

Performance Evaluation for Discretionary Grant Transit Programs

GORDON J. FIELDING AND WILLIAM M. LYONS

Discretionary grant programs have been popular with state legislatures as a mechanism for extending the benefits of transit programs to small cities and rural areas as well as for stimulating innovations in urban areas. This article analyzes state discretionary grant transit programs in California and Minnesota by using the criterion of effective administration. The purpose is to develop a framework for understanding administrative problems that result when state discretionary transit programs do not have adequate objectives. Without explicit objectives, selection, monitoring, evaluation, and overall management are weak. Project performance is reduced and scarce public funds are wasted. Recommendations include the following: (a) legislatures should make explicit the mission and goals of discretionary programs, (b) administrative agencies should define measurable objectives and administrative guidelines, and (c) local grant recipients should be granted funds only after specific objectives and performance standards have been presented.

Although this research is based on the Minnesota and California discretionary grant programs, the framework is general and applicable to other states. The intent is not to advocate or reject the discretionary method or to criticize programs in these two states. Rather, the purpose is to clarify problems and to make recommendations to strengthen the discretionary method as a feasible alternative for allocation of state transit funds.

DISCRETIONARY ALLOCATION PROCEDURES

The distinction between discretionary and nondiscretionary or formula allocation methods is a matter of degree rather than precise categories. In discretionary programs, state agency administrators exercise choice in subsidy decisions, whereas in nondiscretionary programs funds are allocated according to some formula such as population or proportion of annual deficit. Discretionary programs are attractive for states that have specific program objectives. Examples of such objectives include demonstrating innovative transit techniques, providing service to target groups, such as the elderly, or focusing on particular transit-related problems, such as automobile congestion during peak hours.

Although administrative discretion may be unconstrained by formulas, there are degrees of constraint caused by formal rules or informal influence. Even a program based on reimbursement of deficits, as in Minnesota, is discretionary only to the degree that funds are available for the program. When local requirements are less than or equal to funds, decisions are not required and the program is nondiscretionary. However, when demand is greater than funds, administrators are forced to accept or reject everything from line items on budgets to cost overruns and entire projects. The California transit demonstration program, authorized under Senate Bill 283, (California Statutes of 1975, chapter 1130) is more discretionary because it allows greater administrative choice within the funds appropriated. Legislative and agency goals are general, there are no match requirements, and project selection is primarily subject to informal criteria.

Administration of Discretionary Programs

To understand the administrative problems caused by

inadequate objectives in state discretionary programs, we must consider the activities of and relations among the state legislature, the state administrative agency, and the local grant recipient. Figure 1 is a general model of these activities and relations. By enabling laws, the legislature determines a policy direction and the long-range goals for the program. The legislature also approves funding. Legislative goals might include improved mobility for the transit disadvantaged, development of rural paratransit, bus replacement, or reductions in automobile pollution, congestion, and fuel consumption.

The agency should follow this policy direction and develop specific program objectives, guidelines, and procedures to administer the program. These objectives are derived from the legislative goals and are stated in specific, often quantified, terms. Guidelines and procedures, particularly for project selection, should reflect legislative priorities and provide for the orderly implementation of the program. Agency discretion is subject to the enabling laws and the agency's own regulations.

Applicants (counties, cities, and transit districts) are informed of program objectives through agency guidelines. To ensure selection of their projects, applicants conform to agency objectives and indirectly to legislative goals. The agency then accepts or rejects applications by using criteria defined in the guidelines.

The overall administration of the program involves a system of interrelated elements. Figure 1 illustrates the interdependence of goals and objectives at the three levels. For example, a rural transit district's objective to provide 2000 annual trips to nutrition centers for elderly residents would be consistent with a legislature's goal to meet the needs of the transit dependent and an agency's objective to coordinate and improve services provided by several social-service groups.

Agency objectives and project guidelines aid in the selection of local recipients and in the development of performance objectives and standards and procedures for monitoring performance. Through these procedures the legislature intends to achieve maximum transit performance. Performance includes two elements--efficiency and effectiveness. Efficiency concerns the processes by which transit services are produced, particularly through the relationship of inputs to produced outputs (1). Effectiveness concerns the extent to which service consumed corresponds to the goals and objectives established for it by government (Figure 2).

