U.S. Department
of Transportation

Short-Range Public Transportation Improvements

February 1983

Technical Assistance—an UMTA Program

The cover symbolizes the travel markets served by public transportation innovations: Home-to-Work travel, Special User Group travel; and General Purpose travel. The changing administrative and regulatory environment also is depicted.

Short-Range Public Transportation Improvements

Final Report
February 1983

Prepared by
Ronald F. Kirby and Gerald K. Miller
The Urban Institute
2100 M Street N.W.
Washington D.C. 20037

Prepared for
Office of Management, Research
and Transit Services
Urban Mass Transportation Administration
Washington, D.C. 20590

Distributed in Cooperation with
Technology Sharing Program
Office of the Secretary of Transportation

DOT-I-84-14

FOREWORD

Short-range public transportation improvements--actions which can be effective within one or two years--have received a great deal of attention since the mid-1970s as decisionmakers and planners attempted to respond to new kinds of transportation problems. The urgent need to conserve fuel, the desire to increase travel opportunities for the handicapped, and steadily growing transit deficits all prompted UMTA's Division of Service and Methods Demonstrations to test and monitor a wide range of innovative improvement strategies. Under UMTA sponsorship, the Transportation Systems Center of the U.S. Department of Transportation has monitored these tests and documented numerous demonstrations in a series of project evaluation reports.

This document synthesizes the results of this research and development experience into general policy and planning guidelines. It identifies the major planning issues for home-to-work, special user group, and general purpose travel markets and surveys the types of innovations that deserve consideration. We believe that this report will be helpful to decisionmakers and planners as a guide to effective public transportation actions.

W. H. (Ray) Lytle, Director
Office of Management, Research and
Transit Services
Urban Mass Transportation Administration
U.S. Department of Transportation
Washington, D.C. 20590

Alfonso B. Linhares, Director
Office of Technology and Planning
Assistance
Office of the Secretary
U.S. Department of Transportation
Washington, D.C. 20590

TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACKNOWLEDGEMENT

This volume was prepared for the U.S. Urban Mass Transportation Administration (UMTA) under contract DOT-UT-90052. We wish to thank Larry Bruno, project manager, for his guidance and contributions to this volume. The authors received excellent assistance and support in the typing and production of the manuscript by Carolann Marino. Valuable review, assistance, and encouragement was provided by Richard Steinman, Brian McCollom, James Bautz, and Ronald Fisher of UMTA. The opinions expressed are those of the authors, however, and do not necessarily reflect the views of The Urban Institute or the research sponsor.

EXECUTIVE SUMMARY

Short-range public transportation innovations -- actions which can be fully operational within one or two years -- cover a wide range of service alternatives and administrative options. Examples include:

- encouraging employers to subsidize transit passes for their employees,
- involving private providers in the delivery of publicly subsidized services,
- developing programs to promote carpooling and vanpooling,
- designing alternative services for handicapped persons unable to use conventional transit,
- coordinating services to special user groups such as the vulnerable elderly,
- providing taxicab feeder services to conventional bus transit,
- offering travel brokerage services to match users with service providers,
- revising taxicab regulations to encourage new service and provider arrangements, and
- increasing parking prices to discourage private automobile use during congested periods.

Over the past decade, the Urban Mass Transportation Administration (UMTA) of the U.S. Department of Transportation has funded research and demonstration projects to test a variety of short-range improvements, and has monitored a number of innovative schemes implemented by state and local governments. This volume reviews and synthesizes the results of that research and development effort. To aid planners and decision-makers with a particular set of transportation objectives, potential innovations have been grouped according to the primary travel market served: home-to-work, special user group, or general purpose. Major planning issues are discussed for each of these markets, along with the types of innovations that have potential for achieving certain objectives.

This volume also discusses potential changes in the administrative and regulatory environment for public transportation. New developments in the institutional framework for decision-making and planning are addressed, along with recent experience with labor protection requirements, local taxi fare and service regulations, and the management of automobile use. A companion volume titled A Casebook of Short-Range Actions to Improve Public Transportation/1/ provides brief case studies for about 30 public transportation projects.

Background

As transit patronage and revenues fell during the 50s and 60s, the public sector became more involved in planning, operating, and financing transit systems. In the early 70s, short-range public transportation planning focused almost entirely on maintaining and improving existing public transit systems. Planners struggled to maintain and expand effective transit services as urban residents and economic activity shifted from higher density central cities to lower density areas, and as private automobile ownership and use increased. The steady growth in local, state, and federal public transportation subsidies responded to and reinforced public expectations for transit. Fares were kept low to help the disadvantaged and to attract commuters from automobiles, while routes were extended to low density suburbs to provide regional coverage. Transit was called upon not only to serve city centers and to help reduce congestion, but to save energy, improve air quality, and increase mobility for low income, elderly, and handicapped persons.

In the mid-1970s, the pressures of growing transit deficits, the unmet travel needs of handicapped persons, and energy shortages stimulated an aggressive search for cost-effective services to supplement public transit. Several transit agencies developed dial-a-ride services in lower density suburban areas and offered specialized services for elderly and handicapped users. In some cities, private taxicab companies began to offer publicly subsidized shared-ride services for certain user groups. Numerous human service agencies started to provide specialized transportation services for their clients. Stimulated by the gasoline shortage of 1973-1974, transit agencies, local governments, and large private companies began promoting and operating car or vanpool programs.

To respond to these changing priorities, the basic institutional framework for planning public transportation improvements was revised in 1975. New federal regulations governing the urban transportation

---

/1/ Kirby & Miller (1983).

planning process called for greater consideration of short-term, low-capital transportation improvements. This initiative recognized formally that public transportation planning encompassed a range of different services: conventional transit, dial-a-ride, taxicabs, jitneys, subscription buses, and van and carpool programs. To ensure that all of these services were included in the planning process, research efforts were designed to develop new planning procedures and to conduct demonstration projects and case studies of innovative techniques.

Today two primary forces challenge public transportation planners and policy-makers: the multi-faceted, changing nature of urban travel, and the pressures on public subsidy budgets. To meet these challenges, public transportation planners must identify the most cost-effective strategies for pursuing public policy objectives, and be prepared to revise and adapt these strategies as travel conditions and policy objectives change.

High-Density Home-to-Work Travel

The varied nature of work commuter travel presents markets for a number of different service alternatives. Transit, carpools, vanpools, subscription buses, and jitneys are all needed to respond to the variability among work travelers with respect to origin and destination patterns, temporal variations, attitudes, comfort, user costs, and reliability. By focusing on particular problem locations such as congested corridors and worksites, and developing actions tailored to specific commuter segments, planners can devise effective actions for attracting home-to-work trips into higher-occupancy vehicles. Experience to date suggests the following guidelines:

- The most cost-effective strategy for reducing vehicle miles of travel (VMT) and vehicle trips appears to be the expansion of company-organized ridesharing programs aimed at commuter trips for which transit is not available.

- In most large cities, raising current transit fares for work trips from affluent suburbs would produce significant revenue increases with relatively small ridership losses.

- Serving relatively short trips (less than seven miles) with either subscription buses or commuter vans employing paid drivers has not been a cost-effective strategy for reducing VMT.

- Small-scale carpool or vanpool actions that merely divert transit riders without permitting any cutbacks in transit capacity are not likely to be cost-effective ways of reducing VMT.

- Express transit routes charging low fares over long distances (more than 20 miles) have not been cost-effective ways of serving home-to-work travel.

Special User Group Travel

Broad groups of limited mobility travelers -- the poor, the handicapped, the elderly, the young -- are often designated for special treatment in public transportation programs. However, planners must consider specific subgroups within each of these general socioeconomic categories in order to address travel problems adequately. Experience to date suggests the following guidelines:

- Transportation services can be provided efficiently to special user groups in several ways: by volunteers in private cars; through service contracts with human service agencies, transit providers, or private operators; by direct subsidy to the users; or by human service agencies with their own vehicles. The most cost-effective approach depends upon the specific program objectives and local demand and supply conditions.

- While many planners and social service agency representatives advocate greater coordination of transportation programs for special user groups, major start-up and ongoing costs of coordination efforts may well exceed the benefits achieved.

- Travel demand for special user groups occurs at low density: for any given area and time period, only a small number of trips are made. This characteristic makes sharing rides difficult to accomplish, resulting in significantly higher overall costs per trip than most other kinds of travel.

- The benefits of special user group programs have often been enjoyed by relatively small subgroups of the eligible users. Efforts should be made to ensure that the programs reach the most needy subgroups, not just those who find access to the program relatively easy.

- Only small proportions of the trips served to date by these programs would not otherwise have been made. If the programs are to serve more new trips, greater efforts will have to be made to reach elibible users not presently able to travel.

- Dial-a-ride services for special users operated by private taxicab and wheelchair service companies typically cost less per passenger trip than similar services operated by transit agencies. User-side subsidy approaches and other administrative efforts to involve private providers should be well

worthwhile.

- Fully accessible bus transit for handicapped users will be cost-effective in some cities, while specialized door-to-door services will be preferable in other cities. Each city needs to tailor its own combination of handicapped services to reflect local demographics, geography, and weather.

General Purpose Travel

General purpose public transportation programs serve a number of different travel markets in place of, or in addition to, the home-to-work and special user group markets. Experience with general purpose programs suggests the following guidelines:

- While conventional transit services will continue to be the backbone of general purpose public transportation, supplementing transit with paratransit services tailored to specific markets can significantly improve overall productivity.

- Taxicab feeder service to fixed route transit can be a cost-effective way of expanding transit service coverage into low ridership areas.

- The cost-effectiveness of travel brokerage and coordination activities has not been convincingly demonstrated to date. While some specific activities associated with these broad concepts may be cost-effective, each proposal must be assessed critically.

- Transit fare and service changes targeted at specific markets (such as long distance commuters) are often more cost-effective than across-the-board fare adjustments.

- If transit systems are to make better use of their financial resources, planners will have to monitor individual route performance more accurately to determine the true incremental benefits and costs of proposed service changes.

The Administrative and Regulatory Environment

The public transportation environment contains two sets of elements: those bearing on planning and programming activities, and those defining the operating conditions for public transportation. Steadily increasing governmental involvement in the financing of public transportation has brought numerous new administrative requirements for planning and programming. Planners must now deal with continuing changes in the earmarking of public funds for

particular types of expenditures, in requirements for private provider participation, in labor protection procedures, and in mandated service standards for particular user groups. These requirements are beyond the direct control of local planners and decision-makers, and are essentially constraints on local procedures.

The most important influences on the operating conditions for public transportation are state and local regulation of public transportation modes and the management and pricing of automobile use. Since these conditions often can be changed at the local level, planners should consider how various alternatives to existing conditions might improve the performance of public transportation.

Studies of the relaxation of certain taxicab regulations in San Diego, Seattle, Portland, and other cities suggest generally positive impacts for users, the municipal governments, and providers. Information is now available on the effects of removing entry controls for new providers, allowing shared-ride and other types of services, and permitting providers to post their own fares. The results of these studies should assist planners examining arguments for and against taxi regulatory revisions in their areas.

The management and pricing of automobile use affects the speed and user cost of the automobile. By physically restricting or pricing private automobile use, policy-makers can provide a relative advantage to high-occupancy modes. The planning challenge is to combine automobile disincentives with public transportation improvements in a way that enhances overall transportation system performance. While management and pricing disincentives for automobile use have been employed in only a few U.S. cities, the results of several important examples provide useful planning guidance. The major types of actions deserving consideration are:

- priority lanes for high-occupancy vehicles;
- automobile restricted or free zones;
- parking or road pricing; and
- parking supply management, including on-street residential parking restrictions.

Future Directions

Demographic trends suggest that future travel growth in most cities will be concentrated in medium to low density suburban areas, rather than in suburb to downtown corridors. In cities with declining populations, central areas are declining more rapidly than the suburbs, while in growing cities central areas are growing less

rapidly than the suburbs. These trends call for a reexamination of traditional public transportation plans and policies which have focused almost exclusively on radial travel to and from central areas.

Growing financial pressures on public decision-making present additional challenges to public transportation planners. These pressures will make it virtually impossible for policymakers to continue the transit service and pricing policies of the 1970s throughout the 1980s. Greater market segmentation and a wider range of service delivery options will have to be considered in public transportation planning.

Unlike long-range improvements, the short-range actions can be implemented relatively quickly and usually rely primarily on local initiative and funding. Greater emphasis on these short-range alternatives will require changes in the institutional framework for planning and decision-making. Regional bodies such as metropolitan planning organizations (MPOs) and transit operating agencies should become more oriented toward providing planning and monitoring assistance to local public and private decision-makers. In cities such as Baltimore (Maryland), Norfolk (Virginia), and Phoenix (Arizona), transit agencies have become involved in planning and funding a range of service delivery options tailored to specific travel markets. In cities like Washington, D.C. and Minneapolis-St. Paul where transit agencies apparently have chosen to limit their activities to operating regional transit services, city or county transportation organizations and MPOs are planning and programming short-range public transportation innovations to supplement regional transit.

The transportation problems of the 1970s prompted the development of a wide range of short-range improvement strategies for public transportation. Experience with these strategies in selected cities has provided a valuable information base for planners and decision-makers, and should stimulate greater interest in the adoption of short-range innovations in the future.

CHAPTER I
INTRODUCTION

After two decades of concern with the revitalization of bus and rail transit systems, policy-makers were confronted in the 1970s with a new set of issues. Uncertainty about the price and availability of gasoline created demands for high-occupancy travel which could only be partially met by existing transit systems. Increased awareness of the travel needs of handicapped persons prompted a lengthy debate over the merits of making transit systems fully accessible versus providing specialized door-to-door services. And transit operating deficits became steadily more burdensome throughout the decade, with increases averaging close to 20 percent per annum in real terms.

The gasoline shortages in late 1973 were followed by substantial price increases and continuing uncertainty about oil supplies from the Middle East. As a result, energy conservation became a major objective of all public transportation initiatives, ranging from new subway systems to dedication of express lanes for high-occupancy vehicles. Not all of these initiatives were successful, however. In a somewhat controversial assessment of the energy saving potential of different public transportation modes, the Congressional Budget Office (1977) concluded that new rail investments were not promising from an energy viewpoint, and indeed might increase energy consumption rather than reduce it. Carpooling and vanpooling, on the other hand, were found to be very effective energy-saving strategies, particularly in areas not well-served by transit.

Efforts to identify cost-effective fuel conservation strategies demonstrated convincingly that with current patterns of travel and development, existing transit systems can make only limited contributions to relieving energy problems. After three decades of decline in ridership and service levels, transit systems no longer have either the coverage or the capacity to accommodate large numbers of new trips. In the short-run, car and vanpooling proved to be essential supplements to transit for maintaining mobility with reduced fuel supplies. And adjustments in automobile fuel economy are proving to be more promising long-run conservation measures than major investments in new transit capacity.

Price increases and conservation efforts have substantially reduced the nation's dependence on foreign oil, and sudden disruptions in oil supplies seem relatively unlikely in the foreseeable future. Many of the benefits produced by energy conservation programs are still of great value, however. The continuing growth of suburban

shopping and employment centers is being accompanied by many of the same congestion problems experienced by older downtown centers. Short-range programs which can reduce demands on road space and parking facilities, improve air quality, and directly benefit travelers deserve the continuing interest of public transportation planners.

The provision of adequate public transportation services for handicapped persons unable to use bus and rail transit continues to raise difficult planning and policy problems. Based on Section 504 of the Rehabilitation Act of 1973, the U.S. Department of Transportation (DOT) issued regulations in 1979 requiring that all transit systems gradually be made fully accessible to persons confined to wheelchairs. After a successful court challenge to these regulations on the grounds that they would be too costly, the DOT issued new interim regulations in mid-1981 relaxing the full accessibility standards in favor of more general service requirements which leave considerable discretion to state and local governments. Some of these governments responded by dropping all plans for full accessibility and substituting specialized door-to-door services using small wheelchair accessible buses and vans. Others chose to continue with a policy of gradually making transit fully accessible.

The new legislation signed in January of 1983 calls for the U.S. DOT to issue final regulations on the handicapped question. It seems likely that these regulations will fall somewhere in between the strong position taken in 1979 and the much weaker position taken in 1981. In any event, the kinds of service adjustments which should be made to accommodate the handicapped will require continuing attention by planners and decision-makers.

Related to the handicapped question is the broader question of special user groups generally: the young, the elderly, the low income, and others for whom private automobile travel is either impossible or highly inconvenient. As the problems of financing low fare transit to the general public increase, planners will have to focus increasingly on specialized strategies to aid particular disadvantaged groups. These strategies will require a better understanding of travel demand by special user groups and of the types of management, pricing, and service options which can best respond to this demand.

The 1970s was a period of unprecedented expansion in operating subsidies for urban transit systems.[1] Policy-makers allowed transit fares to fall by 16 percent in real terms over the decade, and encouraged substantial service expansion. These policies along with rising fuel prices helped produce a reversal in the previous downward

1. American Public Transit Association (1981).

trend in transit ridership: between 1972 and 1980 the national ridership total rose by 25 percent to return to the level experienced in the mid-1960s.

Transit systems were troubled in the 1970s, however, by increasing costs and declining productivity. The cost of operating a vehicle mile of transit service climbed by 25 percent in real terms over the decade. The net result of declining fares, growing ridership, and increasing costs was a rise in the average operating deficit per passenger of over 300 percent in real terms. The portion of transit operating expenses covered by farebox revenues fell from 84 percent in 1970 to 42 percent in 1980, and the national operating deficit for the industry climbed from less than $1 billion to almost $4 billion in 1980 dollars.

Since 1980, changes in federal policies toward transit operating assistance and a long national recession have threatened to halt and perhaps reverse the trends of the 1970s. New legislation signed by President Reagan in January of 1983 prevents the annual federal operating assistance provided to any one city through fiscal year 1986 from rising above the 1982 level. And strains on government budgets at the state and local levels will limit possibilities for any real growth in operating assistance from these sources. As a result, policy-makers and planners will be forced to seek short-range improvements which sharply reduce the rate of growth in operating deficits. To achieve this goal without substantial service reductions and ridership losses, planners will have to increase productivity, control costs, and raise revenues without unduly discouraging riders.

The gasoline shortages, handicapped travel needs, and transit operating deficits which emerged as major urban transportation issues in the 1970s prompted an active search for new short-range public transportation improvements. Research and demonstration projects conducted during this period provided a greal deal of information on the potential of several kinds of strategies: promoting car and vanpooling; equipping transit buses with wheelchair lifts; providing taxi scrip to disadvantaged groups; encouraging employer-provided transit passes; and moving from flat transit fares to a variety of selective surcharges and discounts for different types of trips and riders.

Recent policy developments suggest that these research and demonstration results will have considerable relevance for emerging public transportation issues. The prospects of gasoline shortages or price raises are greatly diminished, but ridesharing services continue to be useful strategies for relieving congestion at shopping and employment centers poorly served by transit. The need to provide adequate services for the handicapped must still be met, though with greater discretion at the state and local levels than in the past. And the problems of financing transit operating deficits are becoming more severe.

This volume reviews and synthesizes the results of recent U.S. research and development efforts aimed at improving current public transportation systems. The issues and objectives which prompted these efforts are discussed in the following chapter. The various improvement strategies examined are then organized into three chapters according to the travel markets they serve: high-density home-to-work travel; special user group travel; and general purpose travel. Possible changes in the administrative and regulatory framework for public transportation are then discussed, including planning regulations, earmarking of subsidy funds, participation of private providers, labor protection, local service and fare regulation, and restraints on private automobile use. Finally, future directions for public transportation are discussed, with special emphasis on the role and importance of short-range innovations.

CHAPTER II
PLANNING OBJECTIVES AND ISSUES

Recent policy problems have prompted the development of short-range public transportation innovations aimed at three general travel markets:

- high density home-to-work travel, where the major emphasis has been on attracting private automobile drivers into high-occupancy modes like carpools, vanpools, and transit.

- special user group travel, with considerable emphasis on the needs of handicapped persons, but continuing concern for the low income and others for whom private automobile travel is unavailable or inconvenient.

- general purpose travel, where home-to-work travel, special user group travel, and other markets such as travel to downtown shopping have been addressed collectively. Several different kinds of benefits have been sought, though limited public subsidy budgets increasingly have constrained service and fare levels.

In developing short-range strategies to serve these markets, planners have had to deal with a variety of different objectives and issues. The policy directives provided for public transportation have been rather vague and sometimes conflicting. As Altshuler et al. (1979) pointed out in explaining the substantial increases in federal spending during the 1970s, public transportation has been expected to serve a number of different goals:

> Though its direct constituency was relatively small, its ideological appeal proved to be extremely broad. Whether one's concern was the economic vitality of cities, protecting the environment, stopping highways, energy conservation, assisting the elderly and handicapped and poor, or simply getting other people off the road so as to be able to drive faster, transit was a policy that could be embraced.

For each of the above three market areas, specification of objectives and evaluation of alternatives have raised a number of issues.

HIGH DENSITY, HOME-TO-WORK TRAVEL

When transit systems were profitable, expanding capacity to serve high density peak hour travel was a worthwhile undertaking for transit managers. Once transit became unprofitable, however, adding costly capacity to operate during a few peak hours generally exacerbated the deficit problem. Consequently, recent efforts to increase work trip vehicle occupancies have been focused largely on modes which require little or no public subsidy: carpooling and vanpooling. The general objective has been to reduce, with minimal public expenditure, the vehicle miles of travel (VMT) generated by a given level of person travel.

The concern about gasoline conservation has been accompanied by other more traditional objectives for serving the home-to-work market: reduce road congestion, improve air quality, and improve accessibility to employment locations poorly served by transit. In addition, a new objective has developed to reinforce the others: relieve growing pressures on parking facilities at large employment centers. Organizations like the 3M Company in St. Paul, Minnesota, and the Tennessee Valley Authority (TVA) in Knoxville, Tennessee, have found that promotion of high-occupancy home-to-work travel has permitted them to reduce employee parking requirements, thereby permitting more productive use of land in their employment complexes.

Growing interest in carpooling and vanpooling modes has raised a significant planning issue: to what extent will more carpooling and vanpooling worsen the financial situation of existing transit systems? At one extreme, if new car and vanpools are formed largely by transit riders, but in insufficient numbers to permit reductions in transit capacity, peak hour VMT and transit operating deficits may both increase. At the other extreme, if many new car and vanpools include former private automobile drivers, and if enough transit riders are attracted to permit transit capacity reductions, peak hour VMT and transit deficits may both decline. Careful monitoring of a number of home-to-work programs has provided some valuable insights on this issue.

A related issue has been the relative cost-effectiveness of different strategies to promote increased ridesharing for work trips. Most of the successful programs in the early 1970s were administered by large employment centers or in well-organized residential neighborhoods. Relatively little was accomplished from efforts to promote ridesharing through area-wide press or radio appeals, and virtually no efforts were made to persuade neighboring smaller employers to implement joint programs.

The initial difficulties encountered in promoting ridesharing outside of large employers or neighborhoods has led to the formation

of agencies to provide computerized ridematching services and other forms of assistance. Many of these agencies have been formed within city governments or metropolitan planning organizations. Some transit authorities have also begun to take an interest in ridesharing activities. These agencies have resolved insurance and regulatory issues, sought special privileges such as use of express lanes and close-in parking, promoted financial incentives such as reduced parking fees, and even purchased and leased vans to ridesharing groups. A great deal of effort has been devoted by the agencies and their funding sources to assessing the cost-effectiveness of different promotional strategies, and some important lessons have been learned from their experiences.

The potential for attracting short trips (three to seven miles one way) to ridesharing has been another important question for planners. Most successful car and vanpooling programs have been directed at serving relatively long commute trips of between ten and thirty miles one way. For these trips the inconvenience of rather rigid schedules relative to private automobile use have often been outweighed by out-of-pocket cost savings and special privileges like use of express lanes and close-in parking. For shorter trips the advantages to the traveler of ridesharing have been less clear, however, even where transit services have been quite limited.

A rather different issue regarding home-to-work travel has been the practicality and potential impact of restraints on private automobile use. Though difficult to implement, such restraints have long been considered an essential component of any package of measures aimed at producing significant shifts to high-occupancy modes. Many of the most successful ridesharing programs owe at least some of their travel impacts to a reduction in parking spaces for private automobiles. The obvious problem with such measures is that a substantial group of travelers must suffer a significant degradation in the travel choices available to them. Combining a gradual reduction in the convenience of private auto use with vigorous promotion of ridesharing and transit appears to be a promising strategy.

SPECIAL USER GROUP TRAVEL

Though many socioeconomic groups have been singled out at one time or another for special consideration in public transportation programs, Section 504 of the Rehabilitation Act of 1973 has caused most of the attention in recent years to be focused on the handicapped population. The Act insists that handicapped persons should not be denied access to public facilities and services because of their handicaps. People confined to wheelchairs obviously do not have the

same access to conventional bus and rail transit systems as other travelers. Section 504 has prompted the development of several versions of regulations by DOT aimed at ensuring that handicapped persons have adequate access to publicly subsidized mass transportation services.

The planning question which has arisen from the 504 regulations is the relative cost-effectiveness of making transit systems fully accessible versus providing specialized door-to-door services with fully accessible vans or minibuses. (An important issue in this regard is the level of door-to-door service which can be considered comparable to fully accessible transit.) The initial judgement of many planners on these questions has been that specialized services will be more cost-effective, especially in cities with older rail systems or with severe winter weather. Experience has cast some doubt on this view, however, and each city has begun to tailor its own response to the handicapped population based on local preferences and conditions. In the absence of new and more prescriptive federal regulations, considerable diversity seems likely in the provision of services for the handicapped.

An issue which has arisen with regard to virtually all public transportation for special user groups is the coordination of different programs and services. Transportation services are an eligible expenditure under a number of federal, state, and local human services programs. These expenditures can result in several different services being provided for special user groups, sometimes with apparent duplications and redundancies. A number of major efforts have been made to coordinate the demand for and supply of these services in order to improve their cost-effectiveness.

Coordination projects face two major difficulties. First, duplication of services almost always involves benefits as well as costs. Even similar services often have differences which are important to both sponsors and users, and which may well be worth the costs. Second, coordination activities themselves involve costs which may be quite substantial. To be justifiable, coordination efforts must produce enough benefits (or cost savings) to offset the costs of coordination activities.

Hopes for the beneficial impacts of coordination efforts have been high. As in the case of full accessibility for the handicapped, however, experience has begun to modify initial expectations. Planners have gradually assumed a more skeptical view of coordination proposals and have begun to look more closely at what is to be accomplished and at what cost. Though there are undoubtedly some gains to be made, identifying and implementing cost-effective coordination strategies remains a major challenge.

The distribution of benefits of special user group programs has also begun to raise some new planning issues. Setting eligibility criteria in terms of age, income, or type of handicap does not provide much information on who of the eligible group would actually use the services, or for what purposes. Will a few people use the services very frequently, or will a large number of people use the services infrequently? Will the services generate new trips, or trips which would otherwise have been made by some less preferable means? Will the services benefit the most needy among the eligible groups, or the most vocal and persistent? These questions are virtually impossible to answer prior to implementation, but often can be answered quite well through user surveys. Various modifications in eligibility, in permissible numbers and purposes of trips, and in service design can then be made to bring the benefit distribution into line with policy objectives.

Issues of cost-effectiveness and fairness also arise with regard to the selection of the providers for special user group services. Transit authorities, non-profit agencies, and private taxicab companies all have been involved in significant ways in service provision for special user groups. Planners and policymakers have a number of choices: consolidate services in one transit authority or non-profit agency; negotiate provider-side service contracts with periodic rebidding; or disburse user-side subsidies such as discounted tickets or vouchers to promote trip-by-trip competition among a range of eligible providers. Many analysts have advocated greater participation of private providers on some kind of competitive basis. Several different administrative approaches have been tried, and interest in private provider involvement has been growing.

GENERAL PURPOSE TRAVEL

Programs aimed simultaneously at several travel markets typically have had a number of objectives, usually defined in rather vague terms. A transit system in a small community, for example, may be aimed at improving the mobility of residents without access to private automobiles, at promoting downtown commercial activities, and at energy conservation, congestion relief, and air quality improvement. The system also may be a very important image factor for the city, perhaps featuring prominently in Chamber of Commerce brochures.

Uncertainty about the mix of these objectives has created problems for planners and policymakers. If the emphasis is to be on energy conservation and congestion relief, ridesharing programs for home-to-work travel should play a prominent role. If particular user groups are to be singled out for special assistance, targeted fare reductions or user-side subsidies should be considered. If image factors are considered important, the design and appearance of public transportation vehicles may be significant concerns.

Of late, however, the overriding factor in general purpose programs has been the level of public subsidy required. As discussed in Chapter I, steady increases in transit deficits combined with tight public budgets have created pressures to reduce the deficit gap. Policymakers face three difficult options: reduce costs through productivity improvements; reduce costs through service cutbacks, or increase revenues from users and other direct beneficiaries.

Productivity improvements have proven elusive. Increases in transit productivity appear to depend on significant changes in labor costs or work rules. Though part-time driver arrangements have been growing, cost savings have been somewhat disappointing. Moderation in wage rates seems to be lagging that in other sectors. And improvements in transit marketing and management appear to have had little impact on productivity to date. Substitution of lower cost providers has had a significant impact in a few locations, and planners are taking a greater interest in the potential of locally-sponsored minibuses and contracts with private taxicab companies.

Measures for increasing revenues from users and other direct beneficiaries have been receiving considerable attention. The question before policymakers is how to raise revenues without causing significant ridership losses. Can employers and shopping complexes be persuaded to contribute to the cost of public transportation serving their locations? How far can fares be raised before ridership losses become substantial? Can distance-based fares and peak hour surcharges help? Are discounted passes for commuters a good or bad idea?

The potential of alternatives to fixed route transit also continues to be of considerable interest. Numerous experiments with dial-a-ride services in suburbs and small communities have shown dial-a-ride to be comparable with, rather than superior to, fixed route service. A modification of dial-a-ride which serves only selected checkpoints rather than every doorstep has been tested in Europe and has recently been introduced in a few U.S. cities. Though these services deserve attention, they probably will offer little relief from the financial pressures confronting general purpose services.

The increasing diversity of public transportation services and providers has led to interest in facilitating the matching of users to services through travel brokerage functions. A travel broker for urban trips would be rather like a travel agent for inter-city and international trips, but provide information on urban travel options. The question for planners and policymakers, of course, is whether or not such brokerage functions will be cost-effective.

ADMINISTRATIVE AND REGULATORY ENVIRONMENT

A number of aspects of the administrative and regulatory environment for public transportation have been changing in ways which raise new issues for policymakers and planners. The requirements of federal planning regulations have been relaxed by the Reagan administration to permit greater flexibility and discretion on the part of state and local governments. Shared-ride paratransit services have been endorsed and made eligible for federal funds by the Urban Mass Transportation Administration (UMTA) in a 1982 Paratransit Policy. Participation of private transportation providers in federally funded programs is the subject of a new policy under development by UMTA. The Section 13(c) labor protection provisions of the UMTA Act have been complicated by the growing involvement of paratransit services and private providers in federally funded programs. Regulations governing taxicab prices and entry have been relaxed in a few cities, and some new privately operated jitney services have recently been introduced. Some new efforts also have been made to restrain automobile use through residential parking permits and special parking charges in congested areas.

The gradual shift from long-range, metropolitan-wide transportation projects to short-range, localized improvements has created some important issues regarding the respective roles of metropolitan and local planning organizations. Should metropolitan planning organizations (MPOs) simply shrink as metropolitan plans give way to local plans, or do they have an important role in assisting and perhaps coordinating local planning efforts? How should federal regulations governing urban transportation planning be changed? Can staff members trained to conduct long-range planning reorient their interests and skills to short-range plans? There seems to be little doubt that an important transition is underway, though the ultimate outcome is still uncertain.

The issuance of a final UMTA paratransit policy some six years after the proposed policy confirmed what was long anticipated: paratransit services which are shared-ride and available to the public are eligible for federal financial assistance. While the limited federal funds available may continue to be devoted largely to transit systems, the removal of the uncertainty about UMTA policy toward paratransit modes should encourage planners to consider these modes seriously. Whether paratransit services will play a much more significant role in urban public transportation than in the past remains to be seen.

Indications that federal regulations will soon require more aggressive efforts to involve private providers in publicly funded programs may raise some complex planning issues. Will private providers be invited to compete with public authorities for certain services?

How will such a competition be managed? Which institution or institutions will be responsible for ensuring that fair competition takes place? The involvement of taxicab and other private providers in several UMTA-funded demonstration projects has suggested that these issues may be difficult to resolve.

The Section 13(c) labor protection requirements of the UMTA Act have been a source of great controversy over the last decade. Designed to ensure that existing employees of mass transportation systems are not adversely affected by federally funded projects, these requirements often involve lengthy negotiations between grant recipients and affected unions before new grants can be approved. The increased use of federal funding for paratransit services and private providers has greatly complicated these negotiations and will continue to raise difficult planning issues. Because of the complications and delays, some local planners have chosen not to use federal funds for local public transportation services.

The effects of regulatory restrictions on taxicab fares, entry of new taxicab providers, and shared-ride services has been a controversial subject for several decades. Until relatively recently, virtually no major changes had been made in local paratransit regulations, so the arguments for and against various kinds of changes were rather speculative. Within the last five years, however, the cities of San Diego and Seattle have largely removed city control of entry and pricing, allowing new companies to enter the business and encouraging all companies to set their prices competitively. The results of these changes have been monitored closely by UMTA, and will undoubtedly influence the thinking of local regulators in other cities.

Although efforts to introduce road user charges on congested roads in U.S. cities have been unsuccessful, some restraints on private automobile use have been effected through parking programs. Residential parking permits which allow only residents to park for more than limited time periods have been introduced in several busy neighborhoods and appear to be gaining in popularity. Some efforts have also been made to charge substantial fees for non-resident on-street parking in busy recreation areas. Though some of these schemes are still in the experimental stage, they may well become serious planning options in the near future.

Each of the three market areas discussed above is treated in detail in turn in the following chapters. The nature of each market is discussed and various service alternatives are reviewed. Several improvement strategies are then assessed based on experience to date. The chapter following the three market area chapters presents a detailed discussion of the administrative and regulatory issues.

CHAPTER III
HIGH-DENSITY HOME-TO-WORK TRAVEL

In typical urban areas, 25 to 45 percent of all daily person trips are made for work purposes. Understanding the general nature of work travel demand is a necessary step before transportation planners can address the specific problems and travel requirements of this travel market. In the following section, the essential characteristics of work travel demand are discussed and illustrated with information from various metropolitan areas and national surveys.

DIMENSIONS OF WORK TRAVEL DEMAND

The key dimension of travel demand is its temporal distribution. Unlike shopping, personal business, or social and recreational trip making, the timing of travel to and from work usually follows a regular pattern dictated by the requirements of the working activity. The result is that most work (and school) trips are made on a regular basis each weekday at fixed times during the morning and evening. This daily regularity in work trips results in the well known peak rush hours experienced at employment sites and office buildings, on urban roads and highways, and on public transit systems (see figure 3.1).

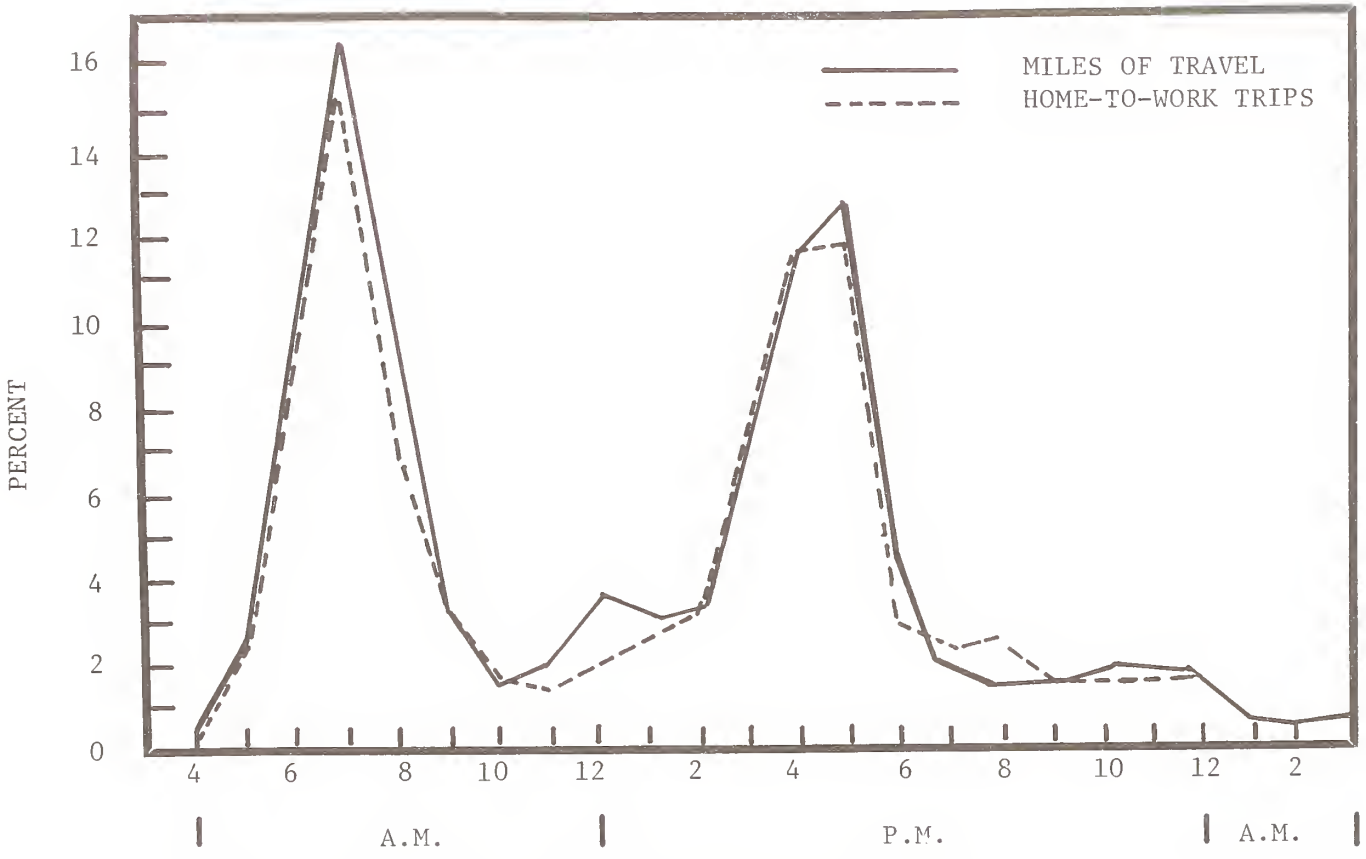
The temporal distribution of demand at particular employment sites is directly influenced by the start and end times, the length of shifts, and the number of working days.[1] There can be considerable variation in these parameters. For example, in a national survey of working conditions in 1970, about 60 percent of a cross-section of workers worked less than 40 hours during the average week and only 65 percent arrived at work between 7:00 and 9:00 a.m.[2] Along particular routes or corridors, the temporal patterns of work travel demand are influenced by numerous factors, including the number of workers traveling, the spatial distribution of residential and employment sites, modal utilization, and road or transit speeds and capacities.

Another important dimension of work travel demand is its spatial distribution. For most workers, work place and residence are the same each day, although for some occupations, such as construction and

1. Transportation Research Board (1980).
2. Survey Research Center (1971).

FIGURE 3.1

PERCENT OF PERSON HOME-TO-WORK TRIPS AND
PERSON MILES OF TRAVEL BY HOUR OF DAY TRIP BEGAN



Source: U.S. Department of Transportation (1973).

sales, job sites may vary from day to day: about nine percent of a national survey of workers in 1970 did not report to the same place each day.[3] People are constantly changing job sites, occupations, and residential locations, and over time these changes can produce significant shifts in the spatial distribution of work travel. In the past two decades there has been a continuing trend toward suburban development throughout the U.S., and to some extent this decentralization has shifted work travel demand away from the radial corridor patterns of earlier decades in this century.[4]

The distribution of employment and residential development shapes the spatial dimension of work travel in metropolitan areas. Urban areas typically have a central business district (CBD), a central city area surrounding the CBD, and a suburban area surrounding the central city. More than half of the population usually lives outside of the central city, and less than two percent lives in the CBD. Employment generally follows the residential distributions. Most urban areas have a suburban ring with more than half of the SMSA employment, and the CBD share of metropolitan area employment is often less than 10 percent. Employment densities in the CBD are an order of magnitude larger than for the rest of the central city, and the remainder of most SMSAs have very low densities. The cental city areas outside the CBDs generally have the highest population densities in the SMSAs.

In large metropolitan areas, the typical worker lives in the suburbs and is employed in the suburbs or in the central city area surrounding the CBD. An examination of the distribution of work trips in large metropolitan areas indicates that the suburban to suburban trips usually constitute the largest portion of total work trips, with the central city to central city trips constituting the next largest portion.[5] For these larger areas the average one-way work trip length is about nine miles, with about 45 percent of the trips less than five miles, 30 percent between six and ten miles, 15 percent between 11 and 19 miles, and 10 percent more than 20 miles. In areas with lower residential and employment densities trips generally are more dispersed and trip lengths are longer: the average trip length in Los Angeles is longer than that for Boston, for example.

In addition to the spatial and temporal dimensions of work travel demand, it is important to understand the general social and economic characteristics of workers. Obviously not all workers are the same: they have different occupations, types of work places, and working arrangements, as well as different personal characteristics such as age, sex, race, and income.

---

3. Ibid.
4. Berry and Gillard (1977).
5. Bureau of Census (1979).

Perhaps the most significant characteristic of workers for travel demand is occupation. In 1982, blue-collar workers represented about 29 percent of all U.S. workers; white-collar workers including professional and management, clerical, sales, and service made up about 68 percent; and the remaining 3 percent were farm workers.[6] Occupation type is related to type of working arrangements which in turn influence travel demand. Number of hours worked, location of employment, compensation, and work schedules are aspects of working that vary considerably by occupation and are responsible for significant variations in travel demand. Socioeconomic characteristics such as education level and income are strongly associated with occupation. Age, sex, marital status, and race are also related to different occupations, and to varying levels of participation in the work force.

Within an urban area, work places vary in location, size, and physical layout depending upon the type of industry. Similar types of employment often cluster together to create concentrations of similar workers and similar types of travel demand: in CBDs, in suburban industrial parks, or in large manufacturing areas, for example.

There has been considerable interest in and study of working conditions and job satisfaction.[7] In general, it has been recognized that work is central in the lives of most adults and contributes to identity and self-esteem. Work offers not only economic self-sufficiency and status, but influences family stability and provides an important opportunity to interact with others in a meaningful way. Some of the important changing conditions that are influencing work include: more women in the work force and two worker families, new careers and greater occupational mobility, new attitudes toward retirement, and more participation by labor in the management of firms. Some of these new conditions are currently affecting travel demand and their impact is likely to be even more significant in future years.[8]

WORK TRAVEL MODES

The modes of travel used by workers vary significantly with population size and with residential and employment densities and distributions. Nationally, according to the 1980 Census, over 84 percent of all workers traveled to work by automobile, truck, or van. About 20 percent of all workers carpooled, six percent used public transportation[9], and almost six percent walked to work. In our largest cities (the standard metropolitan statistical areas with populations over one million, where about 40 percent of all U.S. workers reside) 12 percent of the workers used public transportation. Elsewhere only two percent of U.S. workers used public transportation.

---

6. U.S. Department of Labor (1983).
7. W.E. Upjohn Institute for Employment Research (1973).
8. U.S. Department of Transportation (1980b).
9. Includes bus or rail transit, railroad, and taxicab.

Significant changes in public transportation use for work travel have taken place between 1970 and 1980 at the national and regional levels.[10] In 1970, about nine percent of all U.S. workers used public transportation compared to about six percent in 1980. Public transportation use declined over the decade in each region except the West. The Northeast dropped 17 percent, the North Central lost 13 percent and the South, 7 percent. The West, however, rose 67 percent!

At the metropolitan area level, use of different travel modes for work trips varies greatly by work place location. In table 3.1 the work trip mode splits by work place for four different sized urban areas are presented. Across all of the areas, the share of auto driver trips increases and the transit share decreases as the work place moves away from the CBD. According to 1980 Census results, population and employment at both the metropolitan area and national regional levels continue to shift toward suburban and non-suburban areas which typically have limited transit service.[11]

While the automobile is used for the vast majority of work trips in all areas, it can be seen from table 3.1 that the number of persons per automobile varies from area to area and within a particular urban area. Average auto occupancy figures, calculated by dividing the sum of auto drivers and passengers by the number of drivers, declines as the work place moves farther from the CBD. Other data show that average auto occupancy for work trips tends to increase as trip lengths increase.

Travel mode and trip length are the major factors determining work commute times and user costs. Home-to-work trip times for private automobile generally are less than those for public transportation at any trip length. With typical trip length distributions, over half of the commuters in an urban area arrive at their jobs in less than 15 minutes. In 1980 the average transit fare during commute hours was approximately 40 cents.[12] For most workers, the costs of commuting are those associated with driving or riding in an automobile. Operating costs of automobiles vary depending upon type of vehicle, miles driven, and several factors that influence insurance costs. Assumptions can be made regarding all of these factors to determine operating costs for commuting by car.[13] For an average home-to-work trip of ten miles in length the estimated user costs in 1980 ranged between $1.40 and $1.80 one way, excluding parking. On a national level, less than 10 percent of all automobile commuters pay parking charges; in some cases parking fees are subsidized by employers. Most of the parking facilities in which a user must pay a fee are located in the CBDs of urban areas, and since as illustrated earlier, CBDs generally attract a small percentage of total urban work trips, most automobile commuters in any particular urban area park for free.

---

10. Fulton (1983).
11. Ibid.
12. American Public Transit Association (1981).
13. Misch et al. (1981).

peak periods frequently are such that congestion occurs on road segments, in parking areas, and on public transportation services. Congestion can increase the duration of individual trips and reduce the reliability of arrival times; significant problems for trips which must be made twice every weekday and for which reliability is often very important. Both gasoline use and emissions also generally increase at the lower speeds associated with congested traffic.

Short-range public transportation proposals typically aim to reduce the congestion, pollution, and fuel consumption associated with home-to-work travel by shifting commuters into higher occupancy vehicles, thus reducing the number of automobiles (and parking requirements) and vehicle miles traveled (VMT) for a given number of trips. Planners need to be able to develop alternative actions to effect such shifts, and to determine the costs and benefits associated with each of the alternatives. Different levels of benefits are possible depending upon the existing conditions and the levels of effort and resources committed to achieving VMT and parking reductions. Since local budgets are limited, policy makers must decide how much to spend on particular actions, and when spending more on one type of action ceases to be effective compared to spending on alternative actions.

Planners should be able to address policy questions such as: what are the options and their relative effectiveness if, say, $200,000 is allocated to addressing work commuter problems in the area? Among the numerous options which should be considered are:

- improving transit service on specific routes or marketing transit to the entire area;
- promoting car pools areawide or at employment sites or providing parking subsidies for car poolers;
- setting up a van pool program or encouraging privately operated subscription buses;
- shifting travel demand to less congested times by introducing alternative work schedules.[17]

Planners need to understand the current work trip market and the service alternatives, focus on particular problem locations (congested corridors and worksites), and develop actions tailored to specific commuter segments.

SERVICE ALTERNATIVES

The term "public transportation" traditionally has been used to

17. Transportation Research Board (1980).

refer almost exclusively to conventional fixed route, fixed schedule bus and rail transit services; indeed the term was used in this way in some of the discussion in the previous section. Although conventional transit plays a major role in serving the home-to-work market, para-transit services such as jitneys, car pools, commuter vans, and subscription buses also have important roles to play. Since these modes often can provide high quality service at lower total costs than conventional transit, they are potential supplements to transit in reducing the number of automobiles on roads and at parking facilities.

The varied nature of the work commuter market makes it unlikely that a single mode or even two or three modes can exhaust the market. Rather, a number of different modes are needed to respond to the variability among work travelers with respect to origin and destination patterns, temporal patterns, and attitudes to comfort, user costs, and schedule reliability. To limit the service options to conventional transit is to restrict greatly the opportunities for attracting the single occupant automobile driver from a mode which (given the relatively high user cost) he or she clearly values quite highly.

The general service characteristics of the common home-to-work modes--private automobile, subscription buses, and conventional transit --are summarized and compared in table 3.2. While these general service characteristics give an indication of the relative performance of the various services, there are, of course, variations within each mode that can change its relative performance. For example, a carpool of family members and the next-door neighbor with priority parking at a common worksite will perform better than a carpool that collects riders throughout a neighborhood and drops them off at several worksites. Some vans pick up riders at their homes while others collect them at park and ride lots. And some transit services are much more reliable and comfortable than others.

The most familiar home-to-work mode, conventional transit, probably has the least variability of service type and quality. Transit services in U.S. cities are largely supported by public capital and operating assistance and tend to follow rather similar procedures for vehicle purchase and maintenance and for service design. The existence of a small number of transit management firms which are responsible for day-to-day operations of transit systems in a large number of cities also undoubtedly contributes to standardization of transit management practices across cities. The greatest limitation of conventional transit for the home-to-work market is that only a relatively small portion of commuters have convenient access to transit at both the home and work ends of their trips, and pressures on budgets at all levels of government apparently preclude any major expansion of transit coverage or capacity in the foreseeable future. This is not to say, however, that major improvements cannot be made in the effectiveness of the transit facilities which currently are available for serving home-to-work travel.

TABLE 3.2

SERVICE CHARACTERISTICS OF COMMON HOME-TO-WORK MODES

		Pre-arranged Ride-Sharing			
	Private Auto	Car Pool	Commuter Van	Sub-scription Bus	Conventional Transit
Trip Time					
average waiting time and access time	-	L	L-M	L-M	M
in-vehicle time	VG	VG	VG	G	P
egress time	L	L	L	L-M	L-M
average door-to-door LOS	1.0	1.0-2.0	1.0-2	1.5-3.0	>2.0
schedule reliability	VG	G-F	G-F	G-F	G-F
Flexibility					
departure time	VG	P	P	P	F
route	VG	G	G	P	P
all day availability	Y	N	N	N	Y
User Cost	M	L	L-M	L-M	L
Social Situation					
privacy	VG	F	F	P	P
interaction, dependence conflict	N	Y	Y	N	N
Use of Time During Trip	P	G	G	G	F
Convenience					
comfort	VG	G	G	F-G	F-P
guaranteed seat	Y	Y	Y	Y	N
driving involved	Y	Y-N	N?	N?	N

Y = Yes
N = No

L = Low
M = Medium
H = High

VG = Very Good
G = Good
F = Fair
P = Poor
(?) = Some question

LOS = Level of Service, the ratio of modal trip time to trip time by private automobile.

Pre-arranged ridesharing, particularly carpooling, has several features that can be responsible for variations in service characteristics. The size and spatial relationships of a carpooling group can have a major effect on the total travel time and costs experienced by each user. A typical average carpool size is 2.5; about 65 percent of the pools have two occupants, 25 percent three occupants, 6 percent four occupants, and 4 percent five or more occupants. Several surveys of carpoolers have found that family or household members constitute from ten to 35 percent of all carpools, and most of them have only two occupants.[18] These small two-occupant carpools are obviously not as vulnerable to the access, egress and schedule delays that larger carpools can encounter. Surveys of carpoolers have reported that the additional pick-up times for passengers average about five minutes.[19] However, the distributions of pick-up times can vary significantly depending upon the numbers of passengers, their spatial separation, the travel speed in the pick-up area, and the punctuality of riders when meeting the pool.

In addition to size, the other major feature of carpooling that influences service characteristics is the driving arrangement. There are two general options: all of the members can share the driving and rotate drivers and vehicles on some regular basis, or the same driver and vehicle can carry the passengers each day. If there is a single driver, the question of how costs are shared by the passengers becomes important. A national survey reported that 64 percent of the passengers in non-alternating driver pools ride free.[20] However, a great deal of variability exists with regard to cost-sharing arrangements, making prediction of user costs for a new carpooler difficult. In cases where these arrangements lead to a profit for the driver, special tax and insurance questions may arise.[21]

The social experience of riding together everyday may be congenial and lead to long-term friendships or create tension and lead to the eventual dissolution of the pooling arrangement. The confined social atmosphere, the dependence on others, and the perceived group pressures for conformity and interaction may be real barriers to car pooling for some persons. A well-organized carpool of reliable individuals can be very convenient, however: the ride is comfortable, driving responsibilities are minimal, and user costs are low.

Commuter van service is a subscription service in which the driver may receive compensation and the passengers pay in advance. Most of the current van programs have been sponsored by employers for their employees, though more recently public agencies have set up areawide programs for members of the general public.[22] Some private individuals and private transportation companies also provide commuter van services.

---

18. See Kendall (1975) and Peat, Marwick, and Mitchell (1976).
19. Peat, Marwick, and Mitchell (1976).
20. See Kendall (1975) and U.S. Department of Commerce (1976).
21. Misch et al (1981) and Kearny (1979).
22. Suhrbier and Wagner (1979).

Van travel times exceed those for driving alone but are often comparable with those of car pooling. Vans serving very long trips from sparsely populated areas often pick up most of the riders at park-and-ride lots, while those operating in suburban sections typically pass by each rider's home and provide door-to-door service. Schedule reliability and service dependability are usually high for van service because the driver is motivated to provide good service to keep his passengers. Many programs have rigorous maintenance procedures and some provide back-up vehicles.

User costs vary depending upon several factors: type of vehicle ownership (which influences the vehicle costs and insurance fees), trip length, number of passengers, and degree of route deviation for collection of passengers. The fares are usually paid in advance. For longer trips (greater than 20 miles round trip) van fares are generally lower than the user costs of driving alone. And for very long trips (greater than 50 miles round trip), van fares may be less than user costs for carpooling. Vans can provide very convenient, comfortable, and reliable service. Since van operations are, in general, formally organized and operated in a businesslike way, there are fewer personal arrangements or problems than for carpools and people do not feel as dependent on each other. Personal privacy is lost, but the larger groups provide greater diversity among the riders than in a small group and the driver usually has the authority to resolve any conflicts.

Subscription bus service involves the use of a bus rather than a van or automobile to serve pre-arranged groups of commuters, usually in areas with poor or non-existent transit services. These services have been organized and operated in a variety of different ways, ranging from comfortable and rather expensive services from higher income suburbs to austere services using school buses to serve factory areas.[23] Almost all of the current operations began with just one or two buses and expanded gradually. The routes and schedules have been adjusted to respond to demand changes and the organizers and passengers have worked together to maintain high service standards and control costs. Many operations have provided special service features such as guaranteed seating, door-to-door service, and an express ride for most of the trip.

Access and egress times for subscription bus service are generally longer than for the private automobile or carpooling. Door-to-door service is not as common as in car pooling or commuter van services. Travel times are generally lower than for conventional transit due to fewer stops. Schedule reliability is usually high, but like car pools and van pools there is often little or no schedule flexibility. Some of the larger operations have sufficiently extensive route coverage and service frequency to permit riders to choose between different buses each day.

---

23. Kirby and Bhatt (1975).

User costs depend upon a number of factors: how the vehicles are obtained, the type of drivers employed, the degree of dead-heading required, the load factors achieved, and the trip length. Most of the existing subscription bus operations are privately operated and unsubsidized. In some instances employers have subsidized the bus fares for their employees or provided other benefits such as priority parking spaces. The user fares for an efficient subscription bus service can be quite low compared even to commuter vans and car pools.

Socially, subscription bus service is much like a conventional transit route with a regular group of travelers. Since the same group rides together every day there is an opportunity to interact and develop friendships. Most of the subscription bus operations provide comfortable, reliable service with guaranteed seating. They travel over direct routes and allow the riders to use the time during the trip for reading or other relaxation activities.

In addition to transit, carpools, commuter vans, and subscription buses, there are other less common services that have been proposed for work commuters. One is shared ride auto transit, a concept based upon the informal practice of hitchhiking but limited to an association of drivers and riders checked for driving records and good character.[24] Drivers enroute to work travel along set routes and pick up association members displaying the proper identification. Drivers can display route and destination signs and may or may not charge a fee for each ride. No fixed schedules, predetermined ride matches, or full-time drivers are necessary, although a certain minimum number of participants obviously is required for the service to be viable. A demonstration project of this concept was conducted in the Marin County corridor leading into San Francisco.[25] The project established satisfactory organizational and administrative procedures, but failed to attract enough participants to warrant continuation of the service.

Along higher density corridors the old fashioned jitney could provide service which in several ways would be faster than conventional transit, and provide more schedule flexibility than car pooling. Particularly important aspects of jitney service, which could be provided by taxicabs, limousines, vans, or other small vehicles, are short headways (and hence short waiting times), possible route deviation, a guaranteed seat, and flexibility in supply to meet changing demand conditions. Unsubsidized user fares should be possible, though past experience in the U.S. and current experience in other countries suggests that these fares might have to be significantly higher than current transit fares. In most U.S. cities regulations prohibit the operation of jitney services because of their potential competition with conventional transit, though budget restrictions on transit systems have led to new interest in jitneys in some cities. San Diego relaxed regulatory restrictions on jitneys early in 1979, for example, and Miami is considering allowing jitney service to expand in 1984.

---

24. Kocur et al (1977).
25. Dorosin (1981).

A relatively recent service proposal for home-to-work travel is a brokerage function designed to assist travelers to identify and use the travel mode which best meets their needs. A brokerage service would help to explain the characteristics of the various travel modes available to potential users (in much the same way as a travel agent advises intercity or international travelers, for example). Weisbrod and Eder (1980) describe the application of such a brokerage activity to home-to-work travel in Minneapolis-St. Paul, (Minnesota).

ASSESSING IMPROVEMENT STRATEGIES

The experience documented to date with programs aimed at home-to-work travel provides some valuable guidance to planners on designing such programs. Kirby and Miller (1983) describe a number of examples of home-to-work programs in areas of different sizes and present case studies and references as sources of detailed information. Once planners have identified the travel markets in which they are most interested and determined the general objectives of their public transportation programs, experience with similar programs in similar travel environments provides the best source of guidance on the likely impacts of alternative proposals.

The following section develops some general conclusions and guidelines from experience to date with home-to-work programs. These guidelines are intended to assist planners in formulating alternatives for their own areas; the specific references given throughout the text and in Kirby and Miller (1983) provide sources of more detailed information on experience in particular locations.

Impacts on Vehicle Miles of Travel (VMT) and Parking Spaces

As discussed earlier, the primary benefits sought by home-to-work programs are those derived from reductions in vehicle trips or parking spaces and vehicle miles traveled (VMT), though improving the mobility of certain home-to-work travelers and encouraging the development of certain land use patterns frequently are also explicit objectives. With regard to VMT and parking spaces, many programs which attract home-to-work travelers to higher occupancy modes certainly appear to effect significant reductions at least in the short run.

Two secondary impacts of home-to-work programs tend to offset the commuter VMT reductions effected by shifting work trips to higher occupancy modes: additional household travel resulting from automobiles left at home, and program-inspired location decisions which result in longer work trips. The information currently available on additional household travel suggests that this impact offsets the longer trip length commuter VMT savings by about five percent. While higher VMT offsets may occur with shorter distance commutes, the effect of additional household travel can be regarded as relatively

minor. The effects on VMT of location decisions inspired by home-to-work programs are impossible to quantify from information currently available. Though it seems unlikely that such programs could have a significant effect on location decisions, this is a question in need of further research.

Mobility Impacts

The mobility benefits of home-to-work programs vary greatly depending upon the objectives and design of the programs. (We have attemped to quantify only the user benefits associated with these programs; mobility benefits to non-users such as those derived from increased options for travel have not been quantified in any way.) Programs which offer an attractive new home-to-work service without discouraging use of existing services clearly generate net user benefits: those travelers who elect to patronize the new service have found a service superior to their previous modes. Where disincentives to certain existing services are part of a program, however, the net impact on user benefits is not so clear. Higher parking prices for private automobile travel will create some offsets to the user benefits generated by a vanpool service, for example.

A useful rule of thumb for estimating the net impact of a program on user benefits is the following:

> For each travel mode affected by the program, multiply the price decrease (or minus the price increase) for the mode by the average of the total users of the mode with and without the program. The sum of these quantities over all the affected modes approximates the change in net user benefits effected by the program.[26]

It is clear from this rule that programs which raise the price of single occupant automobile travel generate some negative contributions to net user benefits. If the effects of such price increases are not offset by benefits generated from improvements in other modes, users could actually be made worse off by the program. This occurred, for example, as a result of 1979 increases in parking charges for federal government employees.[27] The TVA program[28] illustrates the issues which arise with regard to user benefits when disincentives are combined with incentives in home-to-work programs.

Most of the programs which offer new services generate substantial net user benefits. (Very few of these programs include any disincentives to private automobile use.) Applying the rule of thumb outlined

---

26. Neuburger (1971).
27. Miller and Everett (1982).
28. See Case Study H8 in Kirby and Miller (1983).

above shows that the net user benefits of these programs are approximately equal to half of the difference in user costs between private automobile travel and travel in the new high-occupancy modes. In aggregate these benefits often far exceed the costs of the program, suggesting that it should be possible to recover program costs through some form of user charge (such as a subscription fee for access to the service).

To the extent that home-to-work programs are concerned with generating VMT reduction rather than user benefits, efforts should be made to maximize the user charges and minimize the public funding required for the programs. This policy could be applied to car and vanpool matching programs, to premium commuter bus services, and to other paratransit services such as jitneys and the organized hitchhiking concept. Reductions in the public funding needed for home to work travel would make more funding available for services aimed at transportation disadvantaged groups, such as the handicapped and others without convenient access to a private automobile.

Organized Carpool and Vanpool Programs

Well organized carpool and vanpool programs can be highly cost-effective ways of achieving VMT reductions, saving parking space, and benefiting both employers and workers. Many carpool and vanpool services cost less per unit of VMT reduction or parking space saved than expanding rush hour bus services, and there appears to be potential for improving their performance even more by increasing user contributions to the services. Expanding ridesharing programs of this type to a large number of high density employment centers in either suburban or downtown locations appears to be a very worthwhile strategy for public transportation programs aimed at home to work travel. A recent manual provides guidelines for implementing and operating effective ridesharing programs.[29]

Experience with home-to-work programs suggests that some qualifications should be made on the potential of carpool and vanpool programs, however. Firstly, it appears that some of the most extensive efforts to promote carpooling and vanpooling may have passed the point of diminishing returns. An aggressive campaign to expand participation in a ride-sharing program through a brokerage activity in Minneapolis - St. Paul proved to be very costly,[30] for example, and an extensive ride-sharing program in Knoxville (Tennessee) also has been questioned with regard to cost-effectiveness.[31]

A second qualification on vanpool programs arises from the experience at the 3M Company in St. Paul, Minnesota, with a vanpool

29. Misch et al (1981).
30. See Case Study H3 in Kirby and Miller (1983).
31. Juster (1980).

service aimed at relatively short trips. This program employed part-time drivers to operate vans on a subscription basis to 3M workers living within 3 miles of the company, and aimed to use the vans for three round trips in each peak period. A maximum of only two round trips could be achieved in each peak period, and costs per unit of VMT reduced were much higher than most other rush hour services, including many conventional transit routes.[32] This experiment suggests that many other types of home-to-work progams deserve to be expanded before consideration is given to the concept of supporting vanpools for short trips.

Experience with small scale carpool programs in transit service areas suggests another qualification on the potential of such programs: heavy diversion of transit riders can reduce the effectiveness of ride-sharing programs. This concern seems to be essentially a matter of scale. Where carpools and vanpools are operating on a large enough scale to permit reductions in transit capacity (as, for example, on the Shirley Highway in Washington, D.C.[33]), they can make a substantial contribution to the overall cost-effectiveness of the public transportation system. Some small scale programs divert transit riders without permitting any transit capacity reduction, however.[34] In these instances cost-effectiveness is reduced for two reasons: transit revenue losses increase the costs of the programs without any offsetting savings from transit capacity reduction, and VMT impacts are limited because so many of the users are diverted from transit vehicles which continue to operate at lower occupancies.

In summary, the challenge for a transportation planner is to help establish the optimal kind of relationship between the various high-occupancy modes. Carpools, vanpools, specialized subscription services, organized hitchhiking, and other paratransit modes can be highly cost-effective elements of home-to-work programs when funded at the right scale and in the right relationship to conventional transit. These modes have a very important role to play in areas which are costly to serve with conventional transit, and as back-up options during transit strikes or fuel emergencies. Cost-effectiveness can be questionable, however, for overly ambitious and expensive ride-sharing programs and for small-scale programs which reduce transit ridership without reducing transit capacity. The most cost-effective direction for the immediate future appears to be the expansion of company-organized programs aimed at serving low occupancy home to work trips for which conventional transit is not currently available.

---

32. See Case Study H6 in Kirby and Miller (1983).
33. McQueen, et al (1975).
34. Olsson and Miller (1978b).

CHAPTER IV
SPECIAL USER GROUP TRAVEL

The U.S. is a highly urbanized nation. In 1970 only 25 percent of the U.S. population lived in areas classified as rural, while over two-thirds lived in areas termed SMSAs containing at least one city with over 50,000 inhabitants. However, urbanization has not increased average population densities. The decentralization of the older metropolitan areas, particularly in the northeast, and the suburbanization of growing cities throughout the country are major forces affecting most aspects of urban America.[1] Low density living patterns have been made possible by several factors, a major one of which has been the increase in automobile ownership and use. Since World War II the proportion of families not owning a car has decreased rapidly from about 40 percent in 1950 to less than 17 percent in 1970.[2] During this period the costs in real terms of owning and driving a car steadily decreased until the rapid escalation in gasoline prices of the late 1970s. The percent of the driving age population with licenses increased from about 43 percent in 1950 to about 75 percent in 1970.

Low-density living patterns in suburban areas and small towns have resulted in travel that is dispersed spatially and temporally and that consequently is more and more difficult to serve with fixed-route transit service. Until relatively recently, public transit ridership has declined steadily in almost all large urban areas and, because of service withdrawals, has ceased to exist in many smaller communities. In large metropolitan areas the low demand for public transit in the suburban areas and the low ridership during off-peak periods such as evenings and weekends has contributed to increasing deficits for fixed-route transit systems.

While the vast majority of U.S. households own automobiles, there are sizable groups of persons that do not have an automobile available or are unable to use one for travel. Because automobile ownership and use is so common, those without access to a car are often at a disadvantage. Much of our economic and social activity presumes a level of spatial mobility which is possible only if an automobile is available. For households without spatial mobility, social interaction may be restricted and job opportunities may be limited.

THE COMPOSITION OF SPECIAL USER GROUPS

People with limited mobility fall into two general groups--those with physical disabilities (the handicapped, and to a lesser extent the

1. Alonso (1978).
2. Kemp and Cheslow (1977).

elderly), and those who are disadvantaged due to social and economic reasons (the carless, the poor, the unemployed, and the young). For several years federal policy has been concerned with improving the mobility of these groups. For the elderly and handicapped in particular, urban areas requesting UMTA financial assistance have been required since 1976 to make special planning efforts aimed at improving the mobility of these groups.

It is important to realize that a low level of trip making by a certain group relative to most members of society may not necessarily indicate a transportation "need". Since travel is primarily a means to accomplish certain other activities, the desire and ability to participate in these activities must exist before travel becomes a key need or problem. Improving public transportation services will allow users better access to locations where they can engage in certain activities such as working, shopping, recreation, and medical visits. However, public transportation improvement may be only one of several changes needed to permit disadvantaged groups to participate in such activities. Enabling elderly groups to obtain improved medical services, for example, may involve upgrading health facilities as well as improving access to the facilities. Providing bus services for an unemployed person to areas without available jobs is of little value. There is considerable evidence to suggest that mobility limitations are only part of the reason why disadvantaged groups are unable to participate in urban activities as much as they would like.[3]

The demographic characteristics and travel patterns of each of these special user groups have been examined in several studies. Though most of the larger scale urban transportation studies of the 1960s failed to distinguish the travel patterns of these groups, in the 1970s more effort has been made to analyze their travel behavior. One conclusion is clear from all of these studies: the travel patterns and requirements of these groups are dissimilar in many important ways and the groups themselves are not at all homogeneous. Age may be less important than income, physical condition, or automobile ownership as a cause of mobility problems, for example, and poor persons in rural areas may have fewer travel options than persons with similar incomes living in the inner-city. Considering particular subgroups within each general socioeconomic category is essential if planners are to understand and address the major travel problems of special user groups.

The Elderly and Handicapped

A number of attempts have been made to estimate the number and location of elderly and handicapped persons in the U.S. One of the difficulties in estimating the size or other characteristics of these

3. Rosenbloom (1978).

groups is the variety of definitions that different programs and funding souces use. The U.S. Department of Transportation definition covers both the elderly and handicapped population without reference to age or type of handicap. Other federal and state programs have different definitions reflecting age, state of health, income or other criteria.

The distribution and demographic characteristics of the elderly, as defined by a minimum age, are available from the U.S. Census data. This information is comprehensive and available on a detailed geographic basis; however, since it is collected every decade it will be less accurate the older it is, particularly at a detailed level. At the national level in 1970, about 10 percent of the population was 65 years or older and over 60 percent of this age group was female. The elderly have lower incomes and more health problems than the general population. About three fourths of this age group reside in urban areas, though there is considerable variation across metropolitan areas and between regions. There are concentrations of elderly in some states such as Florida and Arizona, and within states some rural counties have especially high proportions of older persons.[4] This broad profile of the elderly is based upon an aggregate perspective, however, and tends to mask the fact that elderly persons constitute a very diverse group with widely ranging lifestyle, income, health, age and travel characteristics.

There have been several detailed studies of elderly tripmaking in different cities.[5] These studies all highlight the distinctions between various subgroups of the elderly population: income, locational variables, transportation availability, age and lifestyle all have major influences on the rates and types of tripmaking.

A study of elderly residents of Los Angeles County identified significant differences in daily vehicular trip rates between homogenous "lifestyle groups" of elderly persons.[6] The study found, for example, that the "financially secure" average over twice as many vehicular trips per day as the black and Spanish-American groups.

Comparing average tripmaking rates for segments of the elderly or other groups may be misleading if walk trips are not included. A detailed study of elderly groups in Buffalo, New York indicates that walking is a major mode for many trip purposes, including grocery shopping, banking, visiting friends, and religious activities.[7]

---

4. National Cooperative Highway Research Program (1976).

5. Markovitz (1971) (New York Metropolitan Area); Paaswell and Edelstein (1976) (Buffalo, NY); Carp (1971) (San Francisco); and Bunker et al (1977) (Los Angeles).

6. Bunker, et al (1977).

7. Paaswell and Edelstein (1976).

Perhaps the best two sets of estimates currently available of the number of transportation handicapped persons in the U.S. are those developed by Abt Associates based upon a DHEW 1974 national health survey and those developed by Grey Advertising Inc. based upon a 1977 national survey in urban areas. The Abt approach is based upon four mobility limitations classified in the national health survey and takes into account differences in the incidence of mobility limitations by age group, metropolitan areas, and between regions.[8]

As shown in table 4.1, in 1975 an estimated 5.5 million persons had handicaps which inhibited them in some way from using conventional transportation modes.

TABLE 4.1

ESTIMATED 1975 TRANSPORTATION-HANDICAPPED POPULATION: METROPOLITAN AREAS

	Age			
TH Category	Under 18	18 to 64	65 & Over	TOTAL
Chronic	124,000	1,864,000	2,274,000	4,262,000
Use Transit with Difficulty	48,000	1,049,000	968,000	2,065,000
Cannot Use Transit	76,000	815,000	1,306,000	2,197,000
Acute	71,000	293,000	46,000	410,000
Institutionalized	49,000	226,000	579,000	854,000
TOTAL	244,000	2,383,000	2,899,000	5,526,000

Source: Abt Associates (1975).

8. U.S. Department of Transportation (1976b).

The Grey approach involved over 2,000 personal, in-home interviews from a national sample of urban areas in 1977. The survey estimated the size of the urban transportation handicapped population to be over 7.4 million, representing about 5 percent of the urban population five years of age or over and 12.1 percent of the urban households. The survey also described the travel behavior, the perceived transportation barriers, and an assessment of several transportation solutions for the transportation handicapped.[9]

The following highlights provide some important characteristics of this population group. According to the Grey survey, the typical transportation handicapped person has the following characteristics:

- is older (47 percent are 65 and over);
- has multiple physical problems; and
- has demographic characteristics that are associated with older age, such as being predominantly female, less educated, lower income and not likely to be employed.

However, it is interesting to note that only 21 percent of the total elderly population (65 years and over) is transportation handicapped, and only one percent of the non-working group claims to be unemployed because of inadequate transportation.

During the Grey interviews, transportation handicapped persons and selected non-handicapped persons living in areas served by transit were asked about their tripmaking in a typical month. As shown in table 4.2, the transportation handicapped persons tend to take more shopping and medical trips and fewer work trips than non-handicapped persons. The average total trips per month for the handicapped is considerably lower than for the non-handicapped; however, the trip rates by purpose are not substantially lower except for work travel.

The automobile is used by the vast majority of the transporation handicapped. Over four fifths (83 percent) of the handicapped use a car in a typical month, though only one in three drive themselves. About one-fifth of the total transportation handicapped population use buses, 14 percent take walking trips, and 13 percent ride in taxis. Table 4.3 shows the distributions of trips and trip rates by mode for the handicapped and non-handicapped groups. The handicapped make fewer trips by every mode.

The Economically Disadvantaged

Poverty can restrict severely the activities of an individual or family. There are a host of government programs aimed at alleviating

9. Grey Advertising Inc. (1978).

TABLE 4.2

MONTHLY TRIP RATES BY TYPE OF TRIP TAKEN
(Base: Total Trips Taken by Each Group)

	IN TOTAL URBAN AREAS		IN MASS TRANSIT AREAS			
	Total Transportation Handicapped Trips		Transportation Handicapped Trips (Among 16 yrs.+)		Non-Transportation Handicapped Trips (Among 16 yrs.+	
	Trips Taken (%)	Avg. No. of Trips* (#)	Trips Taken (%)	Avg. No. of Trips* (#)	Trips Taken (%)	Avg. No. of Trips* (#)
Trip Types						
Shopping/Personal	34	12.9	36	13.2	29	16.6
Leisure/Recreation	28	11.5	28	11.9	23	14.4
Medical/Therapy	11	4.8	12	4.9	2	3.9
Work	18	36.3	19	37.8	39	39.1
School	9	31.5	5	26.4	7	25.1
TOTAL	100		100		100	
(AVG. NO. OF TRIPS ACROSS ALL TYPES)		(29.5)		(29.1)		(54.8)

*Average number of trips are based on those who take the trip type.

Source: Grey Advertising, Inc. (1978).

TABLE 4.3

MONTHLY TRIP RATES IN MASS TRANSIT AREAS AMONG TRANSPORTATION HANDICAPPED PEOPLE AND NON-TRANSPORTATION HANDICAPPED

(Base: Total Trips Among 16 Years And Over In Each Group In Mass Transit Areas)

	% OF TRIPS BY USERS		AVG. NO. TRIPS AMONG USERS*	
	Trans. Hand. Trips (16 yrs+) (%)	Non-Trans Hand. Trips (16 yrs.+) (%)	Trans. Hand. Trips (16 yrs.+) (#)	Non-Trans. Hand. Trips (16 yrs.+) (#)
Car	71	78		
As driver	38	62	37.9	50.9
As passenger	33	16	15.2	22.3
Bus	12	9	12.3	18.5
Walking	9	5	15.5	45.2
Taxi	3	1	5.8	7.3
Subway	2	3	20.3	25.7
Personally Owned Van	1	1	20.9	45.8
Association Van	1	-	19.3	-
Other Modes (e.g., School Bus, Train, Trolley)	1	3	10.1	35.2
TOTAL	100	100		

*Based on those who take the trip type.

Source: Grey Advertising, Inc. (1978).

poverty, including income and housing supplements, health and nutrition assistance, and education and job placement. Transportation, as a vital link to essential activities such as jobs and health facilities, also has been identified as an area in which assistance should be provided to the poor, particularly in inner city and rural areas.

Data from the 1970 Census showed that about 11 percent of all U.S. families fell below the "low income level".[10] Of the 27 million low-income persons in 1970, 45 percent lived in the South. About 40 percent comprised related children under 18, and about 20 percent comprised persons over 65 years old. The majority of the low income (57 percent) lives in SMSAs and 60 percent in the central city. This highly aggregate view does not begin to describe the demographic and geographic diversity of low income persons, however.

The travel behavior of low income persons was studied for several locations during the 60s and 70s, with particular emphasis on the effects of transportation on access to jobs.[11] These studies provide considerable insight into the travel patterns and mode use of low income groups: they demonstrate the constraints on housing choice and the low levels and poor quality of travel experienced by low income persons, particularly those without cars. Recently, there has been renewed interest in the problems of transportation planning for the economically disadvantaged.[12] Initially it was hoped that providing better public transportation for the urban or rural poor would raise the level of tripmaking and employment of these groups. It is now clear, however, that the link between mobility and social goals is more complicated than was previously thought.[13] From a transportation viewpoint, planners can attempt to develop public transportation services which are convenient for lower income travelers. However, improved access to jobs or other important social activities usually cannot significantly reduce unemployment or poverty without complementary programs dealing directly with the other social activities.

The Young

Children, adolescents, teenagers, and young adults have vastly different lifestyles and attitudes. Society is deeply concerned about their problems, particularly education, juvenile delinquency, drugs and unemployment. Transportation planners usually consider them a special user group because many are precluded from driving an automobile and

---

10. "Low income level" is defined by the U.S. Department of Commerce (1972).

11. See Paaswell and Recker (1978); Gurin (1973); Falcocchio and Cantilli (1974).

12. Transportation Research Board (1979).

13. Altshuler, et al (1979), pp. 15-28.

consequently are dependent on parents, walking, bikes, hitchhiking, or public transportation for mobility. Nationally, over one-third of the population in 1970 was under 18 years of age. Since children under five are primarily dependent upon their parents for tripmaking, only one-quarter of the population comprises young people who can travel independently. While about 5 percent of the transportation handicapped are young persons, less than one percent of all youth are handicapped.[14] The proportion of persons under 18 belonging to low income families in 1970 was about 15 percent.

Travel by young people is clearly influenced by family characteristics such as income, auto ownership, and household size, but there is little empirical data which can be used to relate these characteristics. In particular, there is little evidence on whether improving mobility for young persons has beneficial impacts on the serious problems experienced by some segments. The most complete study of the travel behavior of youth examined 15-18 year old males in suburban Boston.[15] This study documents the teenagers' existing travel patterns and their relative preferences for public transportation and automobile use. The results of a study of tripmaking by 7th, 10th and 12th grade students in Pittsburgh also provided some evidence of the influences of age, sex, race, and socioeconomic status on travel.[16] Apart from the expected preferences for the independence provided by the automobile, however, neither study developed any insights which could be generalized with confidence.

PLANNING OBJECTIVES

In order to address the concerns and transportation problems of special user groups, transportation planners must recognize at the outset the extremely heterogenous nature of these groups. Many who are disadvantaged in terms of some important social criteria (race, income, education, for example) are not transportation disadvantaged, and those who do have mobility problems tend to have highly diverse travel desires.

The general objectives of transportation programs for these groups are often framed in very broad and rather vague teams. For example, the DOT program for the elderly and handicapped has the following legislative objectives:

> It is hereby declared to be the national policy that elderly and handicapped persons shall have the same rights as other persons to utilize mass transportation facilities and services.

---

14. National Cooperative Highway Research Program (1976).
15. Gurin (1974).
16. Hoel (1968).

> The Secretary shall require that mobility for elderly and handicapped persons is available in each urbanized area requesting a grant or loan under this Act.

The State of Minnesota has established a paratransit program with the following as a major objective:

> To provide transportation services for persons who because of age or incapability are unable to drive a private automobile or use existing modes of public transit.

Since the objectives of such programs lack specificity administrators at the local level have a great deal of discretion with regard to the exact nature and distribution of the benefits to be provided. As discussed in Chapter II, the benefits of these programs are determined primarily by their impacts on travel. Other benefits such as making certain locations and facilities more accessible and increasing options for travel are difficult to quantity and tend to be of secondary importance. The effectiveness of transportation services designed for special user groups depends, then, on the benefits associated with changes effected in travel behavior and on the costs of providing the services.

Decisions on the levels of travel benefits to be provided and the targeting of those benefits to a particular subgroup of the eligible population are largely the responsibility of local decision-makers. The planner's task is to provide information which will assist these decision-makers to choose between the various options available. Often decision-makers need to consider alternatives for some fairly general service characteristics before they can refine their overall objectives to the level of specificity needed for detailed planning. Alternatives for the size of the service area, the fare levels for different user groups, maximum numbers of trips per person per month, and the time in advance that service requests must be made need to be discussed prior to the formulation of specific service proposals.

For markets like special user group travel in which specific objectives are difficult to identify in the early stages of the planning process, planners need to be able to provide decision-makers with general information on what can be achieved and at what cost. This information can then be used as a basis for refining general objectives and narrowing the range of alternative project schemes. Experience in other cities with similar problems and objectives is usually the best source for this general information. Indeed, it is probably fair to say that most new projects for special user groups are based to a large degree on existing projects in other locations. This is not to imply that no entirely new ideas will be formulated during the planning process, but merely that well-organized information on previous experience provides a natural and useful starting point for planning and decision-making.

To the extent that proposals under consideration are very different from existing projects in other areas, planners will have virtually no behavioral information on which they can base demand forecasts. Several attempts have been made to assess this demand by attitudinal surveys, in which respondents were asked to estimate how many more trips they would make if certain hypothetical transportation improvements were made. For example, in a recent national survey of the transportation handicapped 29 percent of those interviewed said they would take more trips if the "ideal" type of transportation were available. The total number of additional trips suggested by these responses would amount to a 14 percent increase in trip-making by this user group. The types of additional trips desired followed the pattern of existing trip making.[17] The validity of these types of estimates is highly questionable, however, since experience has shown major differences between what people say they will do and how they actually behave once specific transportation services are made available.[18]

Changes often can be made fairly quickly to special user group projects if usage or costs depart significantly from projections. To some extent, "trial and error" can serve as a means of determining the optimal set of services, and may often be less costly and more effective than elaborate planning exercises. A thorough, ongoing evaluation and planning effort is essential of course, to ensure that desirable changes to the services are identified and implemented. One caution is in order with regard to the trial and error approach, however: once a certain set of services is implemented, institutional rigidities sometimes make even the most cost-effective changes difficult to accomplish. Consequently, a realistic assessment should be made of the obstacles to future changes before detailed advanced planning is abandoned in favor of trial and error.

SERVICE ALTERNATIVES

Public transportation services developed for special user groups over recent years have been predominantly on-call (or demand-responsive) and door-to-door, with most of the variation occurring with respect to the amount of advance notice required for trip requests. Some projects provide response times comparable to conventional taxi service, with essentially no advance notice required, while for others trip requests must be made anywhere from two to twenty hours in advance of the desired trip time. Some door-to-door services are provided on a subscription basis, where passengers have regular bookings for the same trips at the same times each day or week.

17. Grey Advertising (1978).
18. Hartgen and Keck (1976).

A major policy initiative developed in the mid-1970s to make conventional transit and other public transportation services fully accessible to certain handicapped groups. This initiative grew out of Section 504 of the Rehabilitation Act of 1973, and was formalized in 1979 in a set of DOT regulations which mandate certain modifications to transit systems within defined time frames. A great deal of debate has surrounded these regulations, with many parties arguing that providing subsidized door-to-door services would be a more cost-effective means of meeting travel demand by handicapped groups.[19] The questions of adequate accessibility to public transportation systems and adequate mobility for handicapped persons appear to have become somewhat confused during this debate.[20] In mid-1981, DOT relaxed the fully accessible requirements and allowed greater local discretion in meeting the needs of the elderly and handicapped.[21]

Transportation services can be provided to special user groups in several ways:

- By volunteers and staff in private automobiles;
- By direct earmarked subsidy to the client (user-side subsidies);
- By human service agencies with their own vehicles; or
- By contract with a human service agency, conventional transit providers, or taxi operators.

Many people in both the transportation planning community and the human and the social service community have questioned whether transportation expenditures are being used efficiently and whether they are really meeting the needs of the people for whom they are intended. It has been argued that the funds are often used at the community level in fragmented and duplicative ways, and that there is redundancy in some geographic areas and to some target groups and a complete lack of service in other areas and to other target groups. The solution advocated for these problems is greater "coordination" of transportation programs.

Coordination can have different meanings to different people at the federal, state and local levels. For example, some consider that genuine coordination implies service regulation and integration under one authority, while others consider mere cooperation and exchange of transportation information as adequate coordination. A recent study of

---

19. National Research Council (1979), Congressional Budget Office (1979).
20. Meier (1981).
21. U.S. Department of Transportation (1981b).

coordinating transportation services for the elderly identified four major elements of the process of coordination:

- demand management -- restructuring demand to allow for an optimal utilizaton of existing capacity, by pooling like trips, and smoothing out peaks in the time profile;

- supply management -- restructuring supply to eliminate fragmentation and duplication, and to introduce incentives for efficiency;

- service allocation -- determining what kinds of services should be provided, and how they should be distributed among the eligible population;

- service function coordination -- performing certain functions, such as dispatching or vehicle maintenance, jointly for more than one provider.[22]

The objective of coordinating transportation services is to provide more cost-effective services. There are several ways in which the cost-effectiveness of special user group services can be improved:

- Reducing management and administrative costs;

- Reducing service duplication;

- Generating economies of scale through quantity purchases of vehicles and supplies; and

- Improving vehicle productivity.

The notion that improved coordination is a sure means of achieving one of these outcomes has been widely and rather uncritically accepted until relatively recently. However, experience with major coordination projects in a number of U.S. communities has led to the following conclusion:

> It is an illusion to believe that simply coordinating human service agency transportation and mass transit services for the elderly and handicapped will lead to better utilization of resources. There is not yet any conclusive evidence that cost savings can be attributed to coordinated transportation.[23]

Coordination proposals therefore must be regarded with the same skepticism as any other service proposals; the costs and benefits associated with the proposals must be estimated and compared for

22. Ernst et al (1980).
23. Cutler (1979).

cost-effectiveness with such other alternatives as lowering user payments or reducing service response times.

ASSESSING IMPROVEMENT STRATEGIES

The special user group programs discussed in this chapter are directed primarily at the elderly and handicapped population singled out for special attention by Congress. The first section of the chapter emphasized, however, that not all elderly and handicapped persons are transportation disadvantaged in the sense that they have difficulty using conventional transportation modes. Other special user groups such as the economically disadvantaged and the young in some respects are more transportation disadvantaged than many elderly and handicapped persons, and at various times these latter groups also have been given special attention under public transportation programs.

A characteristic which is common to virtually all types of travel demand served by special user group programs is that of relatively low demand density: for any given area and time period, only a small number of trips generally are made. This characteristic makes sharing of special user group rides difficult to accomplish, and results in overall costs per passenger trip and per passenger trip mile which are quite high by comparison with home-to-work and general purpose programs. High per passenger trip costs imply that only a relatively small number of trips can be served for a given program budget. Consequently, efforts are often made in administering special user group programs to restrict services in ways which maximize the level of ride sharing, or to limit the trips made under the programs to those which are of the greatest social concern.

A great deal of diversity exists in special user group programs with regard to eligibility of users, types of services which can be subsidized, and administrative procedures for disbursing subsidy funds. Kirby and Miller (1983) describe a number of established programs in areas of different sizes and present case studies and references as sources of more detailed information. The information from these programs permits some generalizations about the benefits, costs, and cost-effectiveness of different approaches to serving special user group travel, as will be discussed in the following sections. However, planners designing new services should review the detailed descriptions of programs relevant to their own local objectives and conditions to obtain specific information on demand and operating conditions.

The Distribution of Benefits

The travel impacts that have been monitored in numerous programs suggest that the mobility benefits of special user group programs are enjoyed by relatively small subgroups of the eligible users. In one program more than 70 percent of the trips were made by just nine

percent of the eligible users; for another all of the trips were made by five percent of the eligible users; and on one lift-equipped bus service all of the trips were taken by about five percent of those eligible. These results are consistent with the argument made earlier that broadly defined special user groups such as the elderly and handicapped are very diverse with respect to travel demand, and that only small subgroups will actually respond to these kinds of public transportation improvements.

If the particular subgroups being served by special user group programs are in fact those of greatest concern to decision-makers, then the programs are properly targeted. The low participation rates raise the possibility, however, that the programs are not responding to the needs of some of the most disadvantaged persons. Careful investigation of this possibility seems to be required. Given that the funds available for these programs are limited, and that the costs per trip are very high, efforts should be made to ensure that the programs really are reaching the most needy subgroups. Some special "outreach" initiatives might be worthwhile, perhaps using existing organizations and agencies working with the user groups concerned.

Another important feature of the mobility benefits of many programs is that the proportions of trips which would not have been made without the programs were relatively small: from about 10 to 35 percent. Well over half of the trips served by the programs would have been made by existing modes of travel, such as automobile passenger or driver, full fare taxi, or walking. The effect of the programs for these latter trips is simply to provide a more convenient mode of travel than that which otherwise would have been used. This conclusion raises another question for decision-makers: should greater efforts be made to target special user group programs to serve new trips, or is the type of result reported above a satisfactory outcome? Though administrative requirements and uncertainty about demand responses impose practical limits on the extent to which greater targeting can be accomplished, some shifts in program impacts away from existing trips and toward new trips could be achieved if this were considered desirable by decision-makers.

The question of predicting the demand for special user group programs was discussed briefly in earlier sections of this chapter. The response to special user group programs will be very sensitive to a number of different features of the programs:

- the eligibility criteria for users;
- the types of services subsidized (shared taxi, fixed route, advance request dial-a-ride);
- the procedures used for certifying eligible users;
- any special limits on the number of trips per person per month or on trip lengths; and

- the fares charged (flat fare, zone fares, distance based fares).

Given such diversity, the best approach planners can take to demand estimation for a proposed new program is to find existing programs in other areas with similar design features. The revealed travel behavior in these cases then can be used as a basis for prediction.

Mobility and Accessibility

The benefits sought from special user group programs are almost exclusively those associated with improving the mobility of the eligible users. Most programs of this type tend to increase overall VMT slightly, and therefore cannot claim any of the benefits associated with VMT reductions. The potential impact of special user group programs on residential location decisions and urban form generally appears to be negligible due to the limited number of users and the geographical dispersion of their trip origins and destinations.

One significant kind of benefit of special user group programs is really distinct from the mobility benefits, however. It has become clear from the policy debate on making public transportation systems fully accessible to certain handicapped groups that accessibility itself has a great deal of value for certain groups in the community. Prior to mid-1981, DOT regulations required that all public transportation services be made fully accessible to wheelchair users within set time periods. While for paratransit services the requirement meant only that enough vehicles be equipped to provide comparable service to wheelchair users (a relatively small number of vehicles since overall demand is very low), for conventional transit services all new vehicles and facilities had to be equipped and much of the existing system modified.[24] After the accessibility benefits of this strategy were weighed by decision makers against the questionable performance of the strategy with regard to mobility benefits, the DOT accessibility requirements were changed to provide more flexibility at the local level.

The changes in the DOT accessibility requirements give more options. Since the requirements have been relaxed and greater emphasis can be given to mobility benefits, local planners should be considering programs like the Milwaukee User-Side Subsidy Program and the Portland LIFT as well as fully accessible services like those in Seattle.[25]

The DOT regulations prior to 1981 have influenced some state and local decision-makers to adopt the full accessibility approach. Because of funding limitations, some of the existing "mobility programs" are likely to be scaled down or phased out completely as cities move

---

24. For a review of this experience at over 20 transit systems, see Casey (1981).

25. See Case Studies S1, S3, and S4 in Kirby and Miller (1983).

toward fully accessible transit systems. This undoubtedly will mean that fewer trips desired by special user groups will be served by DOT programs, and greater reliance will be placed on programs funded by other agencies at the federal, state, and local levels. Local planners in these circumstances will be faced with the task of maximizing the travel benefits which can be derived by efficient use of social agency programs and any other funding available for special user group transportation.

Coordination and Administration

Efforts to increase the cost-effectiveness of special user group programs through greater coordination have not been very successful to date.[26] A series of demonstration programs funded by HEW produced disappointing results with regard to cost reductions, though some service improvements apparently were achieved.[27] Publicly funded brokers for social service agency transportation in Knoxville (Tennessee) and Mountain View (California) improved service delivery systems somewhat, but probably not enough to justify the costs of the brokerage activities.[28] A coordination approach employing user-side subsidies is being tried in San Diego (California) under an UMTA demonstration grant. Pittsburgh (Pennsylvania) also had UMTA demonstration funding for a coordination effort, in this case employing competitive contracting procedures to assign providers to different service areas.[29] Experience to date suggests that generating enough benefits to justify the heavy start-up and significant ongoing costs of the coordination activities will be a difficult undertaking for all of the approaches.

A number of different administrative approaches have been employed for special user group programs. The Portland LIFT program employed a combination of minibuses operated by the transit authority and taxicabs operated by private taxicab companies, and found that the taxicabs were the lower cost providers. (The same conclusions have been reached in a very similar project managed by the Metropolitan Transit Commission in Minneapolis-St. Paul.) Other cities such as Milwaukee, Kansas City, and Oklahoma City also have found taxicab companies to be cost-effective providers of services for special user groups. And Cox and Rosenbloom (1978) suggest that many human service agencies would obtain more transportation services for their budgets if they used taxicab companies rather than operating their own vehicles.

The opportunity to involve private providers in special user group programs exists in virtually all large communities and also in many small communities. Services provided by private companies can be subsidized through provider-side contracts based on vehicle-hours, vehicle-miles, or other measures of service delivered, or through user-side subsidies in which eligible users purchase services with

26. Ernst et al (1980).
27. Burkhardt et al (1979).
28. Juster (1980), Cooper (1978).
29. See Case Study S2 in Kirby and Miller (1983).

discount tickets or charge slips and providers are reimbursed for the full value of the tickets collected. The specific advantages and disadvantages of these approaches are discussed by Kirby and Ernst (1981) and Kendall (1980). A new "how-to" report on implementing user-side subsidy programs by Cambridge Systematics (1982) is available.

Much of the cost of any special user group program is due to administration, and considerable potential for improving their overall cost-effectiveness lies in streamlining administrative practices. Overly elaborate central management and dispatching systems can consume resources which could be used for generating mobility benefits. Planners should pay careful attention to the adminstrative costs involved in alternative proposals and ensure that these costs are matched with commensurate benefits.

CHAPTER V
GENERAL PURPOSE TRAVEL

Public transportation programs directed at general purpose travel demand, rather than exclusively at the high density home-to-work or low density special user group markets, are usually seeking the benefits which can be derived from improving the mobility of the general population, making certain locations more accessibe, or reducing vehicle miles of travel. The benefits of general purpose programs are determined primarily by the impacts they have on travel, and the interpretation of these benefits may vary greatly depending on the program and the location. For example, a program in a small city may place great value on increasing shopping trips to the downtown, while a program in a suburban area may be more concerned with serving work and social travel. Service in low income inner city neighborhoods may be aimed primarily at work and other essential trip purposes for local residents.

Low density living patterns in suburban communities, small towns, and rural areas result in travel that is scattered with regard to both space and time. Even living patterns in high density areas such as inner city neighborhoods and activity centers like CBDs often result in dispersed travel that is difficult to serve with high occupancy public transportation modes. In large metropolitan areas the low demand for public transit in suburban areas and the low ridership during off-peak periods such as evenings and weekends has contributed to rapidly increasing deficits for conventional fixed route transit systems.

In this chapter we discuss general purpose travel and review the public transportation services suited to achieving local objectives with respect to this category of travel demand. General purpose programs typically have a more complex set of objectives than home-to-work or special user programs, and planning these services often involves predicting and trading off several different kinds of impacts. The basic input required for this task is a quantitative description of the changes proposed projects are likely to effect in the travel behavior of different socioeconomic groups in the general population.

TRAVEL DIMENSIONS

As automobile ownership and use have increased each year, persons with access to cars have experienced higher levels of mobility. As residences, jobs, and other activity centers have spread throughout the suburban areas of large cities as well as around smaller cities and towns, more and more locations and facilities are accessible only by

automobiles or taxicabs and limousines; conventional transit systems simply do not serve many of these locations. In medium and large metropolitan areas, scheduled bus and rail services carry large numbers of home-to-work commuters along radial corridors leading to the CBD, but provide only limited service to shopping, recreation, health and school facilities throughout the remainder of the area. Taxicabs and limousines carry persons on business trips, to medical services, for shopping and even to work in urban areas of all sizes, and in many suburban communities, smaller towns, and rural areas taxicabs are the only form of public transportation available. In most urban areas with transit, the amount of transit service provided has declined over the past twenty years, particularly during the off-peak hours such as evenings and weekends.

In grouping certain public transportation programs under the heading of general purpose travel, we are distinguishing them from programs which are directed exclusively at one or other of the two travel markets discussed in earlier chapters: high density home-to-work travel and special user group travel. The characteristic defining a general purpose program is that such a program has the objective of serving a number of different travel markets in place of, or in addition to the home-to-work and special user group markets. A small city transit system, for example, may serve home-to-work travel during the morning and evening commute hours, shopping trips during the midday, and recreation trips for school children in the late afternoon and on weekends. General purpose programs of this kind typically have a number of target sub-markets which they seek to serve with the same vehicles at different times of the day.

Planners designing general purpose programs need to be conscious of the different sub-markets which the programs might serve. It may be desirable to vary the fares or service levels provided by the program to respond to these submarkets: high transit fares may be appropriate during the commute hours when demand peaks, for example, while low transit fares may be considered as a means of promoting midday movement within a central business district. Similarly, a bus system can offer special high fare subscription services in the commute hours for regular home-to-work travel, and route deviation services in the off-peak to serve those who greatly value door-to-door service. In this sense, general purpose programs may have several different service forms which change with time or location to match variations in demand.

Any attempt to characterize the market for general purpose public transportation programs must begin with a recognition of the current dominance of the person travel market by the private automobile. In 1970 about 85 percent of all person vehicular trips were by private automobile, with 50 percent as a driver and 35 percent as a passenger. The low population densities which characterize U.S. cities favor the automobile as a means of travel, and for those with convenient access to this mode even the best public transportation services appear highly

inferior. Though many would wish it otherwise, the private automobile in one form or another is likely to continue its dominant role in the person travel market for the forseeable future.[1]

Public transportation programs must seek the areas of the travel demand market in which the private automobile is vulnerable to competition. The most obvious areas are those in which the private automobile is simply not available:

- People who cannot qualify for a driver's license because of age or disability: children, and certain elderly and handicapped persons;
- People whose family incomes severely restrict automobile ownership and use;
- People visiting other cities without their own automobiles, for either business or recreation purposes;
- Areas of cities in which automobiles are banned; and
- Families in which the use of available automobiles by some members leaves other members without access to an automobile.

The next most promising travel markets are those in which automobile use is relatively time consuming or expensive:

- Congested central areas and home-to-work corridors in which public transportation modes have priority treatment; and
- Travel to downtown or other areas in which parking is expensive or difficult to find.

Just as certain promising travel markets can be identified for public transportation, markets in which it will be very difficult for public transportation to compete with the automobile can also be identified:

- Travel to suburban shopping centers for groceries and other goods which must be carried home by the traveler;
- Social, medical and recreation travel to widely dispersed locations and at varying times; and
- Home-to-work travel along free flowing corridors or to locations with abundant free parking.

For these travel markets public transportation modes may be able to attract only people without convenient access to automobiles, and then

1. U.S. Department of Transportation (1980b).

only at high per passenger costs because of the relatively low demand densities.

The notion that general purpose public transportation programs should identify and concentrate on promising travel markets is an important one for planners and decision-makers. Committing large sums of public funds to luring private automobile users to public transportation in markets where the automobile is a highly superior mode will not be very productive. Concentrating on markets in which the automobile is not so dominant, on the other hand, should result in public transportation resources being directed to those areas in which they can generate the greatest social benefit.

PLANNING OBJECTIVES

The objectives of general public transportation programs are likely to be framed in even more vague terms than those for special user groups discussed in the previous chapter. The purposes of the UMTA program for public transportation quoted in the opening chapter illustrate clearly the paucity of legislative direction available to planners and decision-makers on the use of UMTA funds. Public transportation programs formulated and administered by state governments typically provide a similar lack of precision with regard to the objectives or benefits to be pursued under the programs.

The absence of well-defined objectives gives a great deal of discretion to local decision-makers in disbursing program funds. This wide discretion creates some problems for planners, however: in order to formulate and evaluate worthwhile public transportation proposals, they must first divine the kinds of program impacts which will be most favorably received by decision-makers. Should program funds be directed at keeping fares low, or at improving service levels? Should special emphasis be placed on making certain locations more accessible, such as struggling business and commercial areas? How important are VMT savings compared with improving the mobility of disadvantaged groups such as the low income and the transportation handicapped?

Addressing these general questions about program objectives to decision-makers is unlikely to elicit very much specific guidance for planners. Where the objectives of public programs are unclear it is usually necessary to present some initial proposals to decision-makers, and to use their comments on these proposals as a guide for developing more refined proposals. This iterative process helps decision-makers to interpret community goals in terms of specific proposals, and helps planners to identify the kinds of proposals which deserve serious investigation and evaluation.

The broad range of possible impacts of general purpose public transportation programs often presents decision-makers with some difficult trade-offs. Devoting increased funds to expanded rush hour

services may mean reductions in midday services to inner city neighborhoods, for example. Providing low off-peak fares for the elderly and handicapped may mean that fares for the general public must be increased. A policy of low fares for a city-wide dial-a-ride system may mean that passenger waiting times must be relatively long in order to restrain demand, whereas a high fare might permit service to be offered with lower waiting times. Planners need to be able to identify and (if possible) quantify these trade-offs for decision-makers in order to obtain their views on the relative importance of different program impacts.

Predicting the likely impacts of different public transportation programs is a difficult task for the planner. Generalized information on traveler response to different short-range public transportation options is currently very limited. Although several efforts are underway to develop demand models and market survey approaches, perhaps the most reliable basis for prediction at the present time is the information which can be obtained from actual projects in similar environments. A growing number of demonstration projects and case studies can be found for which both operations and impacts have been documented in detail. By drawing upon this body of knowledge planners can often find sufficient guidance to develop reasonable estimates of the impacts of proposed projects. Considerable uncertainty may accompany many of these predictions, however; a fact which should be recognized explicitly by both planners and decision-makers.

SERVICE AND PRICING ALTERNATIVES

General purpose public transportation programs may employ any of the numerous short-range public transportation options available, either singly or in combination. A particular program might offer only conventional fixed route transit, for example, or it might offer conventional transit in the rush hour and some form of route deviation in the off-peak. A different program might employ subscription service during the commuter hours and a dial-a-ride service during the remainder of the day. Taxicabs might be used to provide feeder services from low density areas to conventional transit routes. Peak hour fares might be based upon distance traveled while off-peak fares are a flat rate. The selection of service or pricing options as part of a general purpose program will depend on the different travel markets served by the program.

The range of short-range public transportation services can be divided conveniently into two categories: conventional transit and paratransit. Conventional transit includes all those services which operate on a fixed route and a fixed schedule, and can be provided by the common large diesel buses, by electric trolley buses, by light or heavy rail cars, or by smaller buses, vans, or even taxicab vehicles. (Though changes in rail services which involve constructing new track would not be considered short-range, changes in headways or fares would

be included in this category.) Paratransit includes those services in-between conventional transit and the private automobile: car rental, taxi, dial-a-ride, jitney, car and van pooling and subscription services.[2] Different kinds of vehicles can be used for several of these services: dial-a-ride can be provided by taxicabs or by small buses, for example, and subscription services can be provided by buses, vans or taxicabs.

Some paratransit services are relatively recent arrivals on the public transportation scene. Route deviation services usually operate on fixed routes and fixed schedules but may divert in response to telephone requests to provide door-step service. Check-point dial-a-ride systems provide shared ride services to and from designated check-points or stops rather than from door to door as for conventional dial-a-ride.[3] And shared ride auto transit (SRAT) is a hitchhiking or jitney service provided by private automobiles to an association of drivers and riders, as described in Chapter III on home-to-work travel. Experiments are being designed and conducted for all of these new services with the objective of determining their potential for serving various travel markets.

Matching these service alternatives to travel markets to maximize net social benefits requires an understanding of their respective costs and travel impacts under various kinds of conditions. Experiments and case studies being conducted by UMTA, by state governments in the U.S., and by other countries are gradually increasing this understanding, though only a limited amount of information currently can be generalized with confidence. A later section of this chapter synthesizes the results from a number of actual projects into some broad planning guidelines.

As tight government budgets at the federal, state, and local levels have reversed the steady growth in transit subsidies experienced during the 1970s, many public transportation systems have raised fares in order to generate more revenues. Fare policy decisions traditionally are made in response to financial crises and thus may only reflect short-term political considerations. The results of recent research and experimentation with alternative pricing options suggest that greater attention should be paid to fare policies which recognize the various travel submarkets and which place proper emphasis on cost-effectiveness in meeting specific transportation objectives. Some general guidelines for pricing policies are presented later in this chapter.

In addition to services which actually transport passengers from one place to another, consideration has been given in several locations to a travel brokerage function which would help potential public

---

2. Systan, Inc. (1979) presents a comprehensive guide to implementing dial-a-ride services.

3. Miller and Everett (1980).

transportation users to find the travel mode most responsive to their needs. Proponents of this concept envisage the following scenario:

> ...people calling a centralized broker who will not operate any service at all but will determine the individual's origin and destination, travel time and special needs. Once this information is obtained the broker will locate the most appropriate transit or paratransit service and give the caller instructions for obtaining the service, much as a travel agency does for the airline traveler.[4]

The success of such a scheme will depend on whether or not the travel broker can generate enough benefits to justify the costs of his activities, just as the travel agent and the stockbroker must cover the costs of their activities through commissions paid by the buyers and sellers they serve. The results of some demonstration projects employing brokerage functions are discussed later in this chapter.

As for the special user group market, many transportation analysts and practitioners have argued for greater coordination of the transportation programs and services directed at general purpose travel. Proponents of this view argue as follows:

> ...the present approach to implementation can be effective for particular markets, but it is unlikely to provide an integrated, coordinated system. It is also unlikely to achieve economies of scale in planning, marketing, and maintenance activities. This lack of coordination will become more of a problem as resources become more limited and inefficiencies become increasingly intolerable.[5]

Demonstration projects have been funded by UMTA and other government agencies to explore the costs and benefits associated with various techniques to encourage greater coordination of general purpose programs. The results of such projects are beginning to shed light on the value of different coordination approaches, and some of the indications are discussed later in the chapter.

ASSESSING IMPROVEMENT STRATEGIES

The general purpose programs considered in this chapter include all those programs which are not limited solely to the home-to-work or special user group markets. These programs usually have multiple objectives, seeking benefits from mobility improvements, from VMT reductions, and also from impacts on land use and urban form. To some extent these objectives may be conflicting: improving mobility between

4. Davis (1979), p. 14.
5. Transportation Research Board (1979), p. 73.

the suburbs and central areas by expanding transit services may promote more "urban sprawl", for example, and adding public transportation services during low demand periods may actually increase VMT because of the extra miles traveled by the public transportation vehicles.

Most public transportation funding is directed to general purpose programs. Virtually all conventional transit services would be included in this category; the home-to-work and special user group portions of the services are rarely separated from the "base service" (though in many cases they could be). While general purpose programs account for the most funding and activity in public transportation, they are perhaps the least well understood of the three major program categories. Explicit home-to-work and special user group programs are relatively new initiatives and have received a great deal of attention and analysis in recent years. General purpose programs can now be provided almost exclusively by transit authorities for many years and most of the attention and analysis devoted to these programs has come from within the transit authorities themselves. The procedures used for planning these services have not been well-documented, and undoubtedly have relied to a considerable degree on the judgment of senior transit authority staff.

A growing number of innovative and well-documented general purpose programs can now be found, however, and Kirby and Miller (1983) provide case studies and references as sources of detailed information. The general guidelines that can be drawn from these programs follow below.

Mobility Impacts

A review of many general purpose progrms suggests that the majority of the trips served would have been made in the absence of the programs (as was found in Chapter IV for special user group programs). The programs therefore have generated mobility benefits resulting from the fact that most of the users have found a more convenient mode of travel, and some of the users have made trips they otherwise would not have made.

Some substitution between different public transportation modes, such as taxis and transit, also is evident in many programs. It should be expected that different public transportation services would be close substitutes for some kinds of travel demand. The extent of the substitution between modes is likely to vary from program to program, of course, and presents a difficult prediction problem.

Impacts on Vehicle Miles of Travel

The impact of general purpose programs on VMT appears to be mixed. The introduction of some new commuter services may attract most of the riders from automobiles. Much of this VMT savings may be offset, however, by underutilized off-peak services.

Many of the dial-a-ride systems listed in Kirby and Miller (1983) undoubtedly effect net increases in VMT in their communities: the miles generated by the public transportation vehicles probably exceed the miles saved from reductions in automobile travel. Experience from many programs would suggest that even the fixed route and route deviation systems probably effect little or no VMT reduction. In general, it seems that the home-to-work portions of these programs probably do reduce VMT but the other portions increase VMT, with the net effect dependent on the mix of these two offsetting elements.

Impacts on Land Development and Urban Form

The impacts of general purpose programs on land development and urban form are extremely difficult to quantify. These are longer run impacts, and are difficult to isolate from other forces affecting development. Some anecdotal evidence suggests that land values have increased somewhat along the Minnybus routes in Westport, but no firm evidence exists. As discussed in Chapter III with regard to home-to-work programs, public transportation services which reduce the cost of long trips from suburban areas to city centers probably tend to encourage increased suburban development. This impact is particularly relevant to the home-to-work portions of general purpose programs, though the extension of midday, evening, and weekend services to remote suburbs also reinforces development in those areas. While current data do not permit quantification of these impacts, the general direction is fairly clear.

Fare-free programs have been advocated as a means of helping to revitalize downtown areas, and the extra travel generated certainly would appear to contribute to that goal. However, a study by Ernst (1979) of 40 medium-size SMSAs found no significant impact on downtown retail sales from the increased transit ridership accompanying transit improvements. (In fact, the most important transportation variable in this analysis was found to be parking cost, suggesting that policies to facilitate midday parking may be much more effective than transit improvements in boosting retail sales.) The study suggested that transit improvements may make a significant contribution to the overall attractiveness of downtown areas, and thereby have an indirect effect on improving retail sales.

The Distribution of Benefits

The distribution of benefits generated by general purpose programs is a question which receives relatively little attention from planners and decision-makers. While special user group services such as reduced fares for certain groups may be given explicit attention as elements of general purpose programs, the distribution of the benefits of general services is rarely quantified or discussed. The possible impact of new services on land values in affluent suburbs, for example, raises an important equity question: is the enhancement of real estate values in

well-to-do communities a desirable impact of publicly funded transportation programs? A similar question arises with regard to fares for transit services in high-income areas: should public transportation programs provide subsidized fares below the levels high-income commuters would be willing to pay? These questions have been raised repeatedly by transportation researchers since the inception of public transportation programs, but have not generated much concern among planners and decision-makers. (This situation could change, however, if future funding limitations result in greater emphasis on targeting assistance to disadvantaged groups.)

One aspect of the distributional question which has been brought to the attention of decision-makers is that of discrimination in the provision of public transportation services. In 1977 the City of Hartford filed a complaint with the U.S. DOT alleging that the distribution of transit services in that city discriminated against minority groups located in the central area. The complaint was upheld, and the state of Connecticut (the agency responsible for transit in Hartford) was ordered to remedy the situation. The implications of this case for public transportation systems in other cities still are unclear. In an in-depth study of discrimination in mass transit, Kulash and Silverman (1974) argued that "methodological problems such as the allocation of costs, routes, and services by race and the isolation of race from other factors such as income or place of residence, make empirical proofs of discrimination nearly impossible". If they are correct, the inclusion of discrimination questions in the evaluation of public transportation proposals will pose some difficult problems for planners and, in turn, for community decision-makers.

The Performance of Conventional Transit

Conventional transit programs have evolved from policies of deficit coverage which were initiated in the 1950s and 1960s. During this period private transit companies became unable to operate at a profit services which were deemed to be "essential" by public regulators and decision-makers. Over the last two decades the public contribution to transit services has increased steadily, but usually without any detailed analysis of the costs and cost-effectiveness of different kinds of transit programs. Transit systems have typically been looked at as a whole, and overall levels of public subsidy have been established on the basis of general standards for fare levels and route coverage. As public transportation funding has become more limited, however, greater attention gradually has been directed at the costs and benefits of particular kinds of transit programs.

A great deal of effort is currently being devoted to developing and applying measures of "transit performance".[6] Virtually all of

6. See, for example, Public Technology, Inc. (1978).

this effort appears to be concerned, however, with measures of the internal operating characteristics of transit systems (such as bus availability, schedule adherence, and labor productivity), rather than with external measures (like cost per unit of VMT reduced or cost per passenger trip mile) which gauge the contribution of transit services to the performance of the transportation system.[7] It is rare, for example, to see measures of the incremental costs, benefits, and cost-effectiveness of particular transit service changes, fare adjustments, or marketing programs presented as justification of such proposals. (A lack of such measures creates severe problems in areas where transit deficits must be allocated between jurisdictions: crude and inequitable allocations are often inevitable in these cases.) Computation of these measures is feasible given the relatively extensive data bases mandated by the federal government for transit systems. Procedures are available to help systems accurately estimate the incremental costs of service changes.[8]

Demand-Responsive versus Fixed Scheduled Services

One major planning issue for suburbs and small communities is the cost-effectiveness of door-to-door dial-a-ride relative to fixed route transit services in low density areas. In the abstract it would seem that as densities decline dial-a-ride services at some point would become more cost-effective than fixed route services: operating vehicles only when trips are requested should provide savings over operating the extensive route mileage required to maintain fixed route services. Programs in Danville, Illinois, and Westport, Connecticut, provide some insight into this issue for small communities.[9] In Danville, a fixed route transit system called the Runaround was tested in addition to a shared taxi program. The Danville Runaround had a cost per passenger trip mile only slightly lower than the average shared taxi fare, suggesting that at the demand levels found in Danville, a dial-a-ride system would be just a little more costly than fixed route transit. The Westport cost per passenger trip mile was substantially lower than the shared taxi fare, however, and for similar service levels and fares a fixed route service seems to be the most cost-effective option.

A program in St. Bernard Parish (a suburb of New Orleans) provides another perspective on the dial-a-ride versus fixed route question. These fixed route services in low demand areas were replaced by a shared taxi feeder service to a remaining bus route; city-bound passengers call a taxi to take them to a bus stop and home-bound bus passengers ask the bus driver to radio for a taxi to meet them at a bus stop. This service has been shown to be a cost-effective alternative

---

7. Kirby, et al (1979).
8. Cherony, et al (1981).
9. See Case Studies G1 and G2 in Kirby and Miller (1983).

to operating fixed route services in areas or at times of low demand density.[10] Programs in Chesapeake, Virginia, San Diego, California, and Memphis, Tennessee are recent applications of this concept.[11] Though this taxi feeder scheme has had only limited application, it appears to be a very good candidate for consideration by public transportation planners.

Another potentially cost-effective alternative for low ridership fixed route situations is the substitution of lower cost fixed route providers. Public transit providers typically operate large bus or rail vehicles and must pay relatively high driver wages. Where a small bus, van, or taxicab can provide adequate capacity it may often be worth substituting such providers for large transit buses. Examples in Silver Spring and Chapel Hill (North Carolina) have demonstrated how this technique can be applied to reduce the costs of fixed route operation. The transit agency in Phoenix (Arizona) in 1981 reintroduced Sunday service by contracting with a taxi company to provide dial-a-ride service.

Brokerage and Coordination

Proposals for increasing the cost-effectiveness of general purpose programs are those involving travel brokerage and coordination. As described in the second section of this chapter, a publicly funded travel brokerage function would operate rather like a travel agency does in facilitating airline travel. By making it easier for travelers to identify and purchase the most convenient services for their particular trip origins and destinations, the travel brokerage function ideally would increase the benefits generated by public transportation services to a degree which would justify the costs of the brokerage activity. This technique can be applied to home-to-work, special user group, or general purpose travel markets.

The first large scale attempt to operate a travel brokerage function was located in Knoxville, Tennessee. This program included efforts to obtain institutional changes and introduce new services as well as to provide a brokerage function for the home-to-work and special user group markets. Because the program was so complex and involved many different initiatives at different times over a three year period, it is virtually impossible to separate out the costs and benefits associated with the brokerage element. It has been concluded in an in-depth evaluation of the program, however, that the "overall impact on travel behavior in the Knoxville area was quite limited."[12] A comparative evaluation by Ott and Abkowitz (1980) of a number of projects employing brokerage functions also had difficulty isolating the brokerage elements from other elements of the programs. While the

10. Ernst and Miller (1979).

11. The Chesapeake example is Case Study G4 in Kirby and Miller (1983).

12. Juster (1980).

brokerage technique may well be a cost-effective option for certain situations, more experimentation with the technique in the absence of other complicating changes will be needed before it will be possible to formulate any general guidelines for planners.

Proposals for increased coordination of general purpose programs have essentially the same objectives as those for coordination of special user group programs discussed in Chapter IV: to eliminate duplication and inefficiency which may arise when several different services are planned and implemented in the same general area. Coordination programs would attempt to identify inefficiencies and redundancies in existing public transportation systems and implement management procedures to streamline the supply of services. As with the special user group market, coordination has sometimes been advocated as a self-evident benefit for general purpose programs with little regard for the costs involved.[13] There are virtually no examples available to date in which the costs and benefits of coordination schemes for general purpose programs have been carefully evaluated, and consequently no general guidelines on the efficacy of such schemes exist or can presently be developed.

Coordination can involve a number of different kinds of activities, and there is a need for a clearer definition of the specific types of coordination programs which can be implemented. If planners are to be provided with useful guidance on the cost-effectiveness of coordination approaches, the specific activities involved will have to be defined and some estimates of costs and benefits attributed to them. Until this step is taken, coordination is likely to be a notion accepted widely in principle but rarely translated into specific proposals and actions. Such a notion will be of little value to planners trying to define and evaluate the detailed components of general purpose public transportation proposals.

Pricing Strategies

The combination of growing transit deficits and shrinking public subsidy budgets requires that additional revenues for public transportation be raised from passengers and other beneficiaries of these services. The challenge for planners and policymakers is to find ways of raising these revenues while minimizing losses in benefits to the general public. Pricing strategies can make an important contribution to reducing subsidy funding while minimizing losses in desired passenger trips. The most promising of these strategies are those which can reduce public subsidies without reducing ridership: employer-subsidized passes, discounted coupons sponsored by local governments or human service agencies, and contributions by commercial establishments which benefit from public transportation services. In the longer run, schemes to capture some of the increases in land values stimulated

13. Jones (1979).

by major transit investments might also contribute significantly to reducing subsidy funding while maintaining ridership.

Current fare structures offer considerable potential for targeted increases which would result in minimal ridership losses, and for targeted decreases which might offer significant ridership increases.[14] In combination, these strategies could produce net ridership increases with little or no increase in subsidy requirements. To achieve these results, increases should generally be aimed at long rush hour trips through distance-based fares with peak surcharges, and decreases should be aimed at off-peak trips made by elderly, low income, and student riders.[15] Heavily discounted transit passes for commuters tend to be counter-productive, however; substantial revenues are lost, and few new permanent riders are generated. Fare-free policies are also of doubtful value for similar reasons, with the possible exception of those limited to movement within central business districts.

Elaborate technology and excessively complicated fare structures run the risks of both increasing subsidy costs and driving away riders. Since problems of this kind may be difficult to identify in advance, elaborate new schemes should be implemented with caution and with provisions for change if results turn out to be unfavorable.

The pricing schemes which appear to make the greatest contribution to maximizing the desired passenger trips served for given public subsidy dollars also appear to have favorable equity implications. The common theme among these schemes -- increasing the revenues contributed by those passengers and other beneficiaries most able to pay -- is generally consistent with common notions of equity in financing public transportation. These schemes also generally move in the direction of efficiency-based pricing for public transportation: fares charged various users are brought more into line with the marginal costs of providing their services. The effects of these changes on overall transportation system efficiency will be limited (and perhaps counter-productive), however, until steps are taken to reduce employer-paid parking and other subsidies for private automobile use.[16]

---

14. Lago and Mayworm (1981).
15. Cervero (1981).
16. Wachs (1981).

CHAPTER VI
THE ADMINISTRATIVE AND REGULATORY ENVIRONMENT

The public transportation planner analyzes and evaluates alternative programs within a complex environment of administrative requirements and regulatory conditions. Some elements of this environment pertain to the planning activities themselves: standardized planning procedures, detailed justifications and agreements required for obtaining funding from various levels of government, and public hearings mandated to ensure adequate participation of interested parties in the development of new programs. Other elements pertain to the conditions under which proposed public transportation modes will have to operate: regulation with regard to service types and standards, fares, and entry of new providers and services; and the regulation and pricing of the automobile and other competitive modes.

The first set of elements described above is generally beyond the control or influence of the planner; these elements are the rules under which planning activities are carried out. The second set may be subject to influence, however. Much of the pricing and regulation of public transportation and its competitor modes is in the hands of state and local governments. Public transportation planners at the state, metropolitan or local levels may be called upon to advise decision-makers on the likely impact of changes in the pricing and regulation of various transportation modes. As will be discussed later, some of these changes have important implications for the performance of public transportation programs, and consequently can be highly relevant to public transportation planning activities.

The following sections discuss various elements of the public transportation planning environment in turn, beginning with those bearing on planning activities and concluding with those defining the operating conditions for public transportation. Elements from the first set are presented essentially as planning requirements, with attention directed at how these requirements can best be met. For the second set of elements, we present various changes and alternatives to existing conditions, along with some discussion of their implications for improving the performance of public transportation programs.

PLANNING AND PROGRAMMING

While most of the detailed planning for public transportation improvements takes place in governmental and human service agencies at the county or city levels, regional planning bodies and regulatory and funding agencies at the state and federal levels typically review all

proposals in which they have an interest. These reviews are concerned in part with ensuring that legal and administrative requirements are met, and in part with the actual merits of the proposals in terms of benefits and costs. Obviously the type and intensity of review by regional, state, and federal agencies will depend on their regulatory and financial involvement, and may range from virtually no review at all for strictly local proposals to very lengthy and detailed review where there are substantial regional, state, or federal interests.

The institutional framework for planning public transportation improvements must accommodate the need for detailed study of alternative proposals at the primary decision-making level and the need for review by other levels of government with an interest in the outcome. Meeting both of these needs involves conducting a careful analysis of alternative proposals at the primary decision-making level, and reporting this analysis in a form suitable for review by other levels. Where the primary decision-making level is a local government or human service agency, this analysis requirement may be beyond the capability and resources of existing planning staff. In these cases, additional planning expertise has to be obtained, either through the use of consultants or by drawing upon planning expertise at the regional or state level.

A significant step toward the realization of a comprehensive review process for public transportation projects was taken in 1975 when the Urban Mass Transportation Administration (UMTA) and the Federal Highway Administration (FHWA) of the U.S. DOT issued joint regulations defining an urban transportation planning process required to justify applications for DOT funds.[1] These regulations place responsibility for "cooperatively carrying out transportation planning and programming" in the hands of metropolitan planning organizations (MPOs) designated by the governor of each state, with one MPO for each urbanized area or group of contiguous urbanized areas. The MPO is intended to be "the forum for cooperative decision making by principal elected officials of general purpose local government."

The shift over the last two decades away from long-range regional transportation plans to short-range local plans has raised serious questions about the future role or need for MPOs. In many regions MPOs have relatively little to say about current transportation planning activities. Further, some MPOs have responsibility for very large areas, and are not able to serve the needs of all their jurisdictions. If MPOs do not find a new and constructive role in the near future, they may find themselves in danger of extinction.

One way in which MPOs and other regional planning bodies can

---

1. U.S. Department of Transportation (1975).

facilitate short-range public transportation planning is to serve as sources of planning expertise. As mentioned earlier, local governments and human service agencies often do not have all the transportation planning capability they need within their existing staff. Regional planning bodies ususally have the resources to employ transportation planners who can keep abreast of current information and methodology as well as maintain up-to-date demographic information on their regions. These regional planners could provide valuable assistance to local governments and human service agencies in the evaluation of short-range public transportation proposals. In this role the regional planners would be assisting decision-making at the local level, rather than developing information for decision at the regional level as they typically do in long-range planning.

The fact that the review of alternative public transportation proposals takes place at the actual decision-making level with the assistance of planning staff does not mean that all of these proposals must originate from the decision-makers or their planning staff. Proposals for short-range public transportation improvements can originate from numerous sources: community groups, community development organizations, transportation consultants, employment centers, and public or private transportation providers as well as decision-makers and planners. For improvements in fixed-route transit services, for example, the transit operator would be the most likely source of proposals. Proposals for specialized subscription bus services, on the other hand, might be more likely to originate from employment centers or community groups.

In summary, the institutional framework for short-range public transportation planning should encourage proposals from a variety of sources, both inside and outside the community. It should provide for the evaluation of these proposals by the appropriate decision-making bodies (which in many cases will be local) with the aid of their own planning staffs. Staff from regional planning bodies should be available as resources to assist the planning activities. The plan developed by this process must be presented in a form which permits review by regional, state, and federal agencies where such agencies have a substantial interest.

The institutional framework outlined in the U.S. DOT joint planning regulations provides many of the elements recommended above. While it relies heavily on the MPOs for planning and decision-making, it allows for significant activity to occur at the local level. For the planning of short-range public transportation improvements to be more effective, greater emphasis must be placed on planning and decision-making at the local level. This will involve orienting regional planning bodies toward providing assistance to local decision-makers and their planning staffs. If adequate attention is to be paid to short-range improvements, the institutional

framework for planning and decision-making will have to accommodate a wider variety of procedures for proposal formulation, evaluation, and review than has been the norm for long-range planning.

EARMARKING OF PUBLIC TRANSPORTATION FUNDS

Public transportation funding provided to local areas by federal and state governments is usually earmarked in one or more of the following ways:

- by client group;
- by particular services;
- by provider organizations; or
- by types of transportation expenditure.

These restrictions constrain local decision-makers and planners in a variety of different ways. Criteria for earmarking funds vary greatly from program to program, and the agencies administering the programs often work independently of one another with little coordination of objectives and resources.

Some of the restrictions imposed by higher levels of government (those by client group or service type, for example) reflect judgments about the overall purposes of the funding and the kinds of benefits which are being sought. Certain kinds of funding may be directed to persons with physical handicaps which serverely limit their mobility, or to persons below a particular income level. Restrictions of this type are intended to target assistance to groups of special concern to policy-makers at the federal and state levels, and are particularly common in programs funded by human service agencies.[2] UMTA programs also have such requirements, however: portions of UMTA's funding are earmarked for elderly and handicapped persons.[3]

Earmarking of public transportation funds by the type of service that can be supported is also quite common. UMTA funds were restricted to fixed route transit services until around 1970 when the definition of "mass transportation" was amended by the U.S. Congress to include a broader range of services. A great deal of uncertainty existed throughout the 1970's, however, about the eligibility of paratransit services for UMTA funding. A proposed paratransit policy issued by UMTA in 1976 specified that federal financial assistance

2. Cutler and Knapp (1979).
3. U.S. Department of Transporation (1979a).

could be applied to all "collective (shared-ride) transportation services which are regularly available to the public, i.e. which cannot be reserved for the private and exclusive use of individual passengers."[4] For the next six years, UMTA approved funding for a number of local paratransit projects falling within the range delineated in the proposed policy. In October of 1982, UMTA isssued a final paratransit policy[5] which confirmed the eligibility of paratransit services for UMTA financial assistance.

Public transportation funds from human service agencies are frequently subject to restrictions on the types of trip purposes which can be served: health and nutrition trips are the only types eligible under certain programs, for example.[6] The kinds of transportation services eligible for support are not usually restricted greatly under these programs, though service standards are often mandated by state or regional administrative agencies.

In the spring of 1979 the federal government placed a new set of conditions on public transportation services eligible for federal assistance: the services were required to be accessible to handicapped persons.[7] A final rule implementing Section 504 of the Rehabilitation Act of 1973 set a three-year deadline for changes in public transportation programs needed to ensure accessibility, and instructed recipients of federal funds to prepare transition plans outlining how the changes were to be made. The rule required that all new fixed route facilities be fully accessible to the handicapped, and that by the three-year deadline at least one-half of peak hour bus service be accessible, with accessible buses used before inaccessible buses during off-peak service. Specific schedules were also provided for making rail systems accessible. For paratransit systems recipients were required to operate enough fully accessible vehicles to provide generally the same service to handicapped persons as to other persons. The cost implications of these "504 requirements" caused great concern at the federal and local level and stimulated a legal challenge from the American Public Transit Association. These requirements were relaxed by the Reagan administration in 1981 to allow more local discretion.

Some public transportation programs place restrictions on the kinds of organizations which can receive the assistance and provide the services. Section 16(b)(2) of the Urban Mass Transportation Act provides for assistance to private non-profit corporations and associations without the labor protection conditions which are

4. U.S. Department of Transportation (1976a).
5. U.S. Department of Transportation (1982).
6. Cutler and Knapp (1979).
7. U.S. Department of Transportation (1979a).

required under other sections of the Act. Approximately $20 million per year has been disbursed under Section 16(b)(2) to non-profit agencies throughout the U.S. for equipment to be used in providing transportation services to elderly and handicapped persons. This assistance has not been available to public transit systems or to private, for-profit taxicab operators, though these and other mass transportation providers could receive assistance under other sections of the Act.

Programs funded by the DOT and other agencies also restrict considerable financial assistance to certain kinds of transportation expenditures. Funds available under Section 3 of the Urban Mass Transportation Act can be used for capital but not operating expenses incurred by transportation providers. Similarly, under Section 16(b)(2) of the Act, a non-profit agency can obtain financial assistance for vehicles and other equipment, but cannot obtain assistance for expenses incurred in operating the equipment. The Medicaid program (Title XIX of the Social Security Act) on the other hand, prohibits the use of funds for equipment purchase, but allows the purchase of taxi or transit services for medical trips.[8]

The variations in criteria for earmarking transportation assistance discussed above are merely illustrative of the wide range of statutes and regulations which govern public transportation programs. These complex constraints can create a number of obstacles to the efficient and effective delivery of public transportation services. An analysis by Tye (1973) concluded that restricting transportation assistance to capital expenditures encourages premature replacement of capital equipment and inadequate maintenance. Kirby (1975) concluded that earmarking funds for non-profit providers under Section 16(b)(2) of the Act "may jeopardize the financial viability of for-profit providers concurrently serving the elderly and handicapped." And it has been argued that the tendency of the different administrative agencies to establish independent transportation services for their particular client groups often leads to unnecessary duplication of facilities and services.[9]

The number and complexity of existing public transportation programs and the obstacles to efficiency created by many of their earmarking requirements have generated great interest in strategies for improved coordination between programs. While many of the obstacles to efficiency can be changed only through legislative action (those in the UMTA 16(b)(2) program, for example), some are amenable to administrative actions by federal, state or local governments. Chapters IV and V discuss some specific proposals for coordination,

8. U.S. Department of Health, Education, and Welfare (1976).
9. Institute of Public Administration (1976).

and report on the experience in implementing them.

PARTICIPATION OF PRIVATE TRANSPORTATION COMPANIES

Since the inception of federal asssistance to public transportation in 1964 funding has been used primarily for transit services provided by the public sector (in the form of local governments or specially constituted transportation authorities). Private companies have been involved under contract to provide specialized transit management capability, but most of the facilities have been publicly owned and under the overall control of public officials and their staffs. In a few cases services contracts have been established with private transportation companies which own and operate their own equipment. The state of New Jersey had a policy of supporting all intra-state bus service in this manner until relatively recently, but has now acquired all of the assets of the major private companies for public ownership and operation.

A wide variety of private transportation companies continues to exist in the paratransit area. Taxicab and limousine companies, specialized human service companies for the handicapped, and private ambulance companies provide a great deal of publicly assisted paratransit service. As discussed in Chapter V, these companies also can substitute for public transit operators on low density transit routes if suitable subsidy arrangements can be made. In contrast to the history of transit operations, there appears to be little interest at any level of government in public acquisition of private paratransit companies, though there is growing recognition of the roles such companies can play in providing publicly assisted services.

In order to ensure that private transportation companies are given full consideration in the formulation of public transportation programs at the local level, federal and state governments have developed specific legislative and administrative provisions pertaining to the involvement of these companies. Section 3(e) of the Urban Mass Transportation Act requires "the maximum feasible participation" of private enterprise in programs funded under the Act, and UMTA is developing specific regulations to ensure that private transportation companies are "afforded a fair and timely opportunity to participate in the development of local transportation plans and programs."[10] UMTA has also required that local taxicab companies be given the opportunity to review and sign off on programs funded for the elderly and handicapped under Section 16b(2) of the Act. By directing special capital assistance to non-profit agencies these latter programs often have threatened the viability of taxicab

10. U.S. Department of Transportation (1979b).

companies by serving a portion of the taxicab market at heavily subsidized rates.

In recent years there have been a number of major efforts to involve private enterprise in public transportation programs.[11] The application of the user-side subsidy approach to programs for special user groups and (in a few instances) to general purpose programs has demonstrated one method for involving private operators on a competitive basis.[12] Provider-side subsidies in the form of service contracts have also been used extensively, particularly in California.[13] In the latter cases competitive bids generally are sought by the program administrative agency on a periodic basis, perhaps once per year. One company then is selected for each particular service area and given exclusive responsibility until the next round of competitive bidding. Successful providers are then reimbursed on the basis of in-service miles, in-service hours, or ohter measures of service provision, sometimes with quite complex financial incentives for good performance.

The advantages and disadvantages of different approaches for involving private transportation companies in public transportation programs are still the subject of much research and debate.[14] For the planner, participation of private companies presents two questions: how to satisfy program legislative and administrative provisions requiring that private companies have an adequate opportunity to participate, and how to involve those companies on a cost-effective basis. Careful consideration of specific program policies and regulations and of experience in cities which have had extensive private company involvement will be required to address these questions.

LABOR PROTECTION

Background

When federal financial assistance for the declining urban transit industry was proposed in the early 1960s, organized transit labor worked to ensure a continuation of collective bargaining and to protect employees from losing jobs due to federal capital grants or public acquisition. The Urban Mass Transportation Act of 1964

11. Kirby and Ernst (1981).
12. Kirby (1981b).
13. Teal et al (1980).
14. Kirby and Ernst (1981).

included a specific provision designed to protect employees and continue collective bargaining, Section 13(c). This section states:

> It shall be a condition of any assistance under Section 3 of this Act that fair and equitable arrangements are made, as determined by the Secretary of Labor, to protect the interests of employees affected by such assistance. Such protective arrangements shall include, without being limited to, such provisions as may be necessary for (1) the preservation of rights, privileges, and benefits (including continuation of pension rights and benefits) under existing collective bargaining agreements or otherwise; (2) the continuation of collective bargaining rights; (3) the protection of individual employees against a worsening of their positions with respect to their employment; (4) assurance of employment to employees of acquired mass transportation systems and priority of re-employment of employees terminated or laid off; and (5) paid training or re-training programs. Such arrangements shall include provisions protecting individual employees against a worsening of their positions with respect to their employment which shall in no event provide benefits less than those established pursuant to Section 5(2)(f) of the Act of February 4, 1887 (24 Stat. 379), as amended. The contract for the granting of any such assistance shall specify the terms and conditions of the protective arrangements.

This section applies to discretionary capital grants (Section 3), formula capital and operating assistance (Section 5 and the new Section 9) and demonstration funds (Section 6). Only capital assistance to non-profit organizations for the provision of special service to the elderly and handicapped [Section 16(b)(2)] is excluded from 13(c) coverage. The essence of 13(c) is that no employee shall have his or her conditions of employment worsened as a result of federal mass transportation assistance. If such worsening cannot be avoided, affected employees are entitled to compensatory benefits no less than those of the Interstate Commerce Act [Section 5(2)(f)] provides for the protection of railroad employees. The responsibility for determining that the 13(c) provisions have been satisfied rests with the Department of Labor (DOL) and not the DOT.

Although Section 13(c) does not specify how the "fair and equitable arrangements" are to be determined, the DOL has sought in practice and in its recent guidelines to base the arrangements on a negotiated agreement between affected parties. The section applies to "employees affected" by assistance under the Act, a term which the DOL and DOT have interpreted to mean mass tranportation employees of urban mass transportation carriers. Since 1967, the DOL has applied the section not only to employees of a transit organization receiving federal aid but also to employees of any existing mass transportation

system adversely affected by publicly aid d competition.[15] In order for 13(c) to apply to a particular group of employees it is not necessary to show that the employees will be affected, only that they are potentially affected.

In addition to trying to protect employees from potential harm due to public mass transportation funding, 13(c) agreements specify how a determination will be made on whether or not an employee has been adversely affected by a particular project. The determination is a finding of fact, to be made by an arbitrator. The guiding principals are that the burden of proof is on the grant recipient and that the recipient is liable if the project is found to bear any part of the blame.[16] If it is determined that an employee has lost his or her job or has been adversely affected by the project then the 13(c) provisions specify that, at a minimum, the protections and benefits under Section 5(2)(f) of the Interstate Commerce Act apply.[17] Under these protections an employee who is laid off as a result of the project could be entitled to full pay for up to six years, depending upon the employee's creditable years with the carrier.

The DOL Certification Process

The DOL has issued guidelines to provide information about the administrative procedures it will follow in processing UMTA applications.[18] These guidelines can be summarized as follows. To facilitate review, the application should estimate the effects of the federal funds on mass transportation carriers in the area of the proposed project. The effects include the possible impact upon existing collective bargaining agreements, employment rights, privileges and benefits, and the continuation of collective bargaining rights. The application should identify any labor organization representing mass transportation employees and indicate what steps, if any, have been taken to develop a 13(c) agreement.

DOL will process either preliminary or final applications as they are received from DOT. If affected employees are represented by a labor organization, the DOL will send a copy of the application to the central office of the organization. At this point, the union and the applicant will be expected "to engage in good faith efforts to reach mutually acceptable protective arrangements through negotiation." The DOL may set a target date or time schedule for the negotiations

15. Altshuler (1976).

16. Ibid.

17. As modified by the Amtrak (Rail Passenger Service Act of 1970 provisions. See Jennings et al (1978) p. 135.

18. U.S. Department of Labor (1978). New guidelines are being developed in 1983.

depending upon the circumstances of each case. In projects where the DOT seeks to approve funding by a certain date, "absent special circumstances" the DOL will establish a time schedule for labor negotiations.

After an agreement is made between the participating parties at the local level, the DOL will review it to ensure that it meets the 13(c) requirements. If it does, it will be certified by the Secretary of Labor and a letter of certification will be sent to UMTA. If it does not, DOL may grant additional time for further negotiations or the Secretary may set forth the protective terms himself. Where the parties are unable to reach agreement at the local level, the Secretary can impose the conditions for certification, or refuse to certify for specified reasons.

Non-union employees have the same level of protection as union workers under Section 13(c). If there is no employee labor organization for certain affected employees, the Secretary will establish the protective terms for those employees in the letter of 13(c) certification.

In 1975 the American Public Transit Association (APTA), and the two major transit unions, the Amalgamated Transit Union (ATU) and the Transport Workers Union (TWU), developed a "model" agreement to facilitate the negotiating process for the Section 5 formula assistance program. This agreement has been adopted by a number of recipients of UMTA funds, though some cities have refused to use it because of concern over certain sections which they consider too restrictive.

Identification of Affected Employees for 13(c) Coverage

A major question regarding 13(c) coverage is that of identifying the affected employees. Since only affected employees need to be protected by a 13(c) agreement, it is of paramount importance that this group be defined clearly for each individual mass transportation project. Until relatively recently, the only persons protected by 13(c) agreements have been the employees of public or private organizations engaged in the provision of conventional fixed route transit services. Over the last few years, however, taxicab companies and other private organizations have become involved in public transportation programs in varying degrees.

A project initiated in Akron (Ohio) in 1977 involves taxi drivers as employees of taxicab companies providing services to elderly and handicapped persons under contract to the Akron transit authority. For this project, the DOL determined that the taxi drivers were "only tangentially involved in providing project related services" and therefore were not entitled to 13(c) protections. The 13(c) agreement

stipulated that this determination would be reviewed if the relationship of the employees to the project were to change.

Under a demonstration project begun in Pittsburgh in 1978 several taxi companies are providing subsidized services for elderly and handicapped persons through arrangements with a coordination agency. After investigating the types of services and the revenues associated with each company in 1977, the DOL determined that some of the employees of one company had been providing services similar to those planned for the project and that the project had a "realistic potential of affecting them." It was determined that a minimum of 15 percent of the company's revenue had been produced by the "project type" services, and that individual employees probably had derived a greater percentage of their revenues from this type of service than the company's total of 15 percent. On the basis of this determination the DOL concluded that these company employees, "...and any other that may be similarly situated, cannot be excluded from the coverage of Section 13(c)." The DOL did not delay the Pittsburgh 13(c) certification to allow the taxicab company employees (who were not members of a union) to negotiate a specific protective agreement, but ruled that the 13(c) agreement with the transit union should constitute the level of protection for the taxicab employees as well.

The DOL is proceeding on a case-by-case basis in determining which employees should be included under 13(c) coverage. The deciding factor appears to be how much of the employer's business will be "mass transportation" under the proposed project (so called "project type services"). If the proportion is not substantial (a figure of 15 percent has been used on more than one occasion), then the employees will not be covered. If employers rely on project type services for a substantial portion of their revenues, their employees probably will be covered, either under their own separate agreement, or (as in Pittsburgh) under an agreement negotiated with another labor union in the area, or under a standard DOL certification.

In the case of taxi drivers eligible for 13(c) coverage, there may be a problem of determining whether or not they are employees and whether a protective agreement should be negotiated with them. Many taxi drivers are independent contractors who may lease or own their own vehicles. Many are part-time workers, and turnover is often high. Working hours and earnings are highly variable, and drivers are often not represented by unions. With these types of conditions, applying 13(c) requirements may become quite complex.

Since 13(c) usually requires the recipient of the federal funds to negotiate the labor protection agreement with representatives of the affected employees, the institutional arrangement between the unions and the recipient can influence the agreement. In many cases, UMTA funds a transit authority which deals directly with a transit

union representing its employees. If new workers employed with UMTA funds are to be under the direct control of the transit authority, the transit union can argue that the new workers should have the same rights as existing union members and demand the new jobs. On the other hand, if the UMTA funds go to a city or public body that is not the employer, then it could be argued, the transit union has less of a claim on the new jobs. In any case, the recipient will have to protect existing transit employees from any adverse affects due to UMTA funded projects, and it will have to provide any new employees with substantially the same levels of protection as the transit workers.

Potential Competition Between Providers

The involvement of paratransit services in UMTA funded programs over recent years has introduced providers other than transit organizations and employees in 13(c) arrangements. To the extent that paratransit and transit may be substitutes for each other, the expansion of one may adversely affect the employees of the other. Similarly, in some situations two or more taxicab companies may be competing for the same shared ride customers, either on a day to day basis through user-side subsidies or on a year-to-year basis through competitively bid service contracts. Where the potential exists for such competition between providers, an UMTA grant recipient will be responsible for protecting workers who may affect each other.

Tables 6.1, 6.2 and 6.3 list locations for each major travel market that have or have had 13(c) agreements for UMTA funded paratransit projects. These are not complete lists of all such projects, but represent those with significant 13(c) aspects. Each table summarizes the major project features and indicates when the agreements were made, the type of driver or employee providing the services, and what labor organization made the agreements. Each table indicates brief summary of any new guarantees in the agreements, and what restrictions are placed on the services provided. These tables present a general picture of these projects and the key elements of the agreements; however, many of these projects are rather complex in terms of types of services and provider arrangements and the 13(c) agreements are somewhat more involved than a simple table can convey.

To date there have been no agreements between a recipient and two groups of employees providing directly competitive services. Most of the agreements have been between transit unions and the grant recipient; or as in Danville and Westport, the DOL has established the minimum protective terms and conditions because there was no employee organization for mass transportation. In Pittsburgh the DOL ruled that some taxi company employees were covered and established that the transit union 13(c) agreement applied to them. Often the agreements

TABLE 6.1

SIGNIFICANT 13(c) LABOR AGREEMENTS
HOME-TO-WORK TRAVEL

Location	Service Providers	Agreement With	New Guarantees	Service Restrictions
Knoxville, Tenn. (1975, 1977)	Vanpool drivers	ATU	Minimum bargaining unit size; maintenance jobs	No (1975) Yes (1977)
San Francisco, Cal. (1977)	Vanpool drivers	ATU	Minimum bargaining unit size 2 yrs.	None
Norfolk, Va. (1977)	Vanpool drivers	ATU	Minimum bargaining unit size 3 years; maintenance jobs.	None
Minneapolis, Minn. (1977)	Vanpool drivers	ATU	None	None

TABLE 6.2

SIGNIFICANT 13(c) LABOR AGREEMENTS
SPECIAL USER GROUP TRAVEL

Location	Service Providers	Agreement With	New Guarantees	Service Restrictions
Oklahoma City, Okla. (1976)	Taxi drivers	ATU	Transit jobs if new vehicles or if service becomes scheduled	Only E&H
Akron, Oh. (1977)	Taxi drivers	TWU	"Standard APTA"	Only E&H
Montgomery, Ala. (1976)	Taxi drivers	ATU	None	Only E&H
Danville, Ill. (1975)	Taxi drivers	No Union	None	None
Pittsburgh, Pa. (1978)	Taxi drivers	ATU	None	None

TABLE 6.3

SIGNIFICANT 13(c) LABOR AGREEMENTS
GENERAL PURPOSE TRAVEL

Location	Service Providers	Agreement with	New Guarantees	Service Restrictions
Rochester, N.Y. (1977)	Private company	ATU	Transit workers provide services in two areas; maintenance work	Certain areas
Suburban Chicago, Ill. (1977)	Transit drivers Taxi operators	ATU	New jobs in some areas	Certain areas
Westport, Conn. (1976)	Taxi drivers	No Union	None	None
Orange County, Cal. (1975)	Private companies	TWU	None	None
San Diego, Cal. (1981)	Private companies	ATU	None	not compete with, replace, or displace current fixed-route services
Miami, Fla. (1981)	Private companies	TWU	Transit workers to provide any new fixed-route service if more cost-effective	not compete with, replace, or displace existing fixed-route services

have attempted in advance to avoid any direct competition with existing transit by limiting new service to specific areas (such as in the Norfolk commuter van or the suburban Chicago dial-a-ride demonstrations.) Several of the shared ride taxi services such as Oklahoma City and Akron restrict the service to elderly and handicapped users. For the Rochester dial-a-ride demonstrations, the agreement obliged the ricipient not to operative the new services in competition with the convential transit routes.

The 13(c) agreements for the vanpool demonstrations in Knoxville (Tennessee), San Francisco (California), and Minneapolis (Minnesota) illustrate the protective arrangements when the competitive service is provided by volunteer drivers (see Table 6.1) To protect affected employees, recipients in Knoxville and San Francisco agreed to guarantee the size of the transit union bargaining unit for a specific number of years; however, there was no such guarantee for the Minneapolis project. The original Knoxville agreement (1975) guaranteed the size of the bargaining unit for four years and also required that the maintenance of the vans be performed by the transit workers. A second Knoxville agreement (1977) was required in order for the UMTA funded vans to be sold to private individuals. This agreement extended the original bargaining unit guarantee period for another 18 months and required the recipient to sell the vans with a stipulation that the new private owners would not solicit or carry riders who lived and worked within one quarter of a mile of a bus route.

The Golden Gate Bridge Highway and Transportation District in San Francisco agreed in 1977 not to reduce the number of its bus drivers below 309 for a two-year period after a commuter van service began. Although the agreement stated that the principal purpose of the project was to provide service in areas without transit services, it did not place a limitation on which areas or people could be served by the project vans. It also did not require that the van maintenance be performed by the transit employees because the transit facilities could not accommodate the work. There were no service restrictions or claims for maintenance work in the Minneapolis agreement.

The Rochester and suburban Chicago agreements for new dial-a-ride services, and the Miami and San Diego agreements for taxicab feeder services, illustrate the types of guarantees and new service restrictions obtained by transit workers when some of the competitive services are provided by non-transit employees (see Table 6.3). In these locations new services provided by non-transit drivers cannot compete with the current transit routes. The 13(c) conditions for the dial-a-ride demonstrations in Danville and Westport are examples of the standard protective terms and conditions that DOL estalishes for any mass transportation employee in the service area of an UMTA funded project. In both cases there were no such employees before the

project, but the standard DOL conditions were applied in the certification letter. If organized mass transportation labor unions are formed in these cities over time, future 13(c) agreements presumably will allow for negotiations between the recipients and the labor unions.

The Negotiating Process

A review of the history of the negotiations that have produced 13(c) labor protection agreements is beyond the scope of this chapter; however, some comments about the different circumstances and the process leading to the agreements can be made.

Since a 13(c) agreement is basically the result of negotiations between two parties with potentially different objectives, it is a compromise that must be acceptable to both and approved by the DOL. The outcome of this process if influenced by several factors: the elements and scale of the proposed project, the political and economic conditions affecting each party, and the skills and experience of the individuals involved in the bargaining.

Most of the 13(c) agreements listed in the tables have been for demonstration projects. These projects involve novel service types and provider arrangements, a set project duration, and usually a very small commitment of local funding. Since these conditions are unlike those for locally funded or longer term service changes, the unions and grant recipients may have had a more relaxed attitude toward the 13(c) agreements for these projects than for more permanent services. On the other hand, because UMTA demonstrations have potential national significance as examples that others may follow, UMTA, the DOL, and the national unions have often taken a special interest in the negotiations.

Two examples of this strong interest were in Knoxville and Rochester negotiations. In Rochester, the national Amalgamated Transit Union (ATU) was sufficiently concerned about the local ATU branch's refusal to accept an agreement that it overrode the local union and signed the agreement. In other cases, such as San Francisco, the national ATU has proposed conditions that had been accepted in other demonstrations, but the local unions and the recipients agreed to less restrictive terms. It appears that the attitude of the national ATU is to try to obtain as many new guarantees and new jobs as possible during the negotiations. How much has been actually agreed upon appears to be the result of the local unions' political and economic strengths and the attitudes and bargaining skills of the individuals involved.

The 13(c) agreements for special user group paratransit services using Section 5 funds have not involved difficult negotiations with transit labor. In Oklahoma City, the local ATU union did not object to the loss of new jobs to taxi drivers because of the lack of local political and financial support for transit. In Akron, the TWU accepted the "model" 13(c) agreement discussed earlier, apparently with no concern for new transit jobs.

In none of the agreements do there appear to have been any significant disputes between the parties concerning the "basic" 13(c) provisions such as the continuation of employee rights and collective bargaining, the compensation benefits, and the arbitration procedures. In fact, almost all of the new agreements reference a previous 13(c) agreement and apply it to the new project. With this procedure, the negotiating process quickly focuses on new guarantees, new jobs, and restrictions on the proposed services.

UMTA has expressed concern to two recipients over specific provisions in their 13(c) agreements. In 1978, the Greater Bridgeport Transit District (GBTD) in Connecticut submitted an application to UMTA to purchase 21 taxi vehicles using Section 3 funds. A 13(c) agreement was negotiated between the GBTD and the ATU regarding this application. In 1981 UMTA commented on the agreement:

> Provisions which prevent full consideration of private operators as potential providers of future paratransit services sponsored by the GBTD, or restrict were paratransit may be implemented are contrary to sound transportation policy and UMTA statutory requirements regarding private enterprise (Section 3e/8e of the UMTA Act). Additionally, the provisions unconditionally guaranteeing the size of the bargaining unit for four years could inhibit sound management decision-making and lead to the provision of services not warranted by demand.[19]

In another project, New York City submitted an application to use Section 5 funds for a paratransit project for handicapped persons. During the 13(c) negotiations, the City requested clarification of UMTA's position on prevailing wage standards for paratransit services. UMTA replied:

---

19. Letter from Robert H. McManus, Acting UMTA Administrator to Richard H. Bradley, Bureau of Public Transportation, State of Connecticut on March 4, 1981.

> ...We, therefore, would not approve the use of Federal funds to support projects which incorporate prevailing wage standards.[20]

These concerns and other local concerns were not resolved and UMTA did not fund these projects.

Suggestions Future Negotiations

It is difficult to present specific guidelines for future 13(c) negotiations because of the uncertainty regarding the delineation of affected employees, and because in each project the local political and economic situation and the parties subject to the agreements are often unique. In all cases, the recipient is obligated to meet the DOL administrative guidelines and to obtain an agreement acceptable to DOL. DOL will seek to ensure that all parties negotiate in good faith. It should be useful during the negotiations to have good estimates of the public costs and other impacts of various guarantees, service restrictions, and new jobs. If the implications of proposed conditions are clearly understood by elected officials and the employee organizations, there is a better chance for an acceptable agreement.

Recent legal developments have produced some changes in the collective bargaining process. In 1982, a U.S. Supreme Court decision required unions to sue in state rather than federal court to gain enforcement of collective bargaining and 13(c) agreements. In four recent cases involving transit authorities in Atlanta, Memphis, Chattanooga, and St. Louis, the Secretary of Labor has granted final or conditional approval to 13(c) agreements that did not contain binding interest arbitration provisions.[21] Although these cases have been challenged in the courts, it appears that transit agencies will be less restricted by DOL in the future in the types of 13(c) provisions required. In addition, the Supreme Court's 1982 ruling may lead to greater variation in labor agreements throughout the country, including greater innovation and tailoring of agreements to local conditions.

REGULATION OF PUBLIC TRANSPORTATION SERVICES

The responsibility for regulation of local public transportation

---

20. Letter from Robert H. McManus, Acting UMTA Administrator to Arlene V. Malone, New York City Department of Transportation, on March 5, 1981.

21. Bureau of National Affairs, Inc. (1983).

services cross state boundaries does the federal Interstate Commerce Commission (ICC) become involved directly in the regulation of public transportation. State and local control over public transportation regulation presents the opportunity for planners and decision-makers at the state and local levels to tailor these regulations to meet their own particular goals. In this sense, public transportation regulations are candidates for change as part of the development of state and local public transportation programs.

It is helpful in dealing with public transportation regulations to recognize two distinct categories:

- regulations dealing with passenger safety and security; and
- regulations dealing with service levels and prices.

Discussions about the first category typically are concerned with the degree rather than the type of regulations needed; there is general agreement about the desirability of safety regulation but some disagreement about the stingency of regulation required. For the second category, however, there is a considerable diversity of views on the types of regulations which should be employed, ranging from no regulation at all to strict controls on entry of new providers, delineation of service areas and types of service, and industrywide standardization of fares.

With regard to safety regulation, each state or local community typically sets its own standards. The three major subjects covered under safety regulations are vehicle condition, driver licensing, and insurance. Provisions are usually made for regular inspection of vehicles for safety violations, though in many cities these inspections appear to be quite lax, especially for taxicabs. Drivers are subject to driving record reviews, training and tests which vary in stringency depending on the location and on the size of the vehicles they are to operate. (Training and tests for bus drivers are much more stringent than those for taxicab drivers, for example.) All public transportation services are required to have minimum amounts of liability insurance which again vary with the size of the vehicle and the number of passengers to be carried. [A compendium of safety provisions in many states and local areas has been prepared by the International Taxicab Association (1976).]

Regulation of public transportation service levels and fares is common to virtually all U.S. communities, though there is some variability in the type and degree of regulations employed. Fixed route transit services have been regulated heavily since the electric streetcar companies successfully argued that transit should be regarded as a natural monopoly. In most communities streetcars now have been abandoned in favor of buses, but the monopoly streetcar

franchices have become monopoly bus franchises, held first by the private streetcar companies and gradually taken over by public authorities as transit services became unprofitable. A potential competitor to these franchises, the fixed route jitney service, has been prohibited by local regulations in most U.S. communities since the early 1920s when the jitney operators lost a regulatory battle with the streetcar companies.[22]

The specific routes, schedules, and fares for fixed route transit services all have been publicly regulated since the streetcar era. In fact, the refusal of public regulators to allow bus transit operators to raise fares and eliminate unprofitable evening and weekend services undoubtedly accelerated the decline of transit operations into unprofitability. This decline eventually resulted either in total service withdrawal or public subsidy and (in most cases) public takeover. This shift to public operation of transit services weakens one of the basic justifications for service and fare regulation: to give private operators monopoly rights and profits on lucrative routes so they could affort to provide "essential" services on unprofitable routes. To the extent, therefore, that monopoly operation is not the most cost-effective means of meeting the objectives of public transportation programs, there may be little justification for continuing it.

Service and fare regulation is also common for paratransit modes operated on a for-hire basis. (Carpools and other informal modes operated on a costsharing basis are not usually subject to service and fare regulations, however.) Taxicab services are usually subject to regulatory controls on entry of new providers, the types and levels of service to be offered, and the fares to be charged. In many cities such regulation has held the legal supply so far below the demand for taxi services that taxi licenses or "medallions" have taken on values of $35,000 or more and extensive illegal or "gypsy" taxicab operations have come into being.[23]

While the degree of regulation of services and fares for conventional transit is fairly uniform throughout the country, considerable diversity exists with regard to paratransit regulation. Some large cities like New York, Boston, and Chicago have strict entry, service and fare controls, often with high medallion values and extensive illegal operations. Other large cities like Washington, D.C., Honolulu, and Seattle have no controls on entry per se, and Seattle and San Diego have even relaxed controls on fare levels for taxicabs. Many small cities have only nominal controls on entry of new providers in that virtually any qualified operators are permitted

22. Eckert and Hilton (1972).
23. Kirby, et al (1975).

to offer services. Similarly, fare controls are also only nominal in many small areas since operator requests for rate changes usually are rubber-stamped routinely by regulatory authorities.

Service and fare regulation of public transportation services continue to be quite controversial. While most of the expressed views acknowledge the need for protection of the consumer through clear posting of fare schedules (and through safety regulation as discussed above), there is no consensus on the desirability of entry limitations, service standards and restrictions (such as those against shared-riding), or fare controls administered by public regulatory bodies.

Some analysts have argued that service and fare regulation which goes beyond requirements for fare posting unnecessarily restricts the public transportation services available to the general public.[24] On the other hand, others have argued that extensive controls on entry, service levels, and fares are essential to ensure a stable and reliable supply of public transportation services, and that relaxation of these controls would result in ruinous competition between providers and a decline in overall service levels.[25] An important element of this latter argument where services are operating solely from fare revenues is the need for cross-subsidy to maintain essential services at times or places of unprofitable demand. This point was an important justification for monopoly bus franchises as discussed above, and remains a prime defense of service and fare regulation for taxicabs.

The issues of service and fare regulation is the subject of much continuing research and debate, and the planner will have to look closely at the arguments and evidence being presented before advising decision-makers on the likely impacts of alternative courses of action. Some recent innovations in regulatory procedures in U.S. cities have been closely monitored by UMTA's Service and Management Demonstration Program and provide important new guidance on the impacts of regulatory changes.[26] In some of these cases entry and fare controls on taxicab and other paratransit services have been relaxed, while in other cases controls have been tightened. In general, relaxation of entry and fare controls appears to have had positive impacts for users, operators, and regulatory authorities, though some special problems have arisen at airports and other locations with limited user information and choice.

---

24. See Eckert and Hilton (1972) and Kirby et al (1975).
25. Samuels (1972).
26. Kirby (1981a).

REGULATION AND PRICING OF AUTOMOBILE USE

Restrictions placed on the use of the private automobile have major implications for public transportation programs. The private automobile is obviously the predominant competitor to public transportation modes, and as with all competitive situations it is possible to increase the use of one mode or "product" by making that mode more attractive, or by making its competitors less attractive, or both. Where the objectives of public transportation programs are to divert private automobile users to higher occupancy modes, a number of different regulatory and pricing schemes can be employed to change the relative attractiveness of these alternative modes.

Regulation and pricing of automobile use can affect two primary characteristics of the options available to the traveler: the speed and the user cost. Regulations restricting the private automobile from the use of express lanes or close-in parking spaces give a relative speed advantage to the high-occupancy modes which do have use of these facilities. And pricing schemes which impose extra charges on private automobiles for parking, toll bridge crossing, or use of congested parts of the road network give a user cost advantage to high-occupancy modes. The use of these regulatory and pricing disincentives in combination could have substantial effect on the attractiveness of high-occupancy public transportation modes relative to the private automobile. An attractive feature of automobile pricing policies is that they can contribute toward urban transportation becoming financially self-sustaining, an important consideration at a time of tight public budgets.

For the public transportation planner, measures to regulate and price automobile use can be viewed in two different lights, depending on the circumstances. In some situations the prevailing conditions may be difficult or impossible to change in the short-run, and may have to be accepted as constraints on the potential attractiveness of public transportation relative to the private automobile and, in turn, on the potential market penetration of public transportation modes. In other cases, however, it may be possible for the planner to assist in the development of new regulations and prices on automobile use as supportive actions to public transportation programs, and to present all of these actions to decision-makers as a comprehensive package of transportation improvements.[27]

While automobile disincentives are usually seen as complementary actions to high occupancy vehicle incentive programs, in some situations they could be considered as real substitutes for public transportation projects. In some urban areas automobile disincentive

27. See, for example, U.S. Department of Transportation (1980a).

programs are being comtemplated by themselves as means to address transportation problems which in the past were addressed only by public transportation solutions. Automobile disincentive programs show particular promise where traffic and parking related problems are area and time specific, or where the problems are created by a specific group of people. Examples include commercial or residential areas where commuters (or recreational trips) create traffic congestion or parking shortages.

In spite of the potential effectiveness of automobile regulatory and pricing disincentives -- particularly as collateral components in a package of public transportation improvements -- their implementation is not likely to be easy. Experience to date suggests that many hurdles must be overcome before a politically acceptable program can be evolved. Management of automobile use, under any rationale, is never an easy task in a U.S. city. Careful planning with participation from the affected parties is required. Because automobile disincentives are relatively new concepts with limited experience, and because they require trading benefits to one group against disbenefits to another, regulatory and pricing disincentives have been employed only rarely in transportation improvements programs for U.S. cities. Several important examples exist, however, and their results provide useful guidance for planning in other cities.

Perhaps the most common action is the designation of priority lanes for high-occupancy vehicles. Several examples of such schemes can be found in U.S. cities, though the approach has not been widely adopted. It may be that in many candidate corridors the speed improvements that can be obtained for high-occupancy vehicles do not generate sufficient benefits to cover the costs of designating and policing the lanes. Some highly successful examples exist, however, such as the Shirley Highway scheme in a suburban corridor of Washington, D.C. [documented by McQueen et al (1975)], and planners should aways be alert to possibilities for priority lane schemes in their areas. The Federal Highway Administration has published useful guidelines on a number of priority lane strategies.[28]

Residential parking restrictions have become popular in a few major cities such as Washington, D.C., San Francisco, and Boston. These schemes employ special residential parking permits which allow neighborhood residents to park freely on their local streets while excluding long-term parking by non-residents. While these programs have made more on-street space available for short-term parking and for neighborhood residents, their impact on overall VMT is unclear. Though some former private automobile drivers switch to higher occupancy modes, increases in local resident travel and in short-term

28. See Rothenberg and Samdahl (1981).

shopping trips to the area probably offset any VMT savings resulting from mode shifts. However, the VMT savings per se are perhaps less important that other implications of such programs. For example, if the changes are characterized by less peaking of VMT (even though absolute total VMT might not decrease), congestion, air quality, and energy consumption benefits can still be realized. Further it may also be important to recognize whose VMT have been reduced. An increase in VMT by residents at the cost of a decrease in VMT by non-residents might be a perfectly acceptable end. Additionally, more trip-making for shopping purposes might contribute to the revitalization of retailing, which commuter VMT might have prevented prior to the program.

Auto restricted zones and auto free zones are relatively common in European countries but have received only limited application in U.S. cities to date. Perhaps the most relevant examples for public transportation are those in which only buses and (sometimes) other high-occupancy modes are allowed the use of street space in the restricted area. These schemes make the selected areas more readily accessible by public transportation than by automobile, and therefore give a distinct advantage to the public transportation modes. Most of the applications of such schemes have been in central shopping and business areas. Again, the benefits are usually perceived in terms of an aggregate increase in central area activities, rather than in terms of VMT reductions.

Pricing techniques which impose additional charges on single-occupant automobiles in congested corridors or areas have long been advocated by some transportation economists, but have received very limited application to date. The only application of road pricing in the world at present is in Singapore, though major cities like London and The Hague have given the concept serious consideration. Special parking charges to discourage all day parking have been considered as a more practical though less precise approach than road pricing, and several cities have implemented parking pricing schemes.[29] Pricing disincentives to automobile use could have a substantial impact on choice of travel mode, greatly increase the demand for public transportation services, ease neighborhood problems created by non-resident autos and perhaps help revitalize core areas by encouraging shopping and other trips. However, a few cities have been willing to consider such "punitive" measures as serious options for helping to achieve their transportation objectives.

Whatever type of restrictive regulation or pricing of automobile use is considered, effective enforcement will be necessary to achieve successful results. A recent review of restrictive transportation

29. Miller and Higgins (1983).

system management (TSM) actions found that in many cases enforcement was not adequately considered during design, and was therefore difficult in practice.[30] Another recent review of TSM experience identified several characteristics of successful actions such as the political environment and voluntary compliance.[31]

30. Meyer and Dean (1980)
31. Roark (1981).

CHAPTER VII
FUTURE PROSPECTS AND DIRECTIONS

In developing public transportation improvements for the future, planners inevitably draw to a large extent on the trends and lessons of the recent past. Heavy reliance on the extrapolation of trends has its pitfalls, however. In the 1960s and early 1970s many planners were preoccupied with the continued expansion of urban highway capacity, only to find that community values were shifting away from such policies. The emphasis on capital-intensive regional transit systems which followed the highway era also diminished over time, as unexpectedly large financial requirements collided with tightening government budgets. Even the dominant theme of the 1970s, the need to conserve energy, now appears to be less compelling as the demand for gasoline moderates and prices begin to decline in real terms.

The next ten years may well provide some new twists and turns in the trends currently shaping the environment for public transportation. As in the past, planners probably will not be able to anticipate all of these developments: they will have to base their projections on the best information available at any particular time. While recognizing the uncertainties attending trend extrapolation, this chapter attempts to identify and interpret the major factors likely to affect public transportation in the 1980s. The demographic characteristics of the urban population, the financial and regulatory environment provided by government policies and programs, the problems and issues arising from recent political debates, and experience with public transportation innovations all form part of the information base for planning public transportation improvements. Continual consideration and analysis of these factors provides essential background for tailoring public transportation improvement strategies to evolving policy concerns.

DEMOGRAPHIC FACTORS[1]

The total population of the United States is expected to grow steadily from 226 million in 1980 to 244 million in 1990 and 260 million in the year 2000. This growth will not be spread uniformly across existing metropolitan and non-metropolitan areas, however. Throughout the 1970s there was a steady shift in the geographical distribution of the population away from the northeast and

1. Much of the discussion in this section is based on Spielberg et al. (1980).

northcentral regions to the south and west. While the employment trends which were largely responsible for these shifts may begin to moderate in the 1980s, distributional shifts are expected to continue in these same general directions for some time.

Changes in the geographical distribution of the population will create several different kinds of conditions for public transportation systems. Older cities such as New York, Philadelphia, and Detroit will probably continue to lose population and jobs, with greater percentage losses in the central cities than for the SMSAs as a whole. Newer cities like Houston, Phoenix, and Tampa will continue to grow, with smaller percentage increases in the central cities than for the SMSAs as a whole. Many smaller metropolitan and non-metropolitan areas are also expected to grow, with most of the growth at the relatively lower densities which characterize the suburbs of the larger metropolitan areas.

These projections suggest that the radial suburb to downtown travel for which most urban transit systems have been designed will constitute a declining portion of the urban travel market. Few major metropolitan areas are exhibiting strong activity growth in traditional downtown areas. In most cities the problems of traffic congestion and limited mobility groups appear to be moving with the population to suburban areas.

While the suburbs will develop at lower densities than the existing central cities, they may well experience somewhat higher densities than in the past. Factors expected to contribute to higher suburban densities are greater use of vacant land in the inner suburbs, the growth of relatively concentrated suburban shopping and employment centers, and an increase in multi-unit residential construction in response to continuing declines in average household size. These developments may well lead to serious traffic congestion on suburban roads and at large activity centers poorly served by urban transit systems.

The portion of the national population aged 65 and over is expected to increase from 11.2 to 12.2 percent between 1980 and the year 2000, while the transportation handicapped portion is expected to grow from 4.1 to 4.5 percent. These groups will continue to be dispersed geographically, presenting a major challenge for public transportation systems. While a large number of persons over the age of 65 will undoubtedly be able to drive for a number of their senior years, many will eventually become dependent on public transportation, often after having based their residential location on the availability of convenient automobile travel. Lower income groups are expected to continue to locate primarily in central areas well-served

by transit, so that fare levels rather than service availability probably will be their major mobility problem.

FINANCING CONDITIONS

The 20 percent per year real increases in transit operating deficits during the 1970s created public financing trends which were virtually impossible to sustain. A long national recession and growing tax limitation movements at all levels of government in the 1980s have begun to slow and even reverse these trends of rapidly increasing public assistance. At the federal level, the Reagan administration has effected significant reductions in the level of assistance projected by the previous administration. And fiscal difficulties at the state and local levels have created strong pressures for limiting the subsidy funding provided by these governments.

The prospect of significant reductions in general subsidy funding for public transportation has prompted numerous efforts to secure earmarked sources of financing. At the federal level, legislation passed early in 1983 provided an earmarked source of public transportation assistance for the first time, in the form of one cent of a new five-cent per gallon equivalent increase in the federal gasoline tax. This new source of funding will be available only for capital expenses, however. Further, it represents little more than one-quarter of the $4.3 billion in fiscal 1983 budget authority for mass transportation agreed upon by President Reagan and the Congress in 1981. To maintain the level of funding initially accepted by the Reagan administration in 1981 (well below the level projected by the previous administration), transit advocates will have to sustain an annual commitment of over $3 billion from general revenues. At a time of intense pressure to reduce federal domestic spending, this level of general funding will be difficult to achieve.

It seems likely, therefore, that federal mass transportation funding will decline in real terms despite the new one-cent gasoline tax contribution. Even if the total funding is kept close to earlier levels, a provision in the 1983 legislation requires a steady decline in the funds available for operating assistance. Cities are restricted in the use of federal operating assistance funds to certain fractions of their 1982 funding levels: 80 percent for areas over one million; 90 percent for areas between one million and 200,000; and 95 percent for areas under 200,000.

State funding for public transportation has been growing quite rapidly over recent years, increasing by 20 percent between 1981 and 1982 to an annual total of almost $2 billion. Several state programs introduced initially as stop-gap measures to cover transit capital needs and (in some cases) operating deficits have been redesigned in

the last few years to provide long-range assistance to public transportation. The fiscal difficulties currently overtaking many state governments (including such formerly well-positioned states as California and Minnesota) threaten these assistance efforts, however, and their prospects must be considered uncertain at best.

During the 1970s, local governments steadily increased their contributions to public transportation systems to help expand services and keep fares low. However, the budgetary pressures of the 1980s have forced local governments to try to hold down the rate of growth in general revenues going to public transportation. Many of them are seeking dedicated taxing sources to relieve pressures on general budgets, including sales taxes, property taxes, lottery proceeds, and a variety of local taxes on automobile licenses and gasoline. A 1982 survey by the American Public Transit Association of 300 transit properties found that approximately 20 percent of the 135 properties which responded had dedicated local taxes to help cover operating costs, and that several others were in the process of obtaining such taxes.

Though dedicated taxes for mass transportation may help relieve financial pressures temporarily, such taxes probably will not provide the kind of revenues necessary to maintain transit fares and services at the levels of the 1970s. As dedicated taxes are enacted, reductions may be made in the levels of general revenues for transit to help meet other pressing demands on government budgets. And if the recent past is any guide, the revenues from dedicated taxes will not grow as quickly as transit deficits, leading ultimately to the need for new taxing sources.

While political and economic conditions could change, the early developments in the 1980s suggest that public funding for urban transit systems is likely to fall below the levels necessary to maintain current fare and service levels. Certainly the federal program is beginning to decline in real terms, with more rapid reductions in operating assistance than capital assistance. In order for current fare and service levels to be maintained, state and local funding will have to cover both the federal shortfall and any further increases in operating deficits. While this may be possible in a few locations, most cities will be unable to continue the transit fare and service levels of the 1970s through the 1980s.

POLICY AND PLANNING PROBLEMS

Judgments about the demographic and financing factors affecting public transportation in the 1980s provide a basis for assessing the policy and planning problems likely to be encountered. Several factors suggest that the problems and issues of the future will be rather different from those of the immediate past. Pressures to deal

with rising gasoline prices and uncertain gasoline supplies appear to be easing. The problems of congestion, air pollution, and limited mobility groups appear to be moving gradually away from the central cities and into the suburbs. And obtaining public financing to sustain transit service and fare levels is becoming increasingly more difficult.

Fuel Conservation, Air Pollution, and Congestion

While fuel conservation was one of the major concerns of public transportation planners of the 1970s, there are two major reasons why this particular objective will probably not be as important in the 1980s. First, the chances of gasoline shortages appear to have diminished considerably, and prices have begun to fall. Second, a gradual shift to more fuel-efficient automobiles is proving to be a highly effective means of fuel conservation, reducing the need for efforts to shift travelers to higher occupancy modes.[2] Unless these conditions change, the emphasis placed on fuel conservation in designing public transportation programs is likely to be greatly reduced.

The problem of air pollution resulting from automobile emissions also appears to be more easily tackled through technology improvements to the automobile than through public transportation improvements.[3] As growth in automobile use concentrates in suburban areas not well-served by urban transit systems, the potential for reducing air pollution through transit improvements will diminish. While some air quality benefits will result from public transportation improvements, air quality is unlikely to provide a primary justification for such improvements.

The problems of traffic congestion will continue to provide a major challenge for policy-makers and planners. However, with the exception of a few cities with rapidly growing travel to central areas, congestion problems are likely to occur increasingly at suburban locations. The automobile traffic generated by major employment and commercial centers in the suburbs will tax the capacity of access roadways and parking areas. Because the origins and destinations of trips to these locations are widely dispersed geographically, they cannot easily be served by conventional public transportation services. Policy-makers previously concerned with maintaining radial transit services are likely to face growing pressures to deal with traffic congestion in the suburbs.

2. Meyer and Gomez-Ibanez (1981).
3. ibid.

Limited Mobility Groups

As in the recent past, the limited mobility group of primary concern to public transportation planners probably will be the handicapped population. The regulations issued by the U.S. Department of Transportation to implement Section 504 of the Rehabilitation Act of 1973 have had a major impact on public transportation plans. In moving from an initial requirement of fully accessible transit to interim regulations providing greater local flexibility, the U.S. DOT reshaped local planning objectives with regard to the handicapped. Unfortunately, the exact nature of the federal requirements for transportation services to the handicapped still appears to be changing over time. Legislation signed by President Reagan in January of 1983 requires the U.S. DOT to issue final regulations by mid-1983.

State governments are increasingly developing their own standards for services to the handicapped. California, for example, has its own full accessibility requirements, and the courts in New York State have recently supported claims that New York subway stations should be made fully accessible when renovations are made. At the local level, policy-makers and planners will have to deal with a combination of federal, state, and local objectives and conditions, all of which may be modified over time.

In addition to the handicapped population, many of the young, the elderly, and the low income will continue to rely on public transportation for their basic mobility. The policy question likely to arise with regard to these groups is how limited public funding should be allocated between them. Should available funding be used to keep fares down on existing services, or to provide specialized services? Should reduced fares or specialized services be made available to all of the eligible population on a "first come, first served" basis, or should the most needy among the groups receive first priority? Should a small fare reduction be provided for a large number of trips, or a large fare reduction for a small number of trips? If public funding for limited mobility groups becomes more restricted (as present trends suggest), these questions will become more and more important.

Transit Financing

Budget stringency at all levels of government will focus much of the policy and planning attention for transit systems on the financing question. Though vigorous efforts will no doubt be made to obtain new earmarked funding for transit at the local level, it seems unlikely that the transit fare and service levels of the recent past can be maintained. Consequently, planners will have to try to do more with

less: to maintain and even improve services while reducing the portion of transit costs covered by public funding.

Planners have three basic options for reducing transit deficits: increase productivity; redesign services; or increase revenues from the users and other direct beneficiaries of transit services. While productivity improvements are the most desirable of these options, recent experience suggests that they will also be the most difficult to achieve. Productivity of transit services has been declining over recent years, and to date there have been few signs of a turnaround. Management costs, labor rates, work rules, and maintenance practices all deserve careful scrutiny as possible sources of productivity improvements. Substitution of lower cost services for conventional transit also offers the possibility of maintaining service levels while reducing personnel hours and costs.

The 20 percent per annum real increases in public funding for transit during the 1970s resulted in substantial service expansion in many cities. Some of these new services produced relatively few additional passengers per dollar of public expenditure, and will undoubtedly be candidates for modification as public funding levels decline. The planning problem here will be to identify the least productive services and to provide the information needed to justify service modifications before public hearings.

A great deal of research has been directed at the problem of increasing transit revenues from users and other beneficiaries. Most transit fares are still well below the levels at which further increases would fail to produce revenue gains. However, lower income and other disadvantaged groups might be significantly affected by continued fare increases, threatening the political feasibility of such increases. Careful targeting of fare adjustments will be required in order to raise revenues from those users and other beneficiaries most able to afford higher fares.

PROMISING INNOVATIONS AND DIRECTIONS

For many years, planners responded to urban transportation problems with new long-range investment strategies for highways or mass transit. Such strategies evolved from the view that transportation systems should be designed primarily to increase mobility, and that the way to increase mobility was to increase transportation system capacity. Enthusiasm for these policies was dampened considerably in the 1960s and 1970s by a growing recognition of the problems which accompanied them: the noise, pollution, energy, and aesthetic implications of expanded automobile use; the limitations on the mobility of population groups without ready access to an automobile; and large public financing requirements of conventional transit systems.

Major efforts in the 1970s to develop less costly and more effective responses to urban transportation problems demonstrated that short-range improvement strategies deserved increased attention. While future policy and planning problems may differ somewhat from those of the recent past, they will continue to require as much or more emphasis on short-range strategies as on new long-range imnvestments. Recent experience and research have suggested a number of promising short-range public transportation improvements for each of the home-to-work, special user group, and general purpose markets, and for the administrative and regulatory environment.

High-density Home-to-Work Travel

The expectation that considerable growth in the home-to-work travel market will occur in suburban areas and in smaller non-metropolitan areas suggests a promising future for ridesharing and transit programs organized to serve large suburban employment and commercial centers. The success of many programs at large employment sites in metropolitan areas, and at a number of locations in small urban and rural areas could be replicated in numerous other locations with similar transportation problems.

The fact that the user benefits generated by some of these employment center programs have greatly exceeded program costs implies that well-designed programs could be supported entirely by user fees. Benefits have accrued to employers as well, in the form of more productive use of land formerly required for parking spaces. It is these latter benefits which have been the primary impetus behind active financial involvement by employers in some of the programs. The success in individual locations has been followed by some initial (but qualified) successes by third-party agencies organizing multi-employer programs. While much still needs to be learned about the cost-effectiveness of various organizational and marketing strategies, multi-employer programs seem to have a promising future. Opportunities may well exist for transit agencies, transit management firms, and other private organizations to develop profitable businesses out of the organization and management of public transportation programs oriented toward large suburban centers. As suburban development increases, some of these programs may evolve into suburban circulator services operated by paid drivers in small vehicles such as vans or minibuses.

For home-to-work travel along the traditional radial corridors served by urban transit, existing transit services are likely to be supplemented increasingly by a variety of car pool, van pool, and minibus or jitney services. If operating assistance for transit systems declines in real terms, as seems likely, transit operating agencies will have to seek ways of serving home-to-work travel at lower levels of public subsidy. This can be accomplished in part by

raising fares, particularly for long distance trips by upper income commuters. Supplementary services will also have to be considered along heavy corridors.

Parking policies are likely to play an increasingly important role in shaping home-to-work travel patterns in both suburban and downtown areas. Ridesharing programs have demonstrated that employers have much to gain by reducing the demand for employee parking. Well-designed employer-sponsored public transportation programs can provide an acceptable alternative to driving alone for many commuters, and might facilitate the eventual reduction or elimination of employer subsidized parking. Employees could be given a transportation allowance in lieu of subsidized parking,[4] and encouraged to use the allowance on the travel mode of their choice, whether it be carpooling, vanpooling, express bus, conventional transit, or the private automobile.

Special User Group Travel

The current uncertainty about federal and state requirements for public transportation for the handicapped presents some difficult problems for local policy-makers and planners. Between federal, state, and local statutory and regulatory requirements, many urban transit systems will eventually have to be made fully accessible to handicapped persons, including those confined to wheelchairs. The debate over the effectiveness and costs of fully accessible transit is likely to continue for some time, however. For some cities full accessibility will be implemented only gradually as transit vehicles and station facilities are renovated or replaced, and even then only after lengthy policy debates and court battles.

Whether or not transit systems are eventually made fully accessible, many of the transportation handicapped will continue to be very limited in their intraurban mobility. Cities like Seattle and San Diego which are fully committed to making transit accessible to the handicapped have chosen to continue specialized door-to-door services for elderly and handicapped persons for whom accessible transit is still too inconvenient a travel mode. While fully accessible transit services may satisfy statutory and regulatory requirements, they will not meet all of the travel needs of the handicapped population.

It seems likely, therefore, that specialized services for the handicapped, the elderly, and other disadvantaged groups will continue to be provided regardless of the outcome of the full accessibility debate. As discussed earlier, the policy issue with regard to these

4. Pickrell and Shoup (1980).

groups will be the distribution of limited transportation assistance funding over a virtually unlimited range of actual or potential trip requests.

Special user groups can be considered for planning purposes under two general headings: those for whom conventional transit is convenient but potentially too expensive, and those for whom conventional transit is simply not a viable means of travel. The former groups can be assisted through transit fare reductions, and a variety of such reductions have become a common feature of transit fare structures. If transit operating assistance becomes less plentiful, these fare reductions may have to be applied on a more selective basis. In particular, fares which have been kept low for the general public to ensure adequate mobility for special user groups may have to be raised substantially, with selective reductions limited to persons with incomes below certain levels. Arlington County, Virginia, has adopted a transit fare policy which escalates fares for the general public in line with inflation but provides special discounts for low income groups.

Special user groups for whom conventional transit is not a viable travel mode have been served to some degree by specialized services: typically door-to-door services provided by small buses or taxicabs. The major planning problem with these services has been that the demand at the established low fares has consistently exceeded the supply of services available within public subsidy budgets. The result in some cities has been long delays in service provision, use of the services by just a small group of persistent passengers, and abandonment of the services by many eligible and needy passengers.

The City of San Diego recently resolved this problem by replacing a city-operated dial-a-ride service with discounted vouchers for use on local taxicab and social service agency providers. This approach allows the city to make explicit decisions about the allocation of the specialized services among eligible users, rather than implicitly rationing the services by means of poor service quality. Users are allocated a fixed number of vouchers per month, with especially needy persons receiving additional allotments in accordance with policies established by the city council. The prospect of tight funding for all public transportation services makes the idea of explicit allocation of services through vouchers or other user-side subsidies an attractive option for the future.

General Purpose Travel

Trends in transit financing imply that policy-makers and planners will be trying to maintain public transportation services for general purpose travel while reducing the portion of the costs covered by public funding. As discussed earlier, this task will involve seeking productivity improvements, more effective service designs, and

increased farebox revenue.

Tight public subsidy budgets provide strong incentives for management efficiencies and more productive labor arrangements in public transportation systems. While a growing management and research effort is being devoted to these topics, only a few significant advances have been reported to date. The introduction of part-time drivers by the Seattle transit system in the late 1970s was a major change in the traditional transit labor agreement, though the resultant cost savings were not as large as some advocates had hoped.[5] This provision has since been adopted by several other major transit systems. Lower wage rates have been negotiated in cities such as Cleveland and Kansas City for the operation of small buses, though they have not been used extensively to date. Transit labor unions clearly have a strong interest in improving transit productivity, and may be receptive to other constructive modifications in traditional labor agreements.

Substitution of lower cost providers and services also offers considerable promise as a means of improving productivity. The city of Phoenix has recently substituted demand-responsive shared taxicab service for conventional bus services during low demand periods on Sundays, and Norfolk and San Diego have extended the coverage of their public transportation services by means of taxicab feeder services coordinated with conventional bus routes. A relatively new service concept, checkpoint dial-a-ride, is being tested in Glendale, Arizona, a suburb of Phoenix. This service involves the dispatching of small buses to certain stops or checkpoints in response to telephone requests, and aims to provide service coverage in low density areas at lower cost than regularly scheduled transit or door-to-door dial-a-ride.

Suburban jurisdictions in the Washington, D.C. metropolitan area have begun to replace certain regional transit services employing large buses with locally-sponsored fixed-route services using small buses. Montgomery County has been operating such services successfully for several years, and a number of other jurisdictions are considering similar policies. The substitution of locally-sponsored services for those of regional authorities may become an increasingly common response to tight fiscal conditions. Such policies are likely to raise some difficult planning issues regarding coordination of services provided by different jurisdictions,and

5. Lave (1981).

allocation of costs of services sponsored jointly by two or more jurisdictions.[6]

Research on transit pricing practices has suggested that farebox revenues could be increased with relatively little ridership loss under certain circumstances. In large cities in particular, opportunities exist for greater use of distance-based fares and peak hour surcharges. Heavily discounted commuter passes should probably be eliminated in most instances. And more careful targeting of fare discounts to disadvantaged groups seems to be a promising strategy, as discussed earlier.

Administrative and Regulatory Environment

Though federal funding for public transportation is beginning to decline in real terms, federal oversight and regulations apparently are not. Planners at the local level still will have to deal with federal earmarking of funds, labor protection procedures, service standards for the handicapped, and requirements for private provider participation. The decline in federal funding may mean, however, that these requirements will apply to a smaller portion of urban public transportation systems. The expected growth in locally-sponsored suburban and intra-community services will create a new set of planning problems largely independent of federal oversight and regulation.

These changes in the federal role will lead to changes in the roles of transportation planning agencies at the metropolitan and local level. Metropolitan planning organizations (MPOs) will see many of their regional responsibilities diminish as the importance of federal requirements and regional concerns begin to decline. Local planners, on the other hand, will have a growing role in the development and monitoring of locally-sponsored services. They may also become more involved in working with large employment and shopping centers and with neighboring jursidictions to design and promote services tailored to changing suburban travel demand.

Though some of their former regional responsibilities will decline, an important new role could emerge for the MPOs. The shifting of much of the public transportation planning function to individual local governments (and indeed to some large companies and commercial establishments) creates a problem of planning expertise: can these local entities afford to support planning staffs capable of responding to all of the various issues and problems which might arise? The answer to this question will undoubtedly be 'no' in many areas. As a result, an opportunity will exist for the MPOs to become

6. See, for example, Kemp (1982).

sources of planning assistance to local communities. MPO planners could help local communities learn from each other and from other parts of the country. They could also provide guidance on the nature and suitability of new planning techniques for forecasting demand and costing alternative services. The Los Angeles County Transportation Commission (LACTC) is currently experimenting with this new role for regional planners under an UMTA demonstration grant.

Regional transit authorities responsible for conventional bus and rail services also will have to rethink their role in urban public transportation. Some, like the Tidewater Transportation District in Norfolk, Virginia, may decide to seek an active role in the provision of vanpooling, taxicab feeder services, specialized services for the handicapped, and small fixed route bus services for intracommunity travel. Others, like the Washington Metropolitan Area Transit Authority in Washington, D.C., may elect to concentrate on their traditional rail and bus transit operations and leave the provision of small bus and paratransit services to other agencies and providers. This latter policy may lead, of course, to a gradual reduction in the overall size and role of some of the regional transit authorities.

The evolution of institutional arrangements for policy-making, planning, and service provision may well be quite different in different communities, depending as much on local political forces and personalities as on organizational convenience. The only really discernible pattern at present is that the smaller transit authorities have been much more enthusiastic about diversifying their activities than have the larger ones. This may reflect a concern on the part of the larger authorities that they have as much responsibility as they can handle already, or that they lack the flexibility to move into new kinds of service provision. Overall, it seems likely that changes in urban development and travel demand patterns will lead institutional change, rather than the other way around.

Growing recognition of the importance of managing automobile use may lead to more activity in this area in the future, even though developments to date have been modest at best. The designation of priority lanes for high-occupancy vehicles is gradually becoming accepted practice in congested corridors, and automobile restricted zones have become more common in downtown areas. Parking supply management is also more common, including on-street parking restrictions for commuters in residential areas and increased prices for parking in congested areas or during rush hours. The success of organizations in combining parking reductions with public transportation improvements has encouraged some local governments to develop similar policies by renegotiating parking requirements with developers of new buildings. Reduction of parking subsidies would be

another important initiative in this area, though little has been accomplished to date.

One of the most promising prospects for short-range public transportation innovations is the removal of restrictive local regulation on entry, services, and prices for taxicab and jitney services. The cities of San Diego and Seattle and the state of Arizona have removed such restrictions over the last few years, apparently without any major problems. In San Diego, the number of taxicabs has doubled since entry controls were removed, and average prices have remained quite low. In addition, fixed route jitney services are beginning to expand their operations, even sharing some routes with the regional transit authority. The adoption of similar regulatory revisions in other cities would greatly accelerate the development of more diversified public transportation systems.

REFERENCES

Abt Associates (1975). "Estimation of the Size of the Transportation Handicapped Population." Cambridge, Mass.: Abt Associates.

Alonso, W. (1978). "Metropolis Without Growth." The Public Interest, Fall 1978, New York.

Altschuler, A. (1976). "The Federal Government and Paratransit." See Transportation Research Board (1976).

Altschuler, A.; J.P. Womack; and J.R. Pucher (1979). The Urban Transportation System - Politics and Policy Innovation, Cambridge, Mass.: The MIT Press.

American Public Transit Association (1981). Transit Fact Book. Washington, D.C.: APTA Office of Planning and Policy Analysis.

Berry, B.J.; and Q. Gillard (1977). The Changing Shape of Metropolitan America: Commuting Patterns, Urban Fields and Decentralization Process. Cambridge, Mass.: Billinger.

Bunker, J.B.; D.D. Blanchard; and M. Wachs (1977). "Life-Style and Transportation Patterns of the Elderly: An Empirical Study of Los Angeles." Los Angeles, California: School of Architecture and Urban Planning, University of California.

Bureau of the Census (1979). The Journey to Work in the United States, Current Population Reports, Special Studies P-23, No. 94, Washington, D.C.

Bureau of National Affairs, Inc. (1983). "Collective Bargaining For Public Transit Workers is Viewed as Entering Period of Change." Government Employee Relations Report 0017-260x1/83, Washington, D.C.

Burkhardt, J.E.; D.A. Cutler; S.F. Knapp; and K.P. Ceglowski (1979). "Evaluation of the Office of Human Development Services Transportation Deomonstration Program: Results of the First Year's Activities." Prepared by Ecosometrics Inc. in conjunction with A. M. Voorhees and Associates, for the Office of Human Development Services, Washington, D.C.: U.S. Department of Health, Education and Welfare.

Cambridge Systematics (1982). "User-side Subsidy Programs for Special Needs Transportation--A Planning Handbook," Cambridge, Massachusetts, Cambridge Systematics.

Carp, F.M. (1971). "Correlates of Mobility Among Retired Persons." San Francisco, California: University of California Medical Center.

Casey, R.F. (1981) "The Accessible Fixed-Route Bus Service Experience" Report No. UMTA MA-06-0047a-81-7, Transportation Systems Center, Washington, D.C.: U.S. Department of Transportation.

Cervero, Robert. (1981). "Flat Versus Differentiated Transit Pricing: What's A Fair Fare?" Transportation, Vol. 10, No. 3, September: 211-232.

Cherwony, W.; G. Gleichman; and B. Porter (1981). "Bus Route Costing Procedures Interim Report No. 1: A Review" Report No. UMTA-IT-07-9014-81-1, Washington, D.C.: U.S. Department of Transportation.

Congressional Budget Office (1979). "Urban Transportation for Handicapped Persons: Alternative Federal Approaches." Washington, D.C.: U.S. Government Printing Office.

_____ (1977). "Urban Transportation and Energy: The Potential Savings of Different Modes," Washington, D.C.: U.S. Government Printing Office.

Cooper, T. (1978). "Community Brokerage of Transportation Services for The Elderly in Mountain View, California." Report No. UMTA-CA-06-0002-78-1 to Transportation Systems Center by Crain and Associates, Cambridge, Mass.: U.S. Department of Transportation. NTIS: PB 285-234.

Cox, W.L., and S. Rosenbloom (1978). "Social Service Agency Transportation Services: Current Operations and the Potential for the Increased Involvement of the Taxi Industry." Research Report 1053-IF, Austin, Texas: Center of Highway Research, The University of Texas.

Cutler, D.A.; and S.F. Knapp, (1979). "Coordinating Transportation Services for the Elderly and Handicapped: Executive Summary." Report on Contract DOT-03-60180, Washington, D.C.: U.S. Department of Transportation.

Davis, F.W. (1979). "The Answer to a Transit Operator's Prayer--Paratransit." Taxicab Management, March 1979, pp. 5-21.

Dorosin, E. (1981). "Commuter Connection: Flexible Ridesharing in Marin County, California." Report No. UMTA-CA-06-0128-81-1, Washington, D.C.: U.S. Department of Transportation.

Eckert, R.D.; and G.W. Hilton, (1972). "The Jitney." The Journal of Law and Economics 15, pp. 293-325.

Ernst, U.F.W. (1979). Short-Term Transit Policies and Downtown Revitalization, URI 28500, Washington, D.C.: The Urban Institute.

Ernst, U.F.W.; and G.K. Miller, (1979). "The Taxi Feeder to Bus Demonstration Project in the St. Bernard Parish (Louisiana)." Report No. UMTA-LA-06-0002-79-1, Washington, D.C.: U.S. Department of Transportation.

Ernst, U.F.W.; S. Rosenbloom; C.T. Everett; and M.A. Kemp (1980). "Coordinating Transportation Services for the Elderly." Final Report 1402-1 for the Administration on Aging, Washington, D.C.: The Urban Institute.

Falcocchio, J.C.; and E.J. Cantilli, (1974). Transportation Disadvantaged. Lexington, Mass.: Lexington Books.

Fulton, P. N. (1983). "Public Transportation: Solving the Commuting Problem?" Paper presented at 1983 Annual Meeting of the Transportation Research Board, Washington, D.C.: U.S. Bureau of the Census.

Gakenheimer, R.; and M. Meyer (1978). "Transportation System Management: The Record and a Look Ahead." Report to the Office of Policy and Program Development, Urban Mass Transportation Administration, Washington, D.C.: U.S. Department of Transportation.

Grey Advertising, Inc. (1978). "Technical Report of The National Survey of Transportation Handicapped People," prepared for Urban Mass Transportation Administration, Washington, D.C.: U.S. Department of Transportation.

Gurin, D.B. (1974). "Travel Patterns and Problems for Suburban High School Males: Exploratory Study." Washington, D.C.: U.S. Department of Transportation.

_____ (1973). "Improving Job Access for the Urban Poor" in Highway Research Record 472, Washington, D.C.: Transportation Research Board.

Hoel, L. (1968). "Latent Demand for Urban Transportation." TRI Research Report 2, Pittsburgh, Pa.: Carnegie Mellon University.

Ingram, G.K. (1977). "Reductions in Automobile Use in Four Major Cities as a Result of Carpooling and Improved Transit." Cambridge, Mass.: Harvard University Department of Economics.

Institute of Public Administration (1976). "Coordinating Transportation for the Elderly and Handicapped." Washington, D.C.: U.S. Department of Transportation.

International Taxicab Association (1976). A Compendium of Provisions for a Model Ordinance for the Regulation of Public Paratransit. Report No. UMTA-IL-096-0029. Prepared for the U.S. Department of Transportation, Washington, D.C.

Jennings, K.M.; J.A. Smith, and E.C. Traynham (1978). Labor Relations in Public Service Industry: Unions Management, and the Public Interest in Mass Transit, New York, N.Y.: Praeger.

Jones, D.W. (1979). "Institutional Dynamics of Paratransit Implementation." See Transportation Research Board (1979).

Jones, D.W.; and E.C. Sullivan (1978). "TSM: Tinkering Superficially at the Margin?" Transportation Engineering Journal, November 1978.

Juster, R.D. (1980). The Knoxville Transportation Brokerage Demonstration Project: An Evaluation. Report to the Transportation Systems Center, Washington, D.C.: U.S. Department of Transportation.

Kearny, E.F. (1980). "Legal Impediments to Ride Sharing Arrangements." Federal Highway Administration, Washington, D.C.: U.S. Department of Transportation.

Kemp, M.A. (1982) "Financing Interjurisdictional Bus Lines: The Kansas City Situation." Working Paper 3124-1, Washington, D.C.: The Urban Institute.

Kemp, M.A., and M.D. Cheslow. (1977) "Chapter 6 Transportation" in The Urban Predicament, eds., W. Gorham and Glazer, UI 199-0722-00-02, Washington, D.C.: The Urban Institute.

Kendall, D.C. (1975). "Carpooling: Status and Potential." Washington, D.C.: Office of the Secretary, U.S. Department of Transportation.

_____ (1980). "Comparision of Findings from Projects that Employ User-Side Subsidies for Taxi and Bus Travel." Transportation Research Record 784, Washington, D.C.: Transportation Research Board.

Kirby, R.F. (1981a). "Innovations in the Regulation and Operation of Taxicabs, Transportation 10, pp. 61-86.

_____ (1981b). "Targeting Money Effectively: User-Side Transportation Subsidies." Journal of Contemporary Studies, Volume IV, No. 2.

Kirby, R.F., and K. Bhatt (1975). Guidelines on the Operation of Subscription Bus Services. URI 11100, Washington, D.C.: The Urban Institute.

Kirby, R.F.; K.U. Bhatt; M.A. Kemp; R.G. McGillivray; and M. Wohl (1975). Paratransit: Neglected Options for Urban Mobility. URI 78000, Washington, D.C.: The Urban Institute.

Kirby, R.F.; M.A. Green; and M.L. Olsson (1979). An Assessment of Short-Range Transit Planning in Selected U.S. Cities. Paper URI 28600, Washington, D.C.: The Urban Institute.

Kirby, R.F., and U.F.W. Ernst (1981). "Involving Private Providers in Public Transportation Programs: Administrative Options." Working Paper 1199-1-5, Washington, D.C.: The Urban Institute.

Kirby, R.F.; and G.K. Miller (1983). "A Casebook of Short-Range Actions to Improve Public Transportation." Report 3072-2, Washington, D.C.: The Urban Institute.

Kocur, G.; D. Zaelke; and L. Neuman (1977). "Feasibility Study of Shared Auto Transit: Final Report." Prepared for Urban Mass Transportation Adminstration, Washington, D.C.: U.S. Department of Transportation.

Kulash, D.J.; and W. Silverman (1974) Discrimination in Mass Transit. URI 64000, Washington, D.C.: The Urban Institute.

Lago, A.M.; and P.D. Mayworm (1981). "Transit Fare Elasticities by Fare Structure Elements and Ridership Submarkets." Transit Journal, Vol. 7, No. 2, Spring: 5-14.

Lave, C.A. (1981). "Dealing with the Transit Deficit." Journal of Contemporary Studies, Vol. IV, Spring, pp. 53-60.

Markovitz, J.K. (1971) "Transportation Needs of the Elderly." Traffic Quarterly, Volume 25, Westport, Conn.: Eno Foundation for Transportation.

Mayer, J.R.; and J.A. Gomez-Ibanez (1981), Autos, Transit, and Cities, Cambridge, Mass.: Harvard University Press.

McGillivray, R.G.; M.A. Kemp; and M.E. Beesley (1980). "Urban Bus Transit Costing." Working Paper 1200-72-1, Washington, D.C.: The Urban Institute.

McQueen, J.T.; D.M. Levinsohn; R. Waksman; and G.K. Miller (1975). Evaluation of the Shirley Highway Express-Bus-On-Freeway Demonstration Project: Final Report to the Urban Mass Transportation Administration, U.S. Department of Transportation, Washington, D.C.: U.S. Department of Commerce.

Meier, H. (1981) "Accessible Public Transit: A History and Overview of Accessible Transit Provision in the United States." San Francisco, Cal.: United Cerebral Palsy Association of San Francisco.

Meyer, M.; and J. Sheldon-Dean (1980), "The Role of Enforcement in Short-Range Transportation Planning." Report No. MA-11-0034-11, Urban Mass Transportation Administration, Washington, D.C.: U.S. Department of Transportation.

Miller, G.K.; and M.A. Green (1977). "An Analysis of Commuter Van Experience." Traffic Quarterly, January.

Miller, G.K.; and C.T. Everett (1980). "Checkpoint Paratransit: A Demonstration Concept." Working Paper 1409-5, Washington, D.C.: The Urban Institute.

_____ (1982). "Raising Commuter Parking Prices--An Empirical Study," Transportation 11, pp. 105-129.

Miller, G.K.; and T. Higgins (1983). "Implementing Parking Pricing Strategies." Project Report 3161-1, Washington, D.C.: The Urban Institute.

Misch, M.R.; J.B. Margolin; D.A. Curry; L.J. Glazer; and G. Sherin (1981). Guidelines for Using Vanpools and Carpools as a TSM Technique. National Cooperative Highway Research Program Report 241, Washington, D.C.: Transportation Research Board.

National Cooperative Highway Research Program (1977), "Energy Effects, Efficiencies and Prospects for Various Modes of Transportation,: No. 43, Washington, D.C.: National Academy of Sciences.

_____ (1976). "Transportation Requirements for the Handicapped, Elderly, and Economically Disadvantaged," Synthesis of Practice 39, Washington, D.C.: National Academy of Sciences.

National Research Council (1979). NRC Transbus Study, Report on Contract DOT-OS-90094 to the U.S. Department of Transportation, Washington, D.C.: National Academy of Sciences.

Neuburger, H. (1971). "User Benefit in the Evaluation of Transport Land Use Plans." Journal of Transport Economics and Policy, Volume V, No. 1, pp. 52-75.

Olsson, M.L.; and G.K. Miller (1978). Parking Discounts and Carpool Formation in Seattle. URI 22200, Washington, D.C.: The Urban Institute.

Ott, M.T.; and M.D. Abkowitz (1980). "Review of Recent Demonstration Experiences with Paratransit Services." Paper presented at the 55th Annual Meeting of the Transportation Research Board. Cambridge, Mass.: Transportation Systems Center.

Paaswell, R.; and P. Edelstein (1976). "A Study of Travel Behavior of the Elderly" in Transportation Planning and Technology, June.

Paaswell, R.; and W. Recker (1978). Problems of the Carless. New York City: Praeger Press.

Peat, Marwick, Mitchell and Company (1976). "A Marketing Approach to Carpool Demand Analysis." Washington, D.C.: U.S. Federal Energy Administration.

Pickrell, D.H.; and P.C. Shoup (1980). "Employer-Subsidized Parking and Work-trip Mode Choice." Transportation Research Record 786, Washington, D.C.: Transportation Research Board.

Public Technology, Inc. (1978). Transit Actions: Techniques for Improving Productivity and Performance. Washington, D.C.

Quinn, R.P. (1971). "The 1969-70 Quality of Employment Survey." Ann Arbor, Michigan: Institute for Social Research, Michigan University.

Quinn, R.P.; and L.J. Shepard (1974). "The 1972-73 Quality of Employment Survey: Descriptive Statistics, with Comparison Data from 1969-70, Survey of Working Conditions." Ann Arbor, Michigan: U.S. Department of Labor Research Center.

Roark, J.J. (1981). Experiences in Transportation System Management. NCHRP Synthesis of Highway Practice 81, Washington, D.C.: Transportation Research Board.

Rosenbloom, S. (1978). "Transportation Needs and Use of Social Services: A Reassessment." Traffic Quarterly, July, Westport, Conn.: The Eno Foundation for Transportation.

Rothenberg, M.J.; and D.R. Samdahl (1981). "Evaluation of Priority Treatments for High Occupancy Vehicles." Report No. FHWA/RD-80/062, Washington, D.C.: U.S. Department of Transportation.

Samuels, R.E. (1972). "Samuels Reviews Taxicab Industry Regulations." Taxicab Management 20, Nos. 1 and 2.

Spielberg, F.; S. Andrle; U. Ernst; and M. Kemp (1980). "Impact of Demographic and Migration Trends on Future Travel in Metropolitan Areas," Report No. DOT-P-30-81-01, Washington, D.C.: U.S Department of Transportation.

Survey Research Center, The University of Michigan (1971). "Survey of Working Conditions: Final Report on Univariate and Bivariate Tables." Washington, D.C.: U.S. Department of Labor.

Systan Incorporated (1979). Paratransit Handbook: A Guide to Paratransit System Implementation, Volumes I and II. Report No. UMTA-MA-06-0054-79-1, 1 and 2, Washington, D.C.: U.S. Department of Transportation.

Teal, R.F.; G.J. Fielding; G. Guiliano; J.V. Marks; and R. Goodhue (1980). "Shared-Ride Taxi Services as Community Public Transit," Report No. CA-11-0017-1, UMTA, Washington, D.C.: U.S. Department of Transportation.

Transportation Research Board (1976). "Demand-Responsive Transportation Systems and Other Paratransit Services." Transportation Research Record 608. Washington, D.C.: National Academy of Sciences.

_____ (1977a). Transportation System Management Special Report 172. Washington, D.C.: National Academy of Sciences.

_____ (1977b). Urban Transportation Alternatives: Evaluation of Federal Policy Special Report 177. Washington, D.C.: National Academy of Sciences.

_____ (1979). Paratransit: 1979 Special Report 186, Washington, D.C.: National Academy of Sciences.

_____ (1980). Alternative Work Schedules: Impacts on Transportation, NCHRP Synthesis of Highway Practices 73. Washington, D.C.: National Academy of Sciences.

Tye, W.B. (1973). "The Capital Grant as a Subsidy Device: The Case Study of Urban Mass Transportation" in U.S. Congress Joint Economic Committee, The Economics of Federal Subsidy Programs, Part 6, Transportation Subsidies, February 26. Washington, D.C.: U.S. Government Printing Office.

U.S. Department of Commerce (1972). City and County Data Book, Washington, D.C.: Bureau of the Census.

U.S. Department of Health, Education and Welfare (1976). Transportation Authorities in Federal Human Services Programs. Atlanta, Ga.: Office of the Regional Director.

U.S. Department of Labor (1983). Employment and Earnings, Vol. 30, No.1. Washington, D.C.: Bureau of Labor Statistics.

_____ (1978). "Guidelines, Section 13(c), Urban Mass Transportation Act of 1964, as Amended," Federal Register, March 31, 1978. Washington, D.C.: U.S. Government Printing Office.

U.S. Department of Transportation (1973). "Nationwide Personal Transportation Study, Report No. 8, Home-to-Work Trips and Travel." Washington, D.C.: U.S. Department of Transportation.

_____ (1975). "Transportation Improvement Program." Federal Register, Volume 40, No. 81, September 17, pp. 42976-42984.

_____ (1976a). "Paratransit Services: Proposed Policy," Federal Register, Vol. 41, No. 204, Wednesday, October 20.

_____ (1976b). "Transportation Problems of the Transportation Handicapped," Volumes 1-4, ed. by Crain and Associates, Washington, D.C..

_____ (1979a). "Nondiscrimination on the Basis of Handicap in Federally-Assisted Programs and Activities Receiving or Benefitting from Federal Financial Assistance." 49 CFR Part 27, Federal Register, Volume 44, No. 106, Thursday, May 31.

_____ (1979b). U.S. Department of Transportation "Urban Mass Transportation Act of 1964, as amended through December 1978, and Related Laws." Washington, D.C.

_____ (1980a). A Transportation Improvement Package for the Relief of Traffic-Related Problems. Washington, D.C.: Ofice of Service and Methods Demonstrations, Urban Mass Transportation Administration.

_____ (1980b). Profile of the 80's, prepared by SG Associates, Inc., and The Urban Institute, Washington, D.C.: U.S. Department of Transportation.

_____ (1981a). Urban Transportation Planning. Federal Register, Volume 46, No. 11, January 19, 1981.

_____ (1981b). Nondiscrimination on the Basis of Handicap, Federal Register, Vol. 46, No. 138, July 20, 1981.

_____ (1982). "Paratransit Policy," