

**COSTS OF HAULING
FRESH FRUITS AND VEGETABLES
IN THE HONOLULU MARKET**

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ABSTRACT

Substantially all of the Honolulu produce dealers who maintain a stock of goods and sell fresh fruits and vegetables in quantity are service-type wholesalers. One of the major services provided by these firms is delivery of produce to retail stores and institutional outlets. Another hauling function performed in connection with the Honolulu produce business is the cartage from the docks of some two-thirds of the fresh fruits and vegetables consumed locally. The 35 produce dealers in Honolulu who offered regular delivery service were operating 175 trucks in March 1954. Only a few of these trucks were engaged exclusively in moving produce from the docks, but a considerable number were used for delivery and cartage combined.

During the period of April-June 1954, trucks used for delivery of produce in the Honolulu market area averaged 9.4 delivery trips per 6-day week and required 17.2 hours to complete these runs. On the basis of delivery activities alone the trucks were used about 40 percent of full time. Each truck traveled 127 miles per week in making deliveries with about 13.6 miles being required per trip. Stops per trip averaged 5.5 and the average quantity of produce delivered at each stop was 161 pounds. On a per-trip basis the average load was 972 pounds. Among the units surveyed the average load per trip was less than 500 pounds for almost one-fifth of the trucks and another one-third of these trucks averaged between 500 and 1,000 pounds per trip. On a per-stop basis, deliveries made by half of the trucks averaged between 100 and 200 pounds. The average load per delivery trip represented about 33 percent of the actual carrying capacity of the trucks used for that purpose.

Equipment cost averaged \$0.28 per 100 pounds of produce delivered during the survey period. Labor expense on the same basis was \$0.23 per hundred. The combined outlay was \$0.51 per hundred pounds. Costs per mile traveled in making deliveries averaged \$0.20 for truck expense and \$0.16 for labor. The cost of truck and labor together was \$0.36 per mile of operation. On the basis of time required in making deliveries the cost per hour of truck operation (including labor) ranged from \$2.12 to \$3.52 with an average of \$2.72 per hour for the 12 dealers surveyed.

In taking action to reduce delivery costs Honolulu produce dealers seem to have their best opportunity in steps aimed at making more complete use of their truck equipment. This objective may be achieved through consolidation of routes, extension of delivery period, less frequent calls, and loading the trucks more nearly to actual carrying capacity. In some cases it may be feasible to make more efficient use of trucks by employing such vehicles in hauling produce from the farms and docks, or in performing delivery or pickup service for others on a fee basis. Firms doing a large volume of business have a substantial advantage over smaller concerns in the cost of delivering produce. Larger average loads per trip are the major factor contributing to this advantage.

Among firms studied, the average cost of hauling produce from the docks in Honolulu was \$0.14 per hundred. A considerable number of Honolulu produce dealers employ commercial carriers to perform all or a part of this particular hauling job. On the basis of commercial trucking rates prevailing in April 1954, it would be necessary for a produce dealer to show an average cost of between 10 and 12 cents per hundred in order to have an apparent cost advantage in doing his own hauling from the local docks to his place of business in the city.

In many cases individual trucks are used in both delivery and pickup operations. The effect of joint cost allocations on the cost of each of these two activities is a major factor to be considered in evaluating the alternative methods of moving fresh fruits and vegetables from the Honolulu docks.

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COSTS OF HAULING FRESH FRUITS AND VEGETABLES IN THE HONOLULU MARKET

INTRODUCTION

This is the fourth in a series of reports relating to margins, costs, and other economic considerations in the marketing of fresh fruits and vegetables in Honolulu. All four of these reports are based upon research conducted cooperatively since 1950 by the Hawaii Agricultural Experiment Station and the Agricultural Marketing Service of the United States Department of Agriculture. Two of these publications reported on the consumption pattern of certain fresh vegetables in Honolulu and on the margins, shrinkage, and pricing of such vegetables in the same market.¹ The third report was concerned with truck hauling and delivery costs representing Island conditions.² This latest addition to the series is a logical sequel to the report on truck costs in that it relates to the cost of hauling fresh fruits and vegetables in the Honolulu market area. The cost formula developed by Reed in the earlier study serves as the basis for computation of truck expense in this report.

PURPOSE OF STUDY

Except for those dealers who operate as commission men or sales agents, mostly for mainland firms, the produce wholesalers of Honolulu are predominately of the service type. It is customary for these dealers to provide credit and to deliver fresh fruits and vegetables to the retail and institutional trade in the Honolulu market area. This study had as its primary purpose the measurement of costs involved in delivering fresh produce from the wholesaler's establishment to the buyer's location. A secondary objective was to determine the cost of moving fresh fruits and vegetables from the docks in Honolulu to the wholesaler's place of business.