Clearly stated objectives are essential when discretionary grants are intended to demonstrate transit techniques. A project that has vague or ambiguous objectives is valueless as a demonstration. Because the goal of any demonstration is to learn something, outcomes must be evaluated according to these objectives. Only when we understand why a particular outcome resulted and how it affected the project's objectives will we learn something about the technology or technique being demonstrated (2).

Failure to provide explicit objectives causes problems within the objective-setting subsystem and

Figure 1. Model of discretionary grant program.

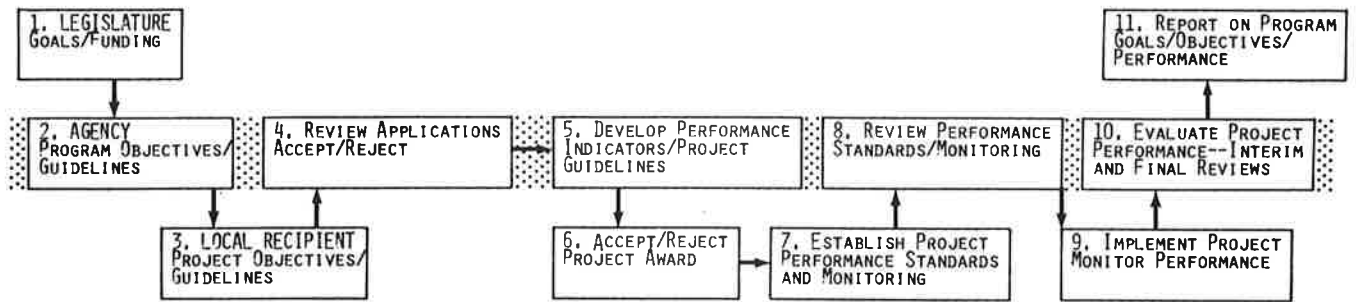
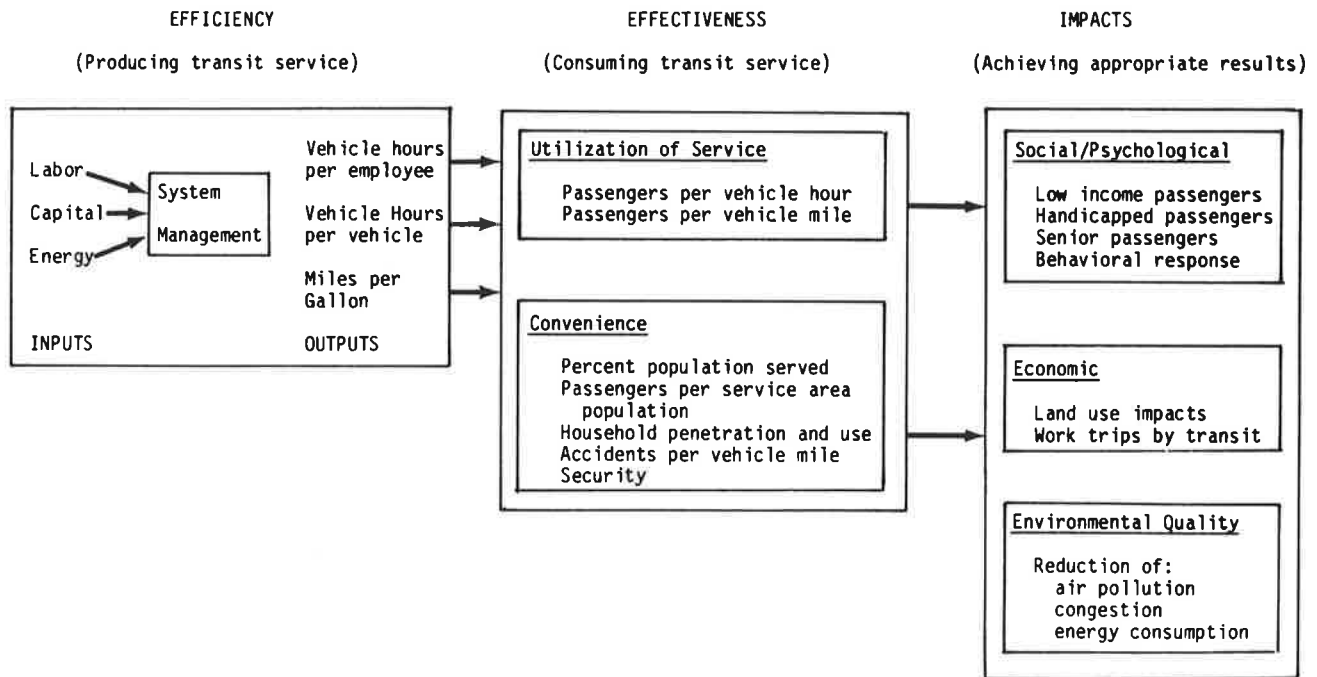


