

that the baseline conditions are still valid. Basic statistical formulas are used in the design of the data-collection program.

A manual incorporating a step-by-step procedure for program design has been produced. With the existence of this manual, the real test will begin--in a climate of fiscal austerity will the transit industry see the justification for spending enough money to get the reliable information necessary to make better decisions?

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## Performance-Based Funding-Allocation Guidelines for Transit Operators in Los Angeles County

GORDON J. FIELDING, SUBHASH R. MUNDLE, AND JOE MISNER

During the last five years, transit performance indicators have been widely used in the transit industry. California and New York have used performance indicators to determine eligibility for funding. In Pennsylvania, transit performance measures have been used to provide incentive payments for superior performance, and in Michigan a detailed analysis of transit operations provides the basis for state managerial assistance. In Los Angeles County, nine transit operators, including Southern California Rapid Transit District, provide fixed-route transit service. Between 1977 and 1980, operating cost per vehicle hour increased from \$28.52 to \$38.76, a rate higher than the consumer price index for the Los Angeles area. In response to state legislation designed to maximize utilization of public subsidies for transit, the Los Angeles County Transportation Commission undertook the development of performance-based guidelines for allocating transit subsidies. The performance guidelines developed in cooperation with the local transit operators are presented here. In this program, service is classified into local and express categories. Seven indicators were chosen to monitor transit performance on a periodic basis. Three indicators were selected to establish standards to be achieved by all fixed-route service operators in Los Angeles County. Compliance with these standards will determine eligibility for discretionary funds (representing 5 percent of operating assistance) in the future. The methodology for quantifying loss of subsidy funds if an operator falls below the established standards is also described. The performance guidelines merit consideration for two reasons. First, they represent an attempt by a large metropolitan area to control transit costs, and second they initiate performance-based funding allocation rather than funding based on demographic characteristics or operating deficits. Both reasons are substantial advancements in the theory and application of performance-based guidelines to transit-financing issues.

A complex institutional structure supplies transit in Los Angeles (1). Thirteen operators provide transit service. Nine of these are fixed-route providers and the remaining are demand-responsive. Only the Southern California Rapid Transit District

(SCRTD) is an independent agency. The others are municipal operators. Programming of state and federal funds is controlled by the Los Angeles County Transportation Commission (LACTC). Short-range transportation planning is sponsored by the Commission and long-range planning by the Southern California Association of Governments (SCAG).

The nine public transit operators providing fixed-route transit service in Los Angeles County operate 2287 vehicles in the peak period and 370 700 miles of service on an average weekday (Table 1). SCRTD, an independent agency created by the State of California, is by far the largest, operating 87 percent of the average weekday miles of service and carrying 88 percent of the total public transit ridership.

The other eight transit systems in Los Angeles County are governed by municipalities in the county. Together they provide the remaining 13 percent of service and carry 12 percent of ridership on an average weekday. None of the operators in the county, including SCRTD, have dedicated local sources of funding except for those state and federal funds that pass through LACTC. However, SCRTD and municipal operators can obtain funding from local sources at the discretion of county and municipal governments.

The total operating cost of average weekday fixed-route transit service in Los Angeles County is \$885 960. The passenger revenue recovers about 39 percent of the operating cost on a countywide basis. The shortfall between operating cost and

Table 1. Summary of average weekday operating statistics.

System	Vehicle Hours	Vehicle Miles	Peak Vehicles	Passenger Boardings	Operating Cost (\$)	Passenger Revenue (\$)
Commerce	56	650	5	2 400	1 890	NA
Culver City	147	1 880	14	5 940	4 340	1 635
Gardena	242	3 140	27	8 930	6 460	2 235
Montebello	269	3 520	19	11 860	7 010	2 510
Norwalk	183	2 760	15	3 635	3 740	610
Torrance	255	3 760	19	8 280	6 920	2 000
Long Beach	1 339	19 880	113	49 170	32 210	8 580
Santa Monica	928	12 090	94	68 190	21 460	11 970
SCRTD	22 870	323 020	1981	1 179 930	801 930	313 200
Total	26 289	370 700	2287	1 338 335	885 960	342 740

revenue is covered largely by state and federal subsidies allocated through the Commission.

