In some instances, a close examination of this type may immediately suggest better ways to do things and help managers find opportunities to improve route efficiency.

Thereafter, management could use the research results to investigate a problem (e.g., when there is a complaint about service or when there is a question of whether a route can take on additional customers, etc.) or when management is considering a change, such as, a change in delivery conditions or practices, in services provided customers, in the number of customers on a route, in delivery equipment used, in route structure, etc.

This approach - an immediate overall look followed by periodic use when it's called for - should minimize the difficulty of introducing standard times into your present route information system.

Apply With Caution

Any type of standard should be applied with caution. Standards are not substitutes for effective management. They are merely a management aid - a tool which managers can use to supplement their own experience and skill. When using these standard times, a manager should never hesitate to inject his own adjustments if he feels the standards do not adequately portray the situation at hand. Some circumstances in which management should adjust the standards are:

1. Routeman is not an average worker. These standards reflect the time needed to complete a work task when the driver is a typical, qualified person working at a normal pace. They will not give true time estimates if the worker is much slower or faster than average. They will not be adequate for estimating service time if the routeman is new on the job.

2. Atypical customer conditions exist. Whenever possible, adjustments should be made when the manager knows the customer stop in question is atypical. Examples include:
   a. Consistently long delays waiting for the store manager to arrive to accept delivery or waiting to unload.
   b. Antagonistic store owners who delay the routeman while he is doing his job. An example is an owner who delays the routeman when he is trying to collect the bill.
   c. Help from store employees will also cause the standards to give inaccurate time estimates, calling for management adjustment.

The moral of the story is that the standards should be applied with a high degree of management awareness. Standards are not sacred, even though in the vast majority of situations they will adequately measure the time in question.

The Missing Link

In the other phase of our research, we are attempting to combine the standard times with customer cost and profitability analysis. We believe the standards are a step in the right direction, but that there should be methods available to translate time savings into cost savings.

The results of this work will be reported in our workshops - the first of which will be April 22 and 23, 1976, in Syracuse.