Figure 2. Framework of system performance.



ultimately reduces overall program performance. The California and Minnesota programs illustrate the validity of this assertion. Problems that result from inadequate objectives are identified and changes are recommended in (a) project selection, (b) project evaluation, and (c) monitoring and accountability.

California and Minnesota Programs

Although the California Senate Bill 283 and the Minnesota Department of Transportation (MnDOT) deficit subsidy programs have important differences, both employ procedures that approximate the objective-setting and administrative model in Figure 1. Also, both are examples of different types of discretionary programs. In each state, legislatures set program policy and goals, MnDOT and the California Department of Transportation (Caltrans) develop program objectives and guidelines, and local recipients set project objectives in their applications.

The Minnesota deficit subsidy program allows less administrative discretion than does that of California. Funds are available only for operating costs, and a one-third local funding match is required. Agency administrators have discretion in

project selection and determination of levels of support. MnDOT administrators make frequent decisions on whether or not to fund cost overruns and new or continuing projects. This degree of discretion will increase as local demands increase and administrators are required to make more decisions.

CALIFORNIA SENATE BILL 283 PROGRAM

In 1975 the California legislature passed Senate Bill 283, which established a three-year program that provides funding assistance for demonstration projects. The program included the following sections:

- Section 5: bus transportation demonstration projects--\$2 million,
- Section 6: rural public transportation demonstration projects--\$1 million, and
- Section 9: public transportation projects--\$1 million.

The legislature set several goals for the program. Projects were to include, but not be limited to, projects to determine the following:

1. Disincentives for motor vehicle and low-occu-

pancy motor vehicle use,

2. Programs for low-mobility groups,
3. Effects of rules on transportation systems,
4. Effects of publicly owned transportation systems in competition with private systems,
5. Improved transit management,
6. Coordinated service techniques, and
7. The feasibility and demonstration of a single-coordinated social-service delivery system.

Funds were also allocated for rural projects to include, but not be limited to, dial-a-ride services and other paratransit systems capable of offering flexible scheduling and routing and of being operational within six months of approval.

Senate Bill 283 directed Caltrans to adopt guidelines for allocation of funds and project evaluation. The Caltrans guidelines repeated the above objectives, specified the content of applications, and listed project eligibility and selection criteria. Applications were to include the following:

1. Statement of what is to be demonstrated and expected results and benefits,
2. Description of project activities,
3. Data to establish a need for the project,
4. Project schedule and plans for continuation beyond the demonstration period,
5. Identification of participating organizations,
6. Proposed project budget and a breakdown of fund sources, and
7. Description of how project will be monitored and the guidelines for project evaluation.

Projects were to be selected based on a rating assigned by using criteria that include the following:

1. Relative cost-effectiveness,
2. Consistency with local and regional plans,
3. Compatibility with community needs,
4. Quality of proposed evaluation guidelines,
5. Relevancy of expected results and benefits of the project to other localities,
6. Degree of innovation, and
7. Ability of the applicant to manage, monitor, and report on the project.

Project Selection

The Senate Bill 283 program developed agency objectives and application guidelines consistent with legislative goals and required applicants to specify objectives. Problems arose in selecting projects. The selection criteria were not strictly related to the legislative and agency goals, and when they were, they relied on subjective criteria. For example, cost-effectiveness is the weakest concept in transit performance measurement. It confuses input with consumption measures so that low-cost, but underused, projects are regarded as favorably as high-cost, heavily used projects. Also, consistency with local and regional plans and compatibility with community needs are too subjective to have been useful in project selection. Projects were selected that were (a) inconsistent with goals and objectives, (b) did not meet local needs, or (c) were proposed to meet nonexistent needs. Limited success of the initial demonstration projects can be explained by poor project selection as well as by problems of monitoring, evaluation, and administrative control.