Hauling costs incurred by wholesale produce dealers are an important item of expense in the marketing process. Despite this fact such costs are often given only slight consideration by the trade as a point at which savings might be effected. There are at least 35 Honolulu wholesalers who operate some 175 trucks in providing delivery service on fresh fruits and vegetables and in picking up such produce at the docks. In contrast to delivery where each dealer usually operates his own equipment, a considerable number of these dealers use a common or contract carrier in moving produce from the dock to their places of business.

On the basis of the findings resulting from this study of hauling costs, it is anticipated that Honolulu wholesalers will be in a better position to evaluate their truck operations. Thus, in common with the other reports in this series, the aim is to achieve greater efficiency in fruit and vegetable marketing by making available to the trade information on which decisions leading to improved operations may be based.

¹ Robert H. Reed and C. Richard Creek, *Family Consumption of Certain Fresh Vegetables in Honolulu*, Hawaii Univ., Agr. Econ. Bul. 5, June 1953. C. W. Peters, Robert H. Reed, and C. Richard Creek, *Margins, Shrinkage, and Pricing of Certain Fresh Vegetables in Honolulu*, Hawaii Univ., Agr. Econ. Bul. 7, June 1954.

² Robert H. Reed, *Truck Hauling and Delivery Costs Representing Island Conditions*, Hawaii Univ., Agr. Econ. Rpt. 17, May 1953.

PROCEDURE

All wholesale produce dealers in Honolulu who maintain a regular place of business and carry a stock of fresh fruits and vegetables from which sales are made to the retail and institutional trade were surveyed in order to determine the extent of delivery service and the manner in which this service is handled by each firm. At the same time information was obtained on the practices as regards pickup of produce at the docks and on the number and types of trucks operated by each dealer. The schedule used in this preliminary survey also provided for recording information on commodities handled and volume of business done by each firm.

From the list of 35 dealers who were found to be providing regular delivery service, there was selected a sample of 12 firms whose delivery and pickup activities were to be observed in greater detail. The range in scale of operation among the 12 dealers selected was divided in such a way that small, medium, and large firms were represented. Other major factors considered in this selection of representative dealers were the degree of willingness of the individual concerns to cooperate in the study, and the frequency and regularity of the hauling schedules maintained by each potential cooperator. From the trucks operated by each of the 12 firms included in the sample there was chosen for observation a varying number of vehicles; the principal consideration in this choice being the number of trucks used on a full 6-day per week basis by each dealer.

The preliminary survey of all produce dealers, who offer delivery service in the Honolulu area, was completed in March 1954. Collection of data on the truck operations of those wholesalers selected for coverage began on April 12, 1954 and continued through the week of April 19. This phase of the study was completed during the week of June 7. One full week of operation, both on delivery and on pickup, was observed and recorded for each of the 2 to 7 trucks selected from among the vehicles used by the individual cooperating dealers. In all there were 55 trucks included in the coverage of the study.

DELIVERY OF PRODUCE BY WHOLESALE DEALERS

In Honolulu it is the usual practice of fruit and vegetable wholesalers to provide their customers regular delivery service for which they make no direct or specific charge. This practice of offering "free" delivery has been declining during recent years in some sections of the mainland. Perhaps much of this shift can be attributed to the development of cash and carry produce dealers in the major markets and to the growth of the large scale retail outlets such as chains and super markets with their tendency to bypass local wholesalers. As this type of food store (large scale) has come into being in Hawaii only since World War II, it is probably not surprising to note that the tendency of wholesale produce dealers to eliminate delivery service has not yet become evident in Honolulu. In Honolulu, as elsewhere, the truck peddlers practically always assemble their loads in the market and thus do not require delivery service on their purchases of fresh fruits and vegetables. Most other retailers and practically all of the institutional trade, mostly Honolulu hotels and restaurants, depend on the dealers to provide regular and frequent delivery service.

Equipment and Methods

The 35 Honolulu produce dealers who provide a regular delivery service owned a total of 175 trucks at the time of the initial project survey in March 1954. These trucks are used almost exclusively for transporting fresh fruits and vegetables in the Honolulu area. Pickup trucks with a factory rated capacity of $\frac{3}{4}$ ton are the type used most frequently. Pickup trucks of all sizes accounted for about two-thirds

of the delivery equipment. The remainder was made up of the conventional flat bed or platform trucks, most of which are of 1½ ton rated capacity. In only a few cases are these trucks equipped with special bodies or beds that are custom made for the produce trade. Except when a tarpaulin is used as a cover during wet weather the produce being delivered is in the open and thus subject to the effects of both wind and sun.

