

Abridgment

COST ANALYSIS OF CURRENT U.S. SURFACE TRANSIT FARE COLLECTION SYSTEMS

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U.S. surface transit fares have typically been collected on-board the vehicle. The objective of this analysis is to measure capital and operating costs associated with collecting fares. A literature review indicated that transit systems do not record such directly related operating expenses. (1) Therefore, six transit systems were visited to obtain detailed data. The systems, selected on the basis of size and uniqueness of fare structure or collection equipment, were:

1. Westport Transit District (WTD), Westport, CT - Annual transit passes account for more than 70 percent of the system revenue, and about 90 percent of passenger boardings.
2. Red Rose Transit Authority (RRTA), Lancaster, PA - A system using conventional fare collection methods typical of small properties.
3. Capitol Area Transit (CAT), Harrisburg, PA - A medium-size system with the latest Duncan Industries fare collection equipment technology.
4. CNY Centro, Syracuse, NY - a medium-size system with the latest Keene Corporation fare collection equipment and vacuum revenue removal, and automatic data retrieval (ARCOM) technology.
5. METRO, Seattle, WA - A large transit system with conventional fare collection equipment but extensive "Magic Carpet" service - a downtown free ride zone.
6. MBTA Surface Transit, Boston, MA - A large multi-modal system with the largest utilization of employee payroll deduction passes in the country.

This discussion addresses two broad categories of costs - direct and indirect. Direct costs are the quantifiable capital and operating costs. Indirect costs, not easy to quantify, are related to system-wide revenue loss, operator involvement in fare-related activities, and impact of fare collection procedure on the system's insurance liabilities.

Direct Fare Collection Costs

Capital Costs

The capital cost estimates were based on an inventory of on-board fare collection equipment, off-board fare processing equipment, and other fare collection-related equipment. Annual depreciation cost for each system was derived from 1976 Reproduction

Cost New and assumes an average 15-year life for fare collection equipment. As shown in Table 1, the annual depreciation cost per unit of operating parameter (peak vehicles and vehicle kilometer) is lower for the case-study systems with non-registering fareboxes than for those with registering fareboxes.

Table 1. Fare collection capital cost comparison

System Location	Total Annual Depreciation Cost ^a	Annual Depreciation Cost	
		Per Peak Vehicle	Per Vehicle km
Westport, CT ^b	\$ 530	\$ 53	0.074¢
Lancaster, PA ^b	1360	50	0.068
Harrisburg, PA	10250	160	0.329
Syracuse, NY	55300	398	0.725
Seattle, WA ^b	18600	37	0.050
Boston, MA	\$202100	205	0.372

^aBased on 1976 Reproduction Cost New and an average 15-year life for fare collection equipment.

^bSystems with non-registering fareboxes.

Not surprisingly, the CNY Centro registering fareboxes, vacuum revenue removal and ARCOM data processing system engender the highest annual depreciation cost per peak vehicle (\$398), and per vehicle kilometer (0.725¢).

Operating Costs

The fare collection-related operating costs were grouped into four categories - Personnel, Materials and Supplies, Service Contracts, and Accidents and Insurance.

Personnel Costs. Typically, maintenance, transportation and accounting department personnel are involved in fare collection-related activities.

Table 2. Fare collection-related annual operating cost.

System Location	Cost Category				
	Personnel	Materials and Supplies	Service Contracts	Accidents and Insurance	Total
Westport, CT	\$ 7700 ^a	\$ 2585	\$ 895	\$ 100	\$ 11280
Lancaster, PA	19900 ^b	825	0	2460 ^c	23185
Harrisburg, PA	55000 ^d	4325	2670	1990	63985
Syracuse, NY	70300 ^a	17360	10610	30020	128290
Seattle, WA	334300 ^a	104050 ^e	43165	2155	483670
Boston, MA	1590500 ^a	17240	24050	129400 ^c	1751190
Total	\$2077700	\$146385	\$71390	\$166125	\$2461600
Percent of Total	84.4%	6.0%	2.9%	6.7%	100.0%

^aThe fare collection-related activities of bus operators have been considered a collateral duty.

^bOne on-board fare collection activity of bus operators, making change, has been included in personnel cost.

^cIncludes an estimate of certain revenue losses.

^dTen minutes of bus operator turn-in time is included in personnel cost, but the operators' on-board fare collection activities, which include selling of tickets, are excluded.

^eIncludes annual cost of farebox-related road calls.

Materials and Supplies. Typical M&S items are spare parts inventory, transfer tickets, punch tickets, various types of adult passes, senior citizen identification cards, and student passes.

Service Contract. Services typically contracted include maintenance of special fare processing equipment, burglary protection, and armored car service.

Accident and Insurance. These costs include those of on-board accidents directly involving fare collection equipment and insurance premiums for employee bonding and felonious assaults.

Operating Cost Comparison

Table 2 shows estimated annual fare collection-related operating cost of the six case-study systems. It is evident that current collection and processing activities are labor-intensive: more than 84 percent of the total cost is personnel cost. For MBTA Surface Transit, almost 91 percent of the fare collection operating cost is personnel-related.

Table 3 relates fare collection operating cost with total operating cost, total operating revenue, cost per peak vehicle and cost per vehicle kilometer. For the six case-study systems, the cost varies from a low of 1.3 percent to a high of 2.9 percent of the total operating cost. Costs of fare collection as a percent of total operating revenue ranges from 3.5 percent to 10.3 percent. This calculation is particularly appropriate since it compares the cost of collecting revenue with the amount of revenue collected. Both WTD and MBTA Surface Transit show fare collection costs as percent of total operating revenue much higher than those of other case-study systems. This is attributable to their charging of lower base fares.