One Senate Bill 283 project used its grant to continue funding an existing recreational bus project. Contrary to the proposal, the project was neither a demonstration of an innovative transit

technique nor was it clearly directed toward a transit-dependent group. The project's objective to "expand the horizons" of a low-income group was too vague to determine whether enough expected benefits would be gained to justify funding. More details must be provided on the types, numbers, and needs of individuals to be served. For example, the project did not distinguish target from nontarget riders and transit funds were used to subsidize ongoing recreational service to the general public. Although these results should have been detected through monitoring and evaluation, improved project selection based on clear and accurate objectives would have restructured this project.

Other projects were approved with unrealistic and overly ambitious objectives. A project to research constraints to paratransit and to collect data on current and duplicated service and unmet needs set objectives far out of proportion to its funding. By selection of a project that could accomplish only a fraction of its stated objectives, Caltrans reduced its ability to direct funds toward a demonstration of specific applications.

Projects were also approved that had vague and ambiguous objectives. A regional agency project to coordinate demand-responsive transportation provided by local social agencies confused ends and means. Coordination was listed as an objective, without stating how improvements over existing services or satisfaction of community needs would be achieved. The intended objective--to reduce duplication and costs of existing service--had to be implied. Existing duplication was not shown in the application nor were measurements taken to establish that the project was successful in reducing costs. Confusion among participating groups over what coordination actually meant resulted in disagreement over what the project was intended to accomplish. Only when the project was completed was it apparent that (a) many services had been coordinated before the project, (b) several agencies were disinterested in coordination as defined by the regional agency, and (c) participating agencies did not separate transportation costs from total agency expenditures, which made evaluation of cost efficiency difficult.

Other projects faced serious problems because of a failure to define needs and other relevant background information in the application. This occurred despite guideline requirements that information be provided on needs, participating organizations, and other data necessary to evaluate the application. A brokerage project had few riders because its subsidized rides suffered from competition from existing free service provided by the transit district and social agencies. The project relied heavily on referrals from apartment managers, taxi companies, and social-service agencies. Refusal of these groups to cooperate, competitive services, and problems under a previous project at the same site should have been determined before the grant was made. Caltrans might have used this information to conclude that brokerage should have been demonstrated at another site.

Project selection should have required clear and consistent objectives, demonstration of existing needs, cooperation of involved groups, and an understanding between Caltrans and recipients of how performance would be demonstrated. Applicants should also have been requested to submit information on project constraints. By approving projects that have unrealistic or ambiguous objectives, Caltrans reduced its ability to control specific transit applications to be demonstrated under the program and to monitor project progress.

Political influence was also responsible for selection of some projects. In discretionary

programs, administrators are under considerable pressure to spread the projects around. Clearly defined, quantitative objectives and selection criteria limit the political role in project selection. They can assist a state agency to respond professionally to requests by elected representatives.

Project Evaluation

Problems associated with evaluation are related to the failure to define needs and objectives. Evaluation is not possible unless there are standards or targets against which to measure actual performance. Thorough evaluation requires

1. Explicit objectives, quantified whenever possible;
2. Techniques for measuring both the efficiency and effectiveness of each project; and
3. Appropriate data collection and reporting.

If a project is designed to provide elderly persons with trips to social-service agencies, this performance must be targeted in objectives, measured, and evaluated. Efficiency indicators of miles and hours and costs per mile and hours of service are important, but do not give a complete picture of effectiveness and services consumed by or needs met for the target group.

Many projects were funded without clear evaluation criteria, contrary to guideline requirements. One project provided objectives that met program requirements but not evaluation criteria. In review of this project, it was not possible to determine cost-effectiveness. Another project had cost-control objectives that could be evaluated with efficiency measures. However, evaluation was limited because there were no target cost standards to define acceptable performance.