Most of the truck operators are a combination of driver and salesman, who assist in the general plant work when not otherwise occupied. One man usually covers a particular route consistently and almost as often the same truck is used from day to day on a given run. In the great majority of cases the driver of a delivery truck is at least partly responsible for assembling and loading the orders he takes out. He also collects for the produce where cash sales are made. In light of these operating methods it can be seen that only a part of the average driver's total wages are properly a direct charge to delivery expense.

In servicing the trucks the usual practice is for the driver to care for the minor adjustments and routine checks. Only a few of the large dealers have a special shop and equipment for handling this type of work. Generally the commercial repair shops and service stations are patronized by the dealers for purchase of gasoline, oil, and tires despite the fact that many of the Honolulu wholesalers could themselves qualify for fleet discounts.

Factors Observed

In this study, attention was focused on a number of factors which when taken together and analyzed comparatively provide much of the explanation for variations found in the actual monetary cost of delivering produce in Honolulu.

1. Trips: One principal factor considered was the number of trips made per truck per week of operation. As is indicated by table 1, the average number of trips per truck ranged from 5.3 to 12.0 among the 12 dealers surveyed. The average for the group was found to be 9.4 trips per week or slightly over 1½ trips per day during the usual 6-day work week. The high average of 12.0 trips in the one case means that each of the trucks observed made 2 trips each work day of the week.

2. Time: As to time actually required for delivery of produce the average per truck for the week was 17.2 hours (table 1). This is equivalent to more than 1.8 hours per trip. The range among the 12 wholesalers was from 5.0 to 34.1 hours in total time per truck and from 0.9 to 3.5 hours per trip. Assuming a work week of 44 hours, which is fairly representative of the wholesale produce trade, the average truck used for delivery was actually employed only about 40 percent of full time. Other uses such as picking up produce at the docks or farms and hauling for hire tend to increase the use ratio in a few cases.

3. Distance: Each truck used for delivery purposes by the 12 firms traveled an average of 127 miles in making deliveries during the week. Table 1 shows a range in distance traveled of from 30 to 267 miles per truck. On a per-trip basis the mileage ranged from 5.7 to 32.0 with the average being 13.6 miles. Two-thirds of the dealers surveyed showed a per-trip average of 12 miles or less. In general it was among those wholesalers who operated country routes in rural Oahu that the higher per-trip averages were found.

4. Stops: The delivery trucks operated by 11 dealers made an average of 5.5 stops per trip during the survey week (table 2). The range in average number of stops per trip was from 2.6 to 9.0. In actual deliveries made there were a number of cases where only one stop was involved in a trip. Other trips showed as many as 25 to 30 deliveries. The range of greatest frequency was from 5 to 15 stops per trip.

TABLE 1. Trips, time, and driving distance required to make local deliveries of fresh produce for one week, 12 Honolulu wholesale dealers, April-June 1954.

DEALER	TRUCKS OBSERVED	TRIPS		TIME*			DISTANCE		
		Total	Per truck	Total	Per truck	Per trip	Total	Per truck	Per trip
A.....	5	47	9.4	<i>hours</i> 66.83	<i>hours</i> 13.37	<i>hours</i> 1.42	<i>miles</i> 562	<i>miles</i> 112	<i>miles</i> 12.0
B.....	3	25	8.3	87.33	29.11	3.49	800	267	32.0
C.....	4	34	8.5	87.17	21.79	2.56	822	205	24.2
D.....	5	50	10.0	46.34	9.27	.93	370	74	7.4
E.....	5	60	12.0	170.34	34.07	2.84	1,107	221	18.4
F.....	5	51	10.2	65.07	13.01	1.28	593	119	11.6
G.....	5	55	11.0	133.50	26.70	2.43	981	196	17.8
H.....	4	32	8.0	51.09	12.77	1.60	265	66	8.3
I.....	3	36	12.0	38.34	12.78	1.06	240	80	6.7
J.....	4	21	5.3	19.84	4.96	.94	119	30	5.7
K.....	6	56	9.3	107.00	17.83	1.91	595	99	10.6
L.....	2	17	8.5	17.17	8.58	1.01	126	63	7.4
Average.....	4.3	40.3	9.4	74.17	17.24	1.84	548	127	13.6

* Includes only time required in actual process of delivery from moment of leaving the dealer's plant until return to starting point. Loading time is not included.

TABLE 2. Stops, quantity delivered, and relation of load to truck capacity during one week of operation, 12 Honolulu wholesale produce dealers, April-June 1954.

DEALER	STOPS PER TRIP	LOAD PER TRIP	LOAD PER STOP	TRIP LOAD RATIO*
		<i>pounds</i>	<i>pounds</i>	<i>percent</i>
A.....	5.57	747	134	28
B.....	8.85†	1,412	179	52
C.....	6.88	950	138	34
D.....	2.90	471	162	22
E.....	9.01	1,087	121	31
F.....	4.06	727	179	29
G.....	6.11	1,385	227	42
H.....	4.06	828	204	28
I.....	2.61	502	192	15
J.....	‡	1,720	‡	65
K.....	7.09§	1,521	132	39
L.....	3.18	314	99	14
Average.....	5.48**	972††	161**	33

* Relationship of load hauled to actual capacity of truck.

† Record obtained for two trucks—one omitted.

‡ Record of stops not available.

§ Record obtained on four trucks—two omitted.

** Average based on operations of 44 trucks.

†† Average based on operations of 51 trucks.

5. Load: On a per-trip basis the average delivery load of the 12 wholesalers was 972 pounds. Reduced to a per-stop basis the average delivery was 161 pounds (based on records of 11 firms—see table 2). The range in average load per trip was from 314 to 1,720 pounds and in quantity delivered per stop it was from 99 to 227 pounds. This latter range represents much less variation than was found on the "per-trip" basis.

Average quantities of produce delivered per trip and per stop during the survey week by each of the trucks for which a record was obtained are indicated by tables 3 and 4. Quantity hauled per trip and per stop is of particular importance in this analysis as it is one of the major factors affecting unit cost of delivery. On a per-trip basis almost one-fifth of the trucks averaged less than 500 pounds per load. Another one-third of the trucks delivered between 500 and 1,000 pounds per trip. Over three-fourths of the average loads per trip were under 1,500 pounds. The average quantity delivered per stop was less than 200 pounds for over two-thirds of the trucks. Half of the trucks averaged between 100 and 200 pounds per stop while 20.5 percent were found to be making individual deliveries averaging less than 100 pounds in weight. Only 11.4 percent of the trucks surveyed had average loads in excess of 500 pounds per stop.

When the average load per trip is related to the actual carrying capacity of the trucks a trip load ratio of 33 percent was found for the trucks operated by the 12 dealers (table 2). Individual firms showed ratios ranging from 14 to 65 percent. In computing the capacity of trucks used for delivering a diverse line of fresh fruits and vegetables an arbitrary figure of twice the factory rated capacity was used; for example, where a $\frac{3}{4}$ ton pickup was used, the capacity was set at 3,000 pounds. This formula is strictly a matter of opinion based on observation of the reasonable quantity of fresh fruits and vegetables that could readily be loaded on

TABLE 3. Average quantity of fresh produce delivered per trip during one week, 51 trucks operated by 12 Honolulu wholesale dealers, April-June 1954.

SIZE OF LOAD*	FREQUENCY†	DISTRIBUTION
<i>pounds</i>		<i>percent</i>
Under 500.....	10	19.6
500-1,000.....	17	33.3
1,000-1,500.....	12	23.5
1,500-2,000.....	4	7.9
2,000-2,500.....	2	3.9
Over 2,500.....	6	11.8
Total.....	51	100.0

* Average per truck for one week of operation.

† Number of trucks in each classification.

and hauled by the trucks used in the Honolulu produce trade. On this basis it appears that the average truck going out on delivery is loaded only to about one-third of its actual carrying capacity.

Costs of Delivery Service

Delivery costs were computed in three different ways. In the first method the cost was related to the quantity hauled (table 5) while the alternative computations were based on distance traveled and hours of operation (tables 6 and 7). In this case the cost of operating the truck itself was based on the formula developed by Robert H. Reed in his study of truck hauling and delivery costs.³ In this case the formula applied was: Unit cost = $\frac{\$12.453 + \$0.0626 \text{ (hours operated per week)} + \$0.0797 \text{ (miles per week)}}{\text{units hauled per week}}$

Labor costs were computed for each truck on the basis of time devoted to the delivery operation by each driver. Wages used were the actual rates paid by the individual dealers with appropriate adjustment being made for payroll taxes and accident insurance.

TABLE 4. Average quantity of fresh produce delivered per stop during one week, 44 trucks operated by 12 Honolulu wholesale dealers, April-June 1954.

SIZE OF DELIVERY*	FREQUENCY†	DISTRIBUTION
<i>pounds</i>		<i>percent</i>
Under 100.....	9	20.5
100-200.....	22	50.0
200-300.....	6	13.6
300-400.....	2	4.5
400-500.....	0	—
Over 500.....	5	11.4
Total.....	44	100.0

* Average per truck for one week of operation.