Allocation of subsidies is based on a formula that uses both vehicle miles supplied and ridership achieved. After deductions for future rapid transit, paratransit, and the 5 percent discretionary funding, the Commission allocates operating subsidies based on the ratio of an operator's revenue vehicle miles and passengers to the combined total for all operators in the county. This is not a performance-based funding guideline and may result in operators offering more miles of service so as to increase their proportionate share of subsidies.

The formula also made it difficult for the Commission to coordinate duplicating service provided by different operators. A dispute between two operators over boarding restrictions on a major local transit route simmered for nearly two years without resolution and helped to convince the State Legislature of the need to strengthen the Commission's authority over the operators. This coincided with the recurrence of an operating budget crisis for SCRTD, which led to new public and political interest in the problem of cost control.

Assembly Bill 103 (AB103), passed by the California Legislature in 1979, required the Commission to guide the allocation of funds among operators and different types of service and to encourage improvement in performance [Chapter 579, California Statutes, 1979 (Assembly Bill 103)]. The Commission was required to set financial standards and productivity guidelines that would be integrally connected to the ongoing process of allocating operating subsidy funds. Standards and guidelines were to be contained in a policy document called a Transit Coordination and Service Program (TCSP), which the Commission was required to adopt by an extraordinary majority of at least eight affirmative votes (out of 11 voting members).

Thus, while the legislative action mandating the development of the TCSP had its origin in the perceived need to resolve service disputes and improve service coordination, the definition of its specific elements had a distinct emphasis in the areas of performance and operating cost. And although the Commission considered revising its entire subsidy allocation formula, it decided to use the approximately \$12 million in the 5 percent discretionary allocation as an incentive for improved performance and to monitor performance more critically and publish the results.

The framework for this program consisted of four components:

1. Development of service classification methodology to determine which services in the county were reasonably similar in operating characteristics so as to make a comparison of their performance characteristics,

2. Selection of performance indicators to provide the Commission with a tool to monitor performance on a periodic basis,

3. Development of performance achievement guidelines to establish level of performance to be achieved by each fixed-route operator in the county, and

4. Development of funding-allocation guidelines to encourage achievement of the desired performance level and to establish a framework for service reallocation in the future.

The objective for the TCSP was to establish a reasonable set of guidelines for separate categories of transit service based on inherent characteristics of transit operations in Los Angeles County and then to use these guidelines, not only to monitor transit performance and recommend management actions to improve performance, but also to reward superior performance through allocation of discretionary funds. It was also a requirement that the TCSP be developed in cooperation with all transit operators in the County of Los Angeles. This both limited the extent of innovation and ensured cooperation. The unanimous adoption of the draft TCSP by the Commission was a reflection of the success in blending new concepts with the practical concerns of operators.

Service classification is an example of this cooperation. There was no established basis for service classification, so the Bus Operators' Subcommittee reviewed the Commission's proposal and collaborated in placing each operator's routes in one of five service categories.

#### SERVICE CLASSIFICATION

To minimize differences in operating environment, transit services were classified into relatively homogenous groups. It was decided that the four demand-responsive operators should be eliminated from consideration as well as the demand-responsive services operated by fixed-route operators because they represent a distinct mode. Charter services and special-event services were eliminated for the same reason. The remaining fixed-route services were classified into local and express services. These two primary categories were further subdivided into secondary categories so as to yield classes of similar service between operators:

##### 1. Local service:

- a. Demand: headways and duration of service determined by demand; usually operates additional peak-period service;
- b. Policy: minimum service level set by policy rather than by demand;
- c. Community: circulation within community; operates shuttle or feeder service to other lines.

##### 2. Express service:

- a. Multistop: operates on freeways and/or surface streets and collects passengers at neighborhood stops;
- b. Limited stop: operates predominantly on freeways and includes park-and-ride service.

Not all fixed-route transit companies operate all classes of service. The largest, SCRTD, provides service in each of the five secondary classifications (Table 2). On a countywide basis, 86.8 percent of the average weekday service hours is local service operated at headways based on demand. The majority of the express service is also operated by SCRTD.

In the TCSP the secondary service classifications were used in the development of a performance-monitoring system, and the primary classifications were used to establish performance guidelines.

#### PERFORMANCE INDICATORS

A wide range of statistics was evaluated as performance indicators. Special consideration was given to avoiding unnecessary data collection. Preference was given to statistics that operators were required to provide for the Urban Mass Transportation Administration (UMTA) Section 15 reports and the performance audits mandated by the California Transportation Development Act. The selection methodology is best described by the relationship among three types of statistics (Figure 1). The three categories of statistics--service input, service output, and service consumption--result in three different and unique categories of indicators:

1. Cost-efficiency indicators measure the resources expended (i.e., service input) to the amount of service produced;
2. Cost-effectiveness indicators measure the level of service use (i.e., consumption) against the resources expended; and
3. Service-effectiveness indicators measure the extent to which transit output is used or consumed.

The selected performance indicators were structured to allow monitoring of both the efficiency and effectiveness of related statistics (2). Though the final selection of indicators was performed cooperatively by the study participants, three criteria weighed heavily in the selection process. These criteria included availability, reliability, and controllability of statistics to change performance in a desired direction (3). The seven indicators selected for inclusion in the Commission's performance-monitoring program are vehicle service hours per peak vehicle, operating cost per vehicle service hour, operating revenue plus local subsidies over operating cost, LACTC subsidy (operating deficit) per unlinked passenger, unlinked passenger per vehicle service hour, passenger revenue over operating cost, and revenue per unlinked passenger.

Transit operators will be required to submit data to the Commission by secondary service classifications as part of their annual reports. The Commission staff will then calculate the indicators for each operator and for each secondary service classification so as to monitor performance as required by legislative mandate.

By using a three-variable cost model (4), the Commission staff will develop operating-cost estimates for each secondary service classification for each operator. All indicators listed above can then be easily computed from the statistics submitted. Comparison can then be made among operators during the reporting period and for the same operator over time on all seven indicators.

Performance indicators for September 1979 showed considerable variation in both costs and revenues for different service classifications provided by the same operator. The magnitude of these differences had not been realized by the Commission since, in the past, data had been reported on a systemwide

basis rather than by service classification.

#### PERFORMANCE ACHIEVEMENT GUIDELINES

Various attempts were made to compute performance guidelines to be achieved by the fixed-route operators in the county. It was agreed that the guidelines should allow some flexibility to transit managers. This was accomplished in two ways: by limiting to three the number of indicators in which operators would be expected to achieve a minimum performance level and by limiting the guidelines to two primary classifications of service, namely, local and express.

Attempts to establish standards quantitatively were unsuccessful due to small sample size and diversity in the current level of performance because of system size and heterogeneous characteristics of the service areas. Therefore, standards were developed against anticipated future changes in transit performance. And in order to obtain agreement by the bus operators, concessions were made for a more rapid escalation in costs for operators who currently provide service more economically. The graduated implementation for operators who already exceed the standards was also a compromise. The three indicators and standards to be achieved are as follows:

1. Operating cost per vehicle service hour: Growth from year to year in operating cost per vehicle service hour should not exceed the actual rate of price inflation, as measured after the fact by the consumer price index (CPI) for the Los Angeles area. However, if an operator's cost per vehicle service hour in a particular year is less than 80 percent of the highest cost per vehicle service hour, then that operator's growth may be as high as a 110 percent increase in the CPI.

2. Operating revenue plus local subsidies over operating cost: The ratio of operating revenue (both fares and auxiliary transportation revenue) and municipal subsidies to total operating costs should not be less than one-third. For operators that did not meet this standard in FY 1980-1981, the standard in the first three years will rise in equal annual increments to 33.3 percent from the operator's actual performance in FY 1980-1981.

3. LACTC subsidy per unlinked passenger: Each operator's subsidy (operating deficit) per unlinked passenger in any fiscal year for local service should not exceed 133 percent of the unweighted mean for that type of service for all operators in the county in that year. For operators who did not meet this standard in FY 1980-1981, the standard in the first three years will fall in equal annual decreases to 133 percent from the operator's actual performance in FY 1980-1981. For express service, a limitation will be placed on the differential between the subsidy per passenger for express service as compared with that for local service. Under this standard, the allowable differential would be the real dollar difference between the unweighted mean subsidy per passenger for local service for all operators in the county and weighted countywide mean subsidy per passenger for express service for all operators in the county, as established in the first year of the program. In subsequent years, each individual operator would be limited to that real dollar differential between the individual operator's subsidy per passenger for express service as compared with the unweighted countywide mean for local service.

#### FUNDING-ALLOCATION GUIDELINES

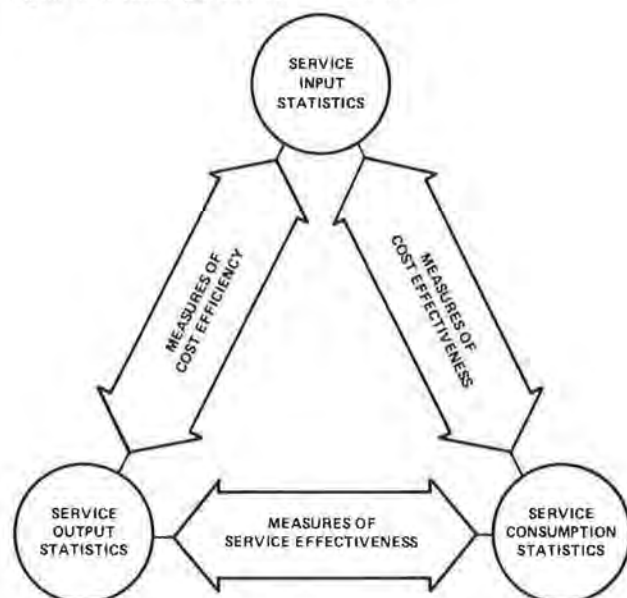
In 1979, also pursuant to AB103, the Commission had



Table 2. Summary of average weekday service hours by service classification.

System	Local				Express			Total
	Demand	Policy	Community	Subtotal	Multistop	Limited Stop	Subtotal	
Commerce	-	-	47	47	-	-	-	47
Culver City	119	-	27	146	-	-	-	146
Gardena	-	112	130	242	-	-	-	242
Montebello	82	129	50	261	-	-	-	261
Norwalk	-	82	95	177	-	-	-	177
Torrance	-	127	-	127	85	-	85	212
Subtotal	201	450	349	1 000	85	-	85	1 085
Percent of total	0.9	1.9	1.5	4.3	0.3	-	0.3	4.6
Long Beach	1 034	178	15	1 227	56	-	56	1 283
Santa Monica	794	25	10	829	53	-	53	882
Subtotal	1 828	203	25	2 056	109	-	109	2 165
Percent of total	7.7	0.9	0.1	8.7	0.5	-	0.5	9.2
SCRTD	12 253	4763	373	17 389	2675	250	2925	20 314
Percent of total	52.0	20.2	1.6	73.8	11.4	1.0	12.4	86.2
Total	14 282	5416	747	20 445	2869	250	3119	23 564
Percent of total	60.6	23.0	3.2	86.8	12.2	1.0	13.2	100.0

Figure 1. Relationship of statistics and indicators.



adopted a formula-based procedure for allocating the state and federal funds that were available for operating subsidy and for the local matching share of federal capital grants. The formula was based equally on vehicle miles and on ridership (both linked and unlinked passengers). The application of this formula was limited by a number of conditions. One of the most significant and controversial of these was the stipulation that 5 percent of the funds to be allocated in any year would be allocated on a discretionary basis. For 1980-1981, almost \$12 million was available in the discretionary fund, and the bus operators agreed that this fund should be allocated as an incentive for achieving the performance standards.

In addition to the formula-based funding allocation, two additional guidelines were established to be included in the overall program:

1. **Impact of noncompliance:** If any standard is not met, a funding penalty not to exceed the operator's share of the 5 percent discretionary fund will be applied two fiscal years after the noncom-

pliance occurs. However, if the operator complies with and exceeds the standard in the intervening year (based on unaudited actual data), the excess in that year may wholly or partly offset the shortfall in the preceding year. The shortfall or excess shall be measured in total dollars of variance from the standard. If funds are not allocated as a result of noncompliance with standards, the Commission may reallocate them to other operators who do meet the standards or may invite private operators to bid to operate service that is being curtailed as a result of the funding penalty (first priority) or any other needed service in the county (second priority).

2. **Measurement of impact:** If an operator fails to comply with more than one of the six standards (three each for local and express service classifications), the total funding penalty shall be the sum of the maximum shortfall (among the three standards) for local service plus the maximum shortfall for express service.

#### CONCLUSION

The recommended performance-based funding-allocation guidelines were unanimously adopted by LACTC and forwarded for public review and comments. The successful development of this program is further evidence of the recognition by both service providers and decisionmakers of the need to improve overall efficiency and effectiveness of transit services.

However, the program should be regarded as satisfactory rather than optimal. The program was based on sound theoretical and technical concepts: Efficiency and effectiveness constructs from performance theory were used together with the techniques of cost modeling and survey analysis to assign costs and revenue to distinct types of bus service. More rigorous standards could have been based on the subsidy per passenger indicator but there was not sufficient agreement on this indicator to assure approval.

Los Angeles is a complex urban society in which policies that cannot be supported by a broad cross section of participating groups are not helpful in decisionmaking despite their theoretical elegance. The performance-monitoring and allocation program adopted by the Commission provides a satisfactory achievement for an agency responsible for coordinating and funding transportation.

The experience gained from this particular program is generally applicable to a variety of metro-

politan and statewide circumstances; the contents, however, may be altered to suit the specific objectives of an agency and the need to achieve cooperation with service providers. The theoretical constructs and analytical techniques used will be more useful than the indicators selected and the intricate method for allocating the 5 percent discretionary fund.

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## Transit Performance in New York State

LELAND C. BARBOUR AND ROBERT J. ZERRILLO

Over the past two years, the New York State Department of Transportation has developed a program to monitor the performance of transit operations that receive state operating assistance. The initial performance evaluation methodology has been revised to better meet a change in Department emphasis to monitor individual operator performance and encourage improvement. Past efforts are expanded by examining (a) the grouping of transit operators on the basis of mode, service type, and vehicle fleet size; (b) the relative performance of each group of operators over time; (c) the performance levels of public and private bus operators; and (d) the advantages and disadvantages of the proposed change in methodology. The results in this analysis show that grouping operators into peer groups yields more meaningful internal group comparisons and, in most cases, should help identify operators that are performing poorly. The overall change in performance between 1978-1979 and 1979-1980 seems to indicate that operator efficiency is improving while effectiveness is declining. Many of the differences seen in performance measures are found to be attributable to vehicle speed. As expected, private operators report higher levels of operating efficiency than public operators and also seem to be holding the line on rising costs better than the public operators. Future years' efforts will need to include expanded time-series analysis of the state's large operators coupled with a more in-depth review of the use of measures of transit service quality.

The New York State Department of Transportation (NYSDOT) began monitoring and evaluating the performance of the state's transit operators in 1979. This effort was undertaken to comply with a State legislative mandate to certify the economy, efficiency, and effectiveness of transit operations participating in the State operating-assistance program (1). Since 1979, the methodology used in the NYSDOT performance-evaluation program has been modified to reflect a shift in both objective and emphasis by the Department. Initial efforts to monitor and evaluate performance were research oriented in order to provide the Department with a better understanding of the problems faced by transit operators. Current efforts, however, are focused on identifying where specific operators are performing poorly and what steps can be taken to improve performance. The Department has also revised its performance-evaluation program to take advantage of new data sources and a greater understanding by the staff of the performance-evaluation process.

This report reviews the NYSDOT performance-evaluation process, beginning with a brief summary of the program's background. This is followed by a discussion of current performance-evaluation efforts, including the changes in methodology and the

reasons for these changes. Trends in transit operator performance are discussed and a brief review of the differences in performance between publicly and privately owned transit operations is presented. The report concludes with a summary of findings and recommendations for future research.

#### BACKGROUND

NYSDOT began its transit performance-evaluation program in 1979. The operating and financial data necessary to implement the program are collected in an annual survey of transit operators. During the first year of its performance-evaluation program, NYSDOT developed 15 multimodal performance indicators that allowed for the comparison of various modes and service types found among transit operations participating in NYSDOT's operating-assistance program. Because there was little or no theoretical base on which to determine the appropriate level of performance, acceptable and desirable levels were set empirically. Individual operators were then reviewed relative to the acceptable and desirable performance levels established.

During the second year of the performance-evaluation program, NYSDOT's focus shifted from individual operators to major regional or county public transportation systems receiving state operating assistance. A major system was defined as one that annually carried more than 1 000 000 passengers or operated more than 1 000 000 vehicle-miles of service, which could be a regional public transportation authority or a county or municipal sponsor of one or more publicly or privately operated transit operators. Of the state's 62 systems, 17 qualified as major systems in State FY 1979-1980. These 17 systems carried 99 percent of the passengers, operated 98 percent of the vehicle miles, and received about 99 percent of state operating assistance. Evaluating systems rather than individual operators better met the Department's desire to monitor major transit operators serving the same geographic area, particularly where service and financing policies were controlled by a single local agency. However, the disadvantage of this approach was that the poor performance of an individual operator could be hidden within the average system performance.

An additional development during the second year