Comparison on the basis of unit operating parameters, peak vehicles and vehicle kilometer, shows

Table 3. Fare collection operating cost comparison.

System Location	As Percent of Total Operating Cost	As Percent of Total Operating Revenue	Per Peak Vehicle	Per Vehicle Km
Westport, CT	2.9%	10.3%	\$1130	1.55¢
Lancaster, PA	1.7	4.6	860	1.18
Harrisburg, PA	2.3	3.5	1000	2.05
Syracuse, NY	2.0	3.5	925	1.67
Seattle, WA	1.3	4.3	970	1.24
Boston, MA	1.4%	8.3%	\$1780	3.22¢

the fare collection cost of MBTA Surface Transit to be much higher than the other systems. For instance, the operating cost of fare collection for the Lancaster system is \$860 per peak vehicle and 1.18¢ per vehicle kilometer. The corresponding cost factors for MBTA Surface Transit are \$1,780 per peak vehicle and 3.22¢ per vehicle kilometer. Yet, MBTA Surface Transit fare collection costs are a typical proportion of total system operating costs (1.4 percent).

Indirect Fare Collection Costs

It has been said that the closer something can be measured, the less important it is likely to be. This may be the case with the costs of fare collection. The directly quantifiable costs of surface transit fare collection, which have been measured with some precision for six bus transit systems with widely divergent fare structures and revenue processing systems, are not a significant percentage of total system operating cost. Based on the previous analysis, measurable transit fare collection costs are in the range of two percent of total operating cost. This indicates that further cost-cutting in the area of revenue collection is unlikely.

Given the relatively small, directly measurable cost of transit fare collection, is there any purpose in the investigation of alternative mechanisms? Before answering this question, we should look beyond the measurable costs into those costs of fare collection that cannot be directly quantified. These are discussed below.

Revenue Losses

Only two of the six transit systems surveyed offered any information on revenue losses associated with fare collection. In no case was the survey able to determine with any precision the ratio of bank deposits to the aggregate fares that riders are supposed to pay under posted tariffs.

Newspaper reports suggest that in some systems revenue losses could be a serious problem. In Washington, D.C., published interviews with WMATA bus operators cited instances of fare underpayments.⁽²⁾ In Philadelphia, SEPTA management reported to the Board that it feared the theft of up to \$1.6 million in revenue annually - about two percent of the system's total.⁽³⁾

Revenue losses, like shoplifting, are a cost of doing business. To the extent that some patrons cannot pay their fair share, or that some employees misappropriate funds, the revenue loss must be made up by other patrons and by tax dollars.

Operators' Wage Costs

Only two of six transit systems had information on operators' wage costs associated with the fare collection system. In the other systems, all fare collection activities of drivers were reported as "collateral."

It is difficult to speculate on how organized labor in different transit systems might react to being taken entirely out of the fare collection cycle. Organized labor might also be interested in the job-creating aspects of an off-board fare collection system. If such a system induced patronage, it could lead to higher service levels and more jobs.

All of these factors would have to be examined in the context of collective bargaining at the individual transit system. In no event would off-board fare collection result in a lower wage rate for operators. It could be used in new contract negotiations, however, to mitigate wage increases.

Insurance Liability

Currently, transit systems pay anywhere from three percent to over ten percent of total operating costs for bodily injury and property damage liability insurance coverages. The cost of such insurance has increased rapidly in the past few years, and its availability is now severely limited. Off-board fare collection could impact insurance costs in two ways.

One possible impact is reduction of insurance premiums and claims resulting directly from the farebox. These costs have been discussed in a previous section.

A second possible impact on insurance costs is more subtle and legally more uncertain. About 20 to 30 percent of total liability insurance claims involve bus patrons (the remaining claims involve accidents external to the bus). When transit was a private industry, a legal contract was created when the patron paid a fare. Liability for injury to a

patron who had paid the fare was adjudicated on the basis of simple negligence. With tax dollars now paying in excess of 50 percent of a typical transit system's operating cost, has the simple negligence standard changed? Would it change if transit service were provided free of direct user charges, much as streets and highways are provided? If the answer to this question is affirmative, significant liability insurance cost savings would result.

Discouragement of Revenue Patronage

The final category of indirect costs related to present fare collection methods is perhaps the most important. To imagine the possible revenue-generating implications of an off-board fare collection system, one only has to ask the question: What if the only kind of telephone were the pay phone, and the only way to call were to deposit exact change in the call box? How much of the current telephone revenue would be lost? Of course, there are significant differences in the relative market positions and feasible billing practices of a telephone company and a transit system. Yet, there can be no question that the current U.S. exact-fare, average-cost-pricing fare collection method is a significant deterrent to increasing revenue ridership.

Conclusions

While the transit industry's current fare collection costs are inexpensive relative to total operating costs (less than two percent), its fare collection methods may not be efficient. By requiring exact change in the farebox for each and every ride, the patron must bear the administrative burden of payment. This is contrary to the dominant trend in private industry toward credit cards and other "convenience" payment forms. The key question which remains to be investigated is: "Would a more convenient fare collection system generate enough additional revenue to offset higher transit agency fare collection costs?"

References

1. American Public Transit Association, "Transit Operating Report for Calendar/Fiscal Year 1975," Washington, D.C.
2. Washington Post, August 8, 1975, followed by Washington Star stories.
3. Philadelphia Inquirer, December 18, 1976.