† Number of trucks in each classification.

³ Robert H. Reed, *Truck Hauling and Delivery Costs Representing Island Conditions*, Hawaii Univ., Agr. Econ. Rpt. 17, May 1953.

TABLE 5. Cost in dollars of equipment and labor involved in delivering 100 pounds of fresh produce during one week of operation, 12 Honolulu wholesale dealers, April-June 1954.*

DEALER	TRUCK EXPENSE	LABOR COST	TOTAL
A.....	.267	.207	.474
B.....	.271	.365	.636
C.....	.345	.287	.632
D.....	.315	.248	.563
E.....	.222	.280	.502
F.....	.302	.214	.516
G.....	.187	.221	.408
H.....	.240	.228	.468
I.....	.302	.270	.572
J.....	.100	.083	.183
K.....	.163	.105	.268
L.....	.674	.256	.930
Average.....	.282	.230	.512

* Costs are based on delivery operations beginning at time vehicle leaves wholesaler's place of business and ending upon return to starting point.

1. Cost based on quantity delivered: Truck expense per 100 pounds of fresh produce delivered by the 12 Honolulu dealers ranged from a low of \$0.10 to a high of \$0.67. The average truck expense for the entire group was \$0.28 per 100 pounds. Half of the dealers had truck expense falling within the \$0.25 to \$0.35 range. Labor cost averaged \$0.23 per 100 pounds delivered. The low to high range of this item was from \$0.08 to \$0.36. Here again there was a concentration of firms within a reasonably narrow range; 9 of the 12 falling between \$0.20 and \$0.30 in the scale of cost per 100 pounds.

TABLE 6. Cost in dollars per mile of operating trucks used to deliver fresh fruits and vegetables, 12 Honolulu wholesale produce dealers, April-June 1954.*

DEALER	TRUCK EXPENSE	LABOR COST	TOTAL	QUANTITY DELIVERED PER MILE
A.....	.1665	.1290	.2955	<i>pounds</i> 62
B.....	.1197	.1611	.2808	44
C.....	.1354	.1128	.2482	39
D.....	.2009	.1580	.3589	64
E.....	.1305	.1648	.2953	59
F.....	.1886	.1341	.3227	63
G.....	.1453	.1714	.3167	78
H.....	.2397	.2276	.4673	100
I.....	.2277	.2032	.4309	75
J.....	.3040	.2508	.5548	302
K.....	.2336	.1498	.3834	143
L.....	.2860	.1085	.3945	42
Average.....	.1982	.1642	.3624	71

* Costs are based on delivery operations beginning at time vehicle leaves wholesaler's place of business and ending upon return to starting point.

TABLE 7. Cost in dollars per hour of operating trucks used to deliver fresh fruits and vegetables, 12 Honolulu wholesale produce dealers, April-June 1954.*

DEALER	TRUCK EXPENSE	LABOR COST	TOTAL	QUANTITY DELIVERED PER HOUR
				<i>pounds</i>
A.....	1.62	1.19	2.81	526
B.....	1.22	1.65	2.87	405
C.....	1.39	1.16	2.55	371
D.....	1.69	1.34	3.03	506
E.....	.95	1.17	2.12	383
F.....	1.72	1.22	2.94	568
G.....	1.08	1.28	2.36	570
H.....	1.25	1.19	2.44	517
I.....	1.54	1.41	2.95	474
J.....	1.94	1.58	3.52	1,830
K.....	1.30	.83	2.13	796
L.....	2.10	.80	2.90	311
Average.....	1.48	1.24	2.72	503

* Costs are based on delivery operations beginning at time vehicle leaves wholesaler's place of business and ending upon return to starting point.

The combined cost of equipment and labor averaged \$0.51 per 100 pounds of produce delivered during the survey period. In range this combined cost of delivering 100 pounds of fresh fruits and vegetables varied from a low of \$0.18 to a high of \$0.93. Over half of the dealers had a total delivery cost of between \$0.40 and \$0.60 per 100 pounds. The cost of delivering the average trip load of 972 pounds (table 2) was \$4.98 when computed on the basis of \$0.512 per 100 pounds.

2. Cost per mile of travel: On the basis of mileage the expense of operating trucks used in delivery of fresh produce averaged almost \$0.20 per mile traveled for the 12 dealers surveyed. The range in this cost of the delivery equipment (labor not included) was from \$0.12 to \$0.30 per mile. Only two dealers had truck expense exceeding \$0.24 per mile, but 4 of the 12 were below \$0.15 per mile. Labor cost per mile averaged over \$0.16 for the 12 dealers. The range in this item of delivery expense was from \$0.11 to \$0.25 per mile. A distinct tendency of labor costs to cluster in the range of 10 to 17 cents per mile was found in analyzing the operations of the individual delivery trucks.

When truck expense and labor are combined the resulting total operating cost averaged \$0.36 per mile traveled during the survey period. From low to high this composite ranged from almost \$0.25 to over \$0.55 per mile among the firms surveyed. In computing the cost per trip of 13.6 miles (table 1) it is found that each delivery trip averaged \$4.93 where the calculation is based on a rate of \$0.3624 per mile.⁴

Deliveries per mile of travel are also indicated in table 6. Generally speaking those dealers operating the longer routes with resultant lower cost per mile traveled also show a lower volume of deliveries per mile. It is indicated, however, that the lower cost per mile traveled cannot be considered in itself an indication of a more

⁴ The slight difference in the cost per trip resulting from the two methods of computation (\$4.98 by weight vs. \$4.93 by mileage) is not significant since it is the result of technical differences in mathematical calculation.

efficient delivery operation. Actually the reverse may be true as is evident in the case of dealers H, J, and K, all of whom have relatively high per-mile costs but who rank well where costs are related directly to quantity of produce delivered (see table 5). It is to be noted, of course, that these dealers were at the top of the list in produce delivered per mile of travel. This observation merely tends to confirm the importance of considering both load and distance in the evaluation of delivery costs.

3. Cost per hour of operation: A further method of analyzing delivery costs is based on the length of time that a truck is used in the operation. In table 7 the cost per hour of operating trucks used in delivering fresh fruits and vegetables is listed for each of the 12 dealers. Truck expense alone ranged from \$0.95 to \$2.10 per hour. The average was \$1.48 per hour of time that the trucks were actually out on delivery. Labor cost on the same basis averaged \$1.24 per hour with a range of \$0.80 to \$1.65 per hour indicated in this item. When the gross labor cost is adjusted for social security, unemployment compensation, and industrial accident insurance paid by the dealers, the net average wage actually received by drivers of produce delivery trucks in Honolulu was between \$1.10 and \$1.20 per hour. Total cost per hour of operation ranged from \$2.12 to \$3.52 among the 12 dealers and the average was \$2.72 per hour.

As was noted above in relation to delivery costs based on miles traveled, the unit cost per hour of operation must be related to quantity delivered if a balanced view of delivery operations is to be obtained. A high or low cost per hour of truck operation required to provide delivery service does not necessarily indicate the relative degree of operating efficiency. Here again it is important to know how much produce is being delivered for each unit of measurement—an hour in this particular case. In relating cost per hour and quantities delivered it is noted in table 7 that Dealer E operated his trucks for \$2.12 per hour while Dealer K had a comparable cost of \$2.13 per hour. Still when the unit cost per 100 pounds hauled (table 5) is examined it is found that Dealer K's rate was only about half that of Dealer E. In large part the explanation of this difference lies in the fact that Dealer K delivered 796 pounds of fresh fruits and vegetables per hour of truck operation while Dealer E's figure was 383 pounds per hour.

As a result of this study it is suggested that produce dealers and others interested in computing hauling costs will find that for most purposes unit costs based on a given quantity delivered (such as 100 pounds) are quite satisfactory as a yardstick of efficiency. If a more detailed analysis is desired, however, then computation of costs based on distance traveled or on operating time may be justified. Both distance and time enter into the determination of truck operating costs in any event, but for some purposes it may be desirable to relate costs to one element or the other.

EVALUATION OF DELIVERY OPERATIONS

From the single standpoint of utilizing trucks effectively it must be granted that Honolulu produce dealers are making only partial use of their equipment. This conclusion is based in large part on the findings that indicate average weekly use totaling only 17.24 hours per truck surveyed and average loads that required only about one-third of the actual truck capacity. Opinion of the trade itself seems to reflect an awareness of this low rate of utilization, but there is no agreement on prospects or methods of improving the delivery operations. The usual attitude of dealers is that deliveries must be made on a daily basis; as early in the day as possible and in any quantity desired by the buyer. It is feared by wholesalers that any deviation from this policy would result in loss of business to a competitor.

Aside from the fact that it is the usual practice to make frequent deliveries of small quantities of produce, the dealers tend to justify present delivery methods as a means of building and maintaining good trade relations. In most cases the truck driver takes orders and makes adjustments while he is on the route. It is considered desirable to build up the good will resulting from regular and frequent calls on buyers by the drivers of the delivery trucks.

If it is assumed that the delivery service performed by Honolulu produce dealers cannot be curtailed drastically then suggestions for improvement must be limited to those measures that may be applied to the existing plan of operation. In passing, however, it should be noted that the "cash and carry" method, in a limited way at least, is being adopted by many produce wholesalers on the mainland. In Honolulu the most obvious method of bringing about greater efficiency is to make more complete use of the trucks now operated by the dealers. This objective could be achieved through consolidation of routes and extension of the delivery period over a greater part of the day. Reduction in frequency of delivery, especially where loads of less than 500 pounds are involved, would improve efficiency providing the number of trucks operated is also reduced.

The practicability of two or more dealers engaging in operation of a joint delivery service should also be considered. A few instances of such cooperation among wholesalers were noted while this study was in progress. Another possibility may be the use of a "for hire" or "express" truck that could serve several firms in providing delivery.

In a surprising number of cases, a truck was used for less than 5 trips a week, including pickup at the docks. With such limited use the cost of operating any truck is excessively high on a per-unit-hauled basis. A number of dealers have more trucks than they actually need. In the course of the survey it was noted that a few trucks were not used at any time during the week. It is suggested that each wholesaler examine his rolling stock carefully in order to determine whether certain vehicles may not be eliminated. Through their trade association the produce dealers of Honolulu may be able to adopt measures aimed at curtailing the present delivery service which by most generally accepted standards is being subjected to considerable abuse by produce buyers and sellers alike.

This study indicates that the firms doing a relatively large volume of business have a substantial advantage over smaller dealers so far as cost of delivering fresh produce is concerned. Table 8 shows these differences in costs and the major reasons for the divergence. The 4 firms doing over \$500,000 in business per year had a delivery cost of \$0.34 per 100 pounds while those 5 dealers falling in the category below \$250,000 in annual volume averaged \$0.63 per 100. The advantage of the larger wholesalers is much more evident in truck expense than it is where labor cost is the basis of comparison. This marked difference between large and small operators prevailed despite the fact that cost of truck operation per mile traveled and number of trips per week per truck were comparable for the two groups of wholesalers. The apparent cost advantage of the larger firms is due in part to the longer period of truck operation (20.89 hrs. vs. 13.04 hrs. per week) and the greater number of miles traveled per week (136 vs. 98).

Important as these two factors may be in explaining the difference in delivery cost, however, they are relatively minor as compared to quantity of produce hauled per trip where the large dealers had loads averaging over twice those of the smaller concerns. The average loads per trip of the two groups were 613 pounds and 1,428 pounds which when related to actual capacity of the delivery trucks gave the larger firms a load ratio of 44 percent, as compared to 23 percent for the other group. These comparisons only tend to emphasize the importance of utilizing to

TABLE 8. Comparative delivery costs and data on truck operations,
9 Honolulu produce dealers, April-June 1954.

ITEM	GROUP 1*	GROUP 2†
Truck expense, per 100 pounds.....	\$0.3752	\$0.1680
Labor cost, per 100 pounds.....	0.2578	0.1722
Total, per 100 pounds.....	0.6330	0.3402
Truck expense, per mile.....	\$0.2179	\$0.2034
Labor cost, per mile.....	0.1620	0.1842
Total, per mile.....	0.3799	0.3876
Trips per truck, per week.....	9.4	9.4
Hours of operation per truck, per week.....	13.04	20.89
Miles of operation per truck, per week.....	98	136
Load per trip (pounds).....	613	1,428
Ratio of load to capacity (percent).....	23	44

* Average for 5 dealers having annual volume of less than \$250,000.

† Average for 4 dealers with annual volume in excess of \$500,000.

the maximum degree practicable the full capacity of trucks, not only as regards relation of load to actual carrying capacity but also in terms of time the vehicle is employed in delivery or pickup service.

In seeking ways of achieving more complete utilization of their trucks, the produce dealers of Honolulu may well consider the possibilities of developing a backhaul operation that would tend to reduce unit hauling costs. To some extent the dealers are now hauling empty crates and picking up produce at the farms or docks on the return trips after making their deliveries, but these activities are at present of relatively minor importance as a means of reducing truck costs.

CARTAGE OF PRODUCE FROM DOCK TO WHOLESALE MARKET

About two-thirds of the fresh fruits and vegetables reaching the Honolulu market in 1953 were brought in from the outlying islands or from the mainland. Except for a relatively small volume of produce moved by air freight from the outlying islands, all of these shipments from sources outside Oahu reach Honolulu by steamship or barge and are unloaded on the local docks in the harbor area. In hauling produce from the docks to their places of business, the individual wholesale dealers use their own trucks or employ one of several commercial trucking concerns commonly referred to in trade circles as "express." In the initial survey made in connection with this project it was found that something less than 25 percent of the produce dealers were making regular use of the "express" service in moving all or a part of their produce from the docks. Fresh produce originating on Oahu farms is usually moved to the market in Honolulu by the growers themselves, but in some cases the wholesaler handling the grower's crop will provide the hauling service. In this study, however, the consideration of hauling costs was not extended to cover the movement of Oahu produce to market.

Among the 12 produce dealers whose hauling activities were surveyed, there were 7 firms that used their own trucks to move all or a substantial part of the produce shipped to them by steamship or barge. In table 9 the costs incurred by these 7 dealers in transporting fresh produce from the docks are classified as "truck expense" and "labor cost." On the basis of cost per 100 pounds hauled the average outlay was \$0.09 for the truck and \$0.05 for the labor, or a total of \$0.14. Among

TABLE 9. Cost in dollars of equipment and labor involved in transporting 100 pounds of fresh produce from dock to market center during one week of operation, 7 Honolulu wholesale dealers, April-June 1954.*

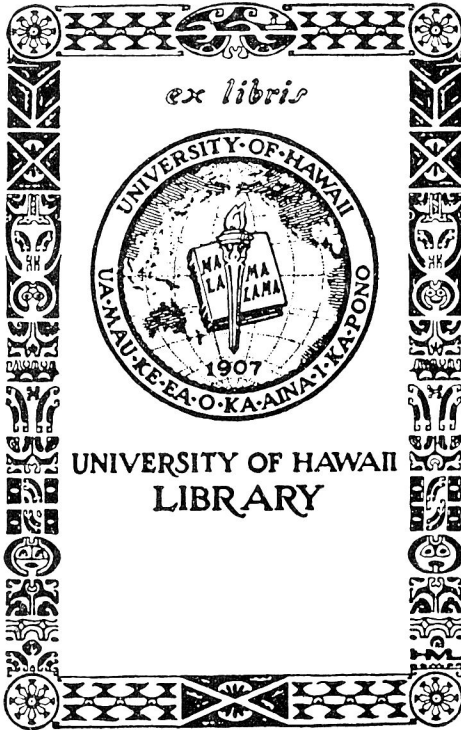
DEALER	TRUCK EXPENSE	LABOR COST	TOTAL
A.....	.173	.076	.249
D.....	.198	.075	.273
F.....	.223	.177	.400
G.....	.044	.035	.079
H.....	.130	.045	.175
J.....	.036	.026	.062
K.....	.102	.075	.177
Average.....	.091	.051	.142

* Only those dealers who hauled on their own trucks at least 20 percent of the produce handled by them during the survey period are included.

the firms there was a marked variation of from almost \$0.04 to over \$0.22 in truck expense and approximately \$0.03 to \$0.18 in labor cost. In total outlay the range among the dealers was from \$0.06 to \$0.40 per 100 pounds hauled.

Assuming that rates charged by the commercial truckers are substantially uniform for all produce wholesalers and that such rates remain at the same level as was reported during the survey period, then it would appear that the "express" service may be advantageous to the wholesalers in all cases where a dealer cannot perform the same cartage service with his own trucks for less than 10 to 12 cents per 100 pounds hauled from the dock. By this standard only 2 firms among the 7 listed in table 9 would find a *cost* advantage in doing their own hauling. In some cases, however, this observation must be modified because of particular circumstances. For example, where a dealer is forced by competition to provide delivery service and uses his truck equipment only at part capacity it may be advisable to haul from the dock in order to keep delivery expense from going higher than it now is. Also, it may be possible to utilize the available labor more effectively by engaging in the picking-up of produce at the docks. Another modifying factor may be the problem of securing "express" service at the specific time that it is needed. In considering the relative merit of the two methods of hauling produce from the docks each dealer must look carefully and realistically at his own situation and then decide what change, if any, should be made in his hauling operations.

One factor that must not be overlooked in evaluating the alternative methods of moving produce from the docks is the element of joint costs involved where equipment is used for *both* delivery and pickup. In reviewing the truck operations of a particular dealer it is not unusual to find that it is profitable for him to continue hauling produce from the docks despite the fact that the cost per unit moved is greater than the charge made by the express trucks. This conclusion is generally the result of finding that the potential saving to be realized through hiring a commercial truck to do the hauling from the docks would be more than offset by the increase in unit cost of delivery when all truck costs must be charged to the latter operation.



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