

SUMMARY REPORT 1066-1(S)

**BACKGROUND DATA FOR DEVELOPING A
GENERALIZED APPROACH TO EVALUATING IMPACTS
OF SHORT RANGE TRANSIT ALTERNATIVES**

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Background Data for Developing a Generalized Approach To Evaluating Impacts of Short Range Transit Alternatives

by

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Continued urbanization and population growth of the cities in the United States have given rise to a great demand for better transportation. The objective of this study is to develop a generalized approach to impact evaluation of short range transit alternatives. It is hoped the approach suggested and other findings of the report can assist transportation officials and planners in choosing one alternative among the several proposed. The fully developed approach will be presented in the forthcoming final report.

This summary report summarizes the findings presented in Research Report Number 1066-1 under the appropriate section headings of that report.

Relevant Short Range Transit Alternatives

Through an extensive search of literature, short range alternatives are classified according to two major types of services: the conventional bus system and the demand responsive system. While the conventional bus system refers to local and express buses running along fixed routes and at fixed schedules, the demand responsive system provides services at levels demanded by users. Despite the differences, the two systems have six transit elements which are common to both. These elements are, transit fleet, routings, schedulings, facility construction, fare structure, and marketing techniques. The adjustments of these six elements, together with the demand responsive system adjustments, form seven categories of short range transit alternatives. Under each of these categories, transit submodes are identified. Table 1 lists the seven categories and their subcategories of short range transit alternatives.

The size of a city is found to be related to the availability or feasibility of certain transit alternatives. Results of a telephone survey conducted in seven Texas cities indicate that improvements of routings ranked higher than others regardless of city sizes. On the other hand, all the priority treatments for high occupancy vehicles (HOV) were applicable only in larger cities. Park-n-ride service, which ranked high in large cities in the survey, was found to be unavailable in smaller cities.

Table 1. Categories and Subcategories of Short Range Transit Alternatives

Categories	Subcategories
I. Fleet Adjustments (FFT & DRT)	Changing size of Fleet Changing Fleet Composition Upgrading/Rehabilitating Fleet
II. Route Adjustments (FFT & DRT)	Adding/Subtracting Routes Altering Existing Routes
III. Schedule Adjustments (FFT & DRT)	Changing Headways Changing Operating Hours Improving Reliability of Operations
IV. Facility Adjustments (FFT & DRT)	Adding Shelters/Benches Adding Park-n-Ride Service Providing Exclusive Treatments for HOV's: Ramps Lanes Signal Preemption Providing Auto Restricted Zone
V. Fare Adjustments (FFT & DRT)	Fare Structure Changes Providing Peak/Off-Peak Fare Differentials Road/Parking Pricing
VI. Marketing Adjustments (FFT & DRT)	
VII. DRT Adjustments	Altering Charter Service Stimulating Carpool/Vanpool Changing Shuttle Service Changing Subscription Service

Determination of Relevant Impacts

User and nonuser impacts of short range alternatives identified in the study are grouped into three categories: (1) user costs, (2) system costs, and (3) nonmonetary user and nonuser costs. User impacts include travel time costs, fare, toll and parking fees, vehicle operating costs and accident costs. System impacts cover transit vehicle operating and accident costs, highway/road operating and maintenance costs, capital investment costs and rider-ship. Impacts on accessibility to jobs, passenger comforts, land use, business activity, energy consumption, and air and noise pollution belong to the last category. Most of the impacts are found to be sensitive to population size and population density of a city, except the nonmonetary user impacts which are found to be unrelated to any city size characteristics. Table 2 shows the categories and the subcategories of relevant impacts identified.

Table 2. Categories and Subcategories of Relevant Impacts

Categories	Subcategories
User Costs	Travel Time Costs Fare Toll/Parking Fees Accident Costs Vehicle Operating Costs
System Costs	Transit Vehicle Operating Costs Highway/Road O & M Costs Capital Investment Costs Ridership
Nonmonetary User and Nonuser Costs	Accessibility to Job Opportunity Passenger Comforts Land Use Business Activity Energy Consumption Air Pollution Noise Pollution

Alternative Analytical Techniques for Impact Evaluation

The three commonly used evaluation methods are: economic efficiency analysis, cost effectiveness analysis and the scoring method. In the economic efficiency analysis, user's net benefits are maximized by selecting the optimal alternative. Benefit-cost ratio, net present value and internal rate of return are the three methods often used. Net present value is generally a better measure because of its simplicity in application and the absence of confusion of the changing dollar values from year to year.

The cost effectiveness analysis measures how effective an expenditure is. The technique is developed because some of the impacts are difficult to be measured in monetary terms; besides, some evaluation factors are more meaningful in quantitative or qualitative terms. The disadvantage of this method rests in its inability to justify an investment.

The scoring method is used to avoid the measurement problem. Scores are given by a panel of experts according to the degrees of achievement of objectives by the alternatives. Besides the lack of indicating the justification of an investment, the scoring method involves personal subjectiveness.

Outline of a Recommended Approach to Impact Evaluation

It is felt the three evaluation methods have served long range impact assessments rather extensively but have played only a limited role in short range impact evaluation. Therefore, an improved technique is proposed in outlined form in this report for evaluating short range alternatives. The recommended technique combines all three methods. The economic efficiency approach is used for evaluating user costs, the cost effectiveness method for system costs assessments, and the scoring method for nonmonetary user and nonuser costs assessments. The finalized form of this technique will be fully developed in the final report.

Conclusions and Recommendations

The rise in demand for mass transit since 1973 can be attributed to population growth, the continued urbanization of the cities and the increased cost of fuel. Transportation officials are constantly faced with making a decision on choosing the best possible alternatives to solve a traffic problem. Evaluation procedures have been developed mainly for long range analysis and focused on user costs and benefits studies. In Research Report 1066-1, a full range of short run alternatives and the relevant impacts are identified. The three commonly used evaluation procedures are discussed. Finally, an impact evaluation approach consisting of all these evaluation methods is outlined. This approach will be more fully developed and presented in the final report.

The published version of this report may be obtained by addressing your request as follows:

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