Inadequate data reports also limited evaluation. Outside funds were combined with Senate Bill 283 funds, and program funds were spent in ways other than those specified in applications. Consequently, it is difficult to distinguish what Senate Bill 283 inputs produced particular outputs. Inadequate budget requirements and lack of periodic audits reduced data available for evaluation. As a result, important conclusions on applications of transit techniques to specific types of communities were ultimately lost.

Control and Accountability

Periodic data reports and agency monitoring would have revealed that one project offered service indiscriminately to the general public rather than exclusively to the target group. It would also have been possible to predict cost overruns on some projects and the exhaustion of a 12-month budget in 9 months on another project. In one project, program costs were not distinguished from normal operating costs, which made it difficult to distinguish project from general funds and to determine exactly what was accomplished. Early detection of these problems through periodic monitoring and comparison of actual to expected performance and expenses would have allowed Caltrans to work with local managers to make adjustments. In many cases this might have resulted in improved performance.

The structural lines between Caltrans, their district offices, and regional planning agencies are not strong lines of control and accountability. The administrative responsibility of each agency for the program is not clear. Regional agencies certified projects for consistency with short- and long-range

plans, but had no formal role in project development or monitoring. District offices assisted in preparation of applications, but faced possible conflicts of interest when asked to monitor projects because they solicited and sometimes designed projects. Recipients were largely left to themselves. Without a requirement for matching local funds, there was little motivation for local control.

The Senate Bill 283 program's control and accountability problems indicate that neither state nor local management was effective. Both were diminished by the program's structure. Community involvement and concern were less likely because no local funds were spent. Local operators lacked clear incentives to administer competently or to improve performance. And performance criteria were seldom defined in a way to facilitate control or evaluation.

MINNESOTA EXURBAN SUBSIDY PROGRAM

The 25 exurban transit projects subsidized by MnDOT under the Public Transit Operating Assistance Program (1977-1979) illustrated problems similar to those described for California. Excluded were all Twin Cities metropolitan transit operations and all projects funded under the Paratransit Demonstration Program. During the 1977-1979 biennium, \$4 million was allocated and used to assist these exurban systems with operating expenses. For the biennium, these subsidized systems provided for 8 505 000 bus miles in 161 transit vehicles that carried approximately 14 178 000 unlinked passenger trips.

These projects can be divided into two types. The first is regular fixed-route, including projects as diverse as the 101 bus system in Duluth and the single bus system in Becker County, which follows a fixed but different schedule each day. The second is paratransit, including projects as diverse as subsidized taxi and volunteer driver programs, dial-a-ride, and route-deviation projects.

Legislative goals for the program are stated in Minnesota Statutes (1976), Section 174.21. These are to increase vehicle occupancy; to reduce the use of single-occupant vehicles and the associated congestion, pollution, energy consumption, highway damage, and other costs; and to increase the productivity and efficiency of transit systems.

Objectives relevant to the regular route program are stated in the 1978 MnDOT state transportation plan. These include the following:

1. Coordination of transportation service,
2. Cooperation with intercity bus lines,
3. Alleviation of transportation problems of the elderly and handicapped, and
4. Encouragement and sponsoring of ridesharing programs.

MnDOT has final authority to grant financial assistance not to exceed two-thirds of the operating deficit to the exurban projects and may require local contributions as a condition for receiving the grant.

The typical project receives annual grants for two-thirds of its operating costs. However, the program is partly discretionary, since recipients must apply annually and receive grants subject to MnDOT approval. Administrators exercise discretion over costs, including budget line items, service changes, overruns, and new projects.

MnDOT has responsibility to establish the procedures and standards for review and approval of applications, and for evaluating and monitoring performance (Minnesota Code of Agency Rules, Vol. 14, Sections 1.4025-1.4028). Each application for a

grant must include a description of local organizational structures, a management plan, and a financial statement.

Project Selection

The MnDOT program was unable to limit selection and allocation to projects whose objectives were clear, realistic, and consistent with program objectives. Local objectives were formed independently because recipients lacked a clear idea of MnDOT program objectives. Small projects often had unstated or very general objectives. Many objectives must be implied from route and fare policies that appeared to direct service to particular groups. Grants to subsidize service to elderly, handicapped, and low-income student groups were clearly consistent with MnDOT's objectives. Other grants used to provide tourist shuttles and \$0.10 rides to middle-income commuters were not clearly consistent with program objectives. One planner stated that the goals of the project were to survive, to be feasible in the future, and to maximize receipt of state and federal funds. If these projects had other unstated objectives or if results were intended to be consistent with MnDOT objectives, this should have been explicit.

The MnDOT program required less information than Caltrans did of its applicants. MnDOT required a needs statement, but what it received was of varying quality. The range was from a consultant's formal needs assessment, which detailed trip patterns and age and income group mobility, to a brief letter from a local official who had an opinion on local needs. Incomplete needs assessment was a particular problem when a project had objectives that were not clearly consistent with those of MnDOT. Grants to subsidize a group such as middle-income commuters in one community, and not in others, must be justified by documenting particular congestion, pollution, or other local problems.

MnDOT lacked prioritized objectives and guidelines that would have assisted in project selection and amendments. Guidelines would have allowed administrators to make more routine decisions and to justify them.

Evaluation Problems

MnDOT evaluation also was limited by lack of specific performance standards for each project and data reports that precluded comparison because definition of data items was not consistent between projects. Evaluation was primarily of efficiency, which can be indicated through simple ratios. MnDOT required all projects to report data on revenues, operating costs, and service outputs of passenger trips, vehicle miles, and, in some cases, vehicle hours. Input-output ratios provided useful information on current costs and trends and a reasonable evaluation of those projects that had objectives to provide rides to large numbers of passengers in the most economical manner. The result of overall evaluation was a table of performance measures for all projects. This encouraged unfair comparison between the low passenger cost of urban projects with the high costs of rural projects. Objectives other than cost items were not successfully evaluated. For example, MnDOT was not able to evaluate how well projects satisfied objectives that direct service to target groups, such as transit dependents, or to target destinations, such as social-service centers.

Control and Accountability

As with the California program, the links between

MnDOT and its grant recipients did not represent strong lines of control and accountability. This is in contrast to the structure and roles represented in Figure 1.

MnDOT expected that concern for community funds invested would result in local control and evaluation of transit services. However, several factors reduced local control. Local staffs and techniques were limited, and evaluation was usually limited to ratio measures. MnDOT allowed recipients, and recipients allowed their contractors, to proceed independently until complaints occurred. This resulted in a form of crisis management rather than routine evaluation, anticipation of problems, and timely agency intervention. MnDOT exercised some control through good personal relations between individuals who represented the agency and the recipients. However, this is not a reliable source of management control.

OBJECTIVES AND EVALUATION

The California and Minnesota case studies illustrate how administrative problems occur when objectives are not explicit. As a result, selection, monitoring, evaluation, and overall management of projects are weak. Ultimately, project performance is reduced and scarce public funds are wasted.

Project Selection

The process through which significant and realizable projects are distinguished from weak projects is diminished by unclear policy directions and goals from legislatures, vague agency objectives, and incomplete guidelines. Priorities for goals (such as reduced pollution, demonstration of innovative techniques, or target group mobility) should be communicated by the legislature to the agency either through legislation or with the appropriation. The agency should develop specific and quantified objectives to meet the legislature's program goals and administrative procedures for implementing the program. Lack of legislative direction forces agency administrators to set policy through decisions that should be made at a political level. It creates a climate in which administrators are cautious about making decisions that result in tentativeness and inconsistency that deters progress toward state goals.

Weak projects can be selected even when there is an attempt to state clear goals and objectives and to provide selection criteria. Failure to collect thorough and accurate information on the community background for the proposed project can result in approval of redundant proposals or the continuation of experiments that have failed. Information is required on community needs, participating and affected groups and their attitudes toward the project, and whether similar projects have been attempted and, if so, the results. Complete needs assessment and identification of constraints are expensive and controversial and will not be undertaken unless applicants believe that this information will help to qualify their project.

State agencies face two important constraints in their attempts to improve project selection. First, local information and state audits for accuracy are limited by lack of resources. Second, despite thorough information and concise objectives, there is no assurance that project operators will attempt what they have set for themselves unless there are incentives and monitoring. However, agencies contribute to selection difficulties with imprecise objectives. Without explicit program objectives and guidelines, applicants neither feel obligated nor

able to state objectives other than superficially.

The evaluation of discretionary programs is not possible without standards against which to measure performance. Without explicit agency objectives, the legislature cannot evaluate the program. And without specific targets for each project, it is not possible to evaluate performance and provide a complete description of accomplishments.

Performance evaluation requires analysis of efficiency, effectiveness, and impact (Figure 2). In both California and Minnesota, evaluation was primarily of efficiency as indicated through input-output ratios. Objectives other than efficiency were not successfully evaluated, although they were specified in authorizing legislation. Evaluation of impacts, such as reduced automobile use, improved environmental quality, or demonstration of innovative techniques, must be completed if these are the results that the project sought to achieve. Although it will always be difficult to measure these impacts, it can be accomplished if measures are defined when submitted for funding.

Expenditure of scarce funds for one project rather than another cannot be justified, and conclusions on important demonstrations cannot be reached without evaluation of effectiveness and impacts. This can only be done by establishing explicit program and project objectives, because effectiveness and impact indicators evaluate accomplishment against some guideline or standard. Explicit objectives can be expressed in terms of performance measures, including standards for trips or miles of service to be provided for target groups. The same performance measures can then be used to measure results. Mere restatement of what happened is insufficient. We need to understand why performance guidelines were or were not achieved.

A formal evaluation should be conducted before applications are approved. Objectives selected must have measurable results and a clear understanding of expected performance must exist. Reports should be required that are performance oriented, periodic, and provide complete information on expenditures. There should be a quarterly monitoring of expenditures to ensure that funds are spent for the purposes for which they were allocated. Each discretionary program should have an audit guide developed for this purpose. Evaluation should be continuous and permit the state to assist project managers as problems are detected.

Discussion

G. Gray

Although I am not in complete agreement with all the statements given in the paper, I am in substantial accord with the recommendations as given in the abstract. There are a few errors or ambiguities in the write-up as it relates to the Caltrans program, but they are inconsequential and do not affect the value of the work.

There are, however, three aspects of the California program that I feel need further explanation and comment. They are the program background, its success, and implementation considerations.

PROGRAM BACKGROUND

The program was the result of legislation originated during the fuel crisis of 1974. Several separate bills were combined late in the legislative year

with less-than-perfect coordination. This resulted in some conflicts between the various parts of the act. A number of studies and programs were contained in the final bill. These ranged from a hydrogen bus demonstration project to studies of the feasibility of several rail passenger services. Funding for departmental costs was provided for some of the items, but unfortunately not for others, including the three items reported in this paper. This combining of some 10 or 11 prior bills also resulted in nonuniformity of program goals, reporting requirements, responsible agencies, and similar onerous conditions in the final legislation. My point is that the first key to a good discretionary program is good legislation. Nonetheless, the act did provide funding for innovation in demonstration projects for public transportation.

The California program developed criteria for program selection through the active involvement of an advisory group that represented diverse interests. Project selection was structured by restricted funding and based on attempts at band-aid solutions by local agencies. It is not realistic to expect project selection to be completely separate from the political process.

SUCCESS?

Sixty-one projects were eventually funded. Six of these were still using program funds in February 1981, although the original three-year program expired July 1, 1979. Of the 17 projects that involved implementation of new transit services, all but one are operating at this writing. These 16 have been successful in obtaining other funding. This is a phenomenal success rate for demonstration projects. It is in sharp contrast to the reported 5-15 percent survival rate reported by the Rand Corporation in some federal programs to improve education.

Although a number of projects were of questionable innovative value, the projects did conform to the general legislative direction. Remember that innovation, like beauty, is in the eye of the beholder. In small urban and rural areas that have limited transit experience, the definition of what is innovative is much more liberal. By strict definition, but in recognition of this, some of the projects could be classified as deployment rather than development of demonstration in nature.

Innovative projects included projects that involved subsidized taxi, bus driver training, coordinated marketing among six major transit systems, transit education for schools, organized hitchhiking, and implementation of the broker concept. The projects varied widely in funding level as well as concept. The smallest project was provided just \$4000 and the largest was given \$300 000 in state funds. This divergence in project size influences the depth and extent of evaluation. This is not recognized in the paper. In fact, the paper implies that all projects should be handled in the same way. I feel some discretion must be exercised.

Only about one-half of the projects have been completed long enough to evaluate. The status of the program as of February 1981 is given in Table 1. Overall success in the three sections of the program, in my opinion, is secure. The magnitude of that success must be determined later, after the program has been completed a sufficient length of time to have full impact.

IMPLEMENTATION CONSIDERATIONS

The biggest single problem Caltrans had with the

Table 1. Status of California programs.

Funding Statute	Projects Funded			Projects Evaluated	
	Funded	Completed	Dropped	2/20/81	7/1/81
Section 5	33	22	3	18	27
Section 6	17	16	0	13	16
Section 9	<u>11</u>	<u>7</u>	<u>1</u>	<u>3</u>	<u>3</u>
Total	61	45	4	34	46

program was in trying to implement it without funding being provided for its administration. It took more than a year to correct this oversight, and that meant that the implementation moved very slowly since the resources that could be diverted to this new activity for almost one-half the legislatively established life were severely limited. This problem was compounded by the requirements of the other sections of the legislation, as the relatively small number of staff available and competent to carry out the combined responsibilities, even with funding available, was limited.

This very real problem is largely ignored in the paper, although it does address the lack of resources constraints from a different view. In my opinion, to ensure a reasonable chance of success, planners of such programs, and especially those responsible for legislation, need to be cognizant of the abilities of the responsible organizations to carry out the program. If that is in doubt, provisions for alternatives (i.e., contracting the work

need to be in the legislation.

Authors' Closure

Information provided by George Gray contributes to our thesis that professionals must assist legislators in thinking through the entire discretionary grant process before the legislation is passed. Legislation usually results from a crisis situation. Insufficient consideration is given to either program objectives or the staff required to disburse funds and monitor results. Our purpose was not to single out California and Minnesota, but to use examples to help other state agencies improve discretionary grant programs. Adequate staffing is essential and George Gray has helped by emphasizing an element that we had overlooked.

REFERENCES

1. G.J. Fielding, R.E. Glauthier, and C.A. Lave. Performance Indicators for Transit Management. Transportation, Vol. 7, 1978, pp. 365-379.
2. P.W. House and D.W. Jones. Getting It Off the Shelf: A Methodology for Implementing Federal Research. Westview Press, Boulder, CO, 1978, pp. 154-155.

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Use of Productivity Measures in Projecting Bus and Rail Transit Operating Expenditures

JAMES M. HOLEC, JR., AND ROBERT L. PESKIN

This paper presents a model for projecting bus and rail operating costs that incorporates measures of productivity and performance typically used in the transit industry. The model was based on the recent experience of large, North American bus and modern rail transit operations as well as on data from vehicle manufacturers. A set of equations is presented that describes costs in specific aspects of operations and maintenance functions as a function of the quantity of service provided (e.g., vehicle miles and platform hours). Examples of the application of the model for the Houston Transitway Alternatives Analysis are presented. Areas for further model development and research are discussed briefly.

This paper presents a model for projecting bus and rail transit operating costs that incorporates measures of productivity and performance typically used in the transit industry. The model was based on the recent experience of large North American bus and modern rail transit operators as well as on data from vehicle manufacturers. This model, intended for use in the evaluation of regional transportation plans, was applied in the Houston Transitway Alternatives Analysis (HTAA). The project was performed by a team of consultants for the Metropolitan Transit Authority (MTA) of Harris County, Texas. Although some aspects of the model are specific to Houston, many aspects are applicable to the evalua-

tion of alternative transit plans in other urban areas.

The remainder of this paper discusses the general approach and the structure of the model. The reasoning behind the selection of various model coefficient values is discussed in detail, particularly in those areas where the current Houston bus operating experience is deficient. The paper concludes with a brief discussion of the application of the model in the HTAA and the applicability of the overall approach for other planning and financial analysis studies for other transit properties.

APPROACH

Transportation planners have long struggled with the problem of estimating future operating expenditures for transit systems that are undergoing alternatives analysis. Typically, two general approaches have been used: engineered costs and historical unit costs. Engineered costs are estimates based on a complete inventory of staffing and material requirements for specific activities (i.e., estimates that relate the cost of vehicle operations to its component costs). Historical costs deal with aggregate costs. They are estimates that relate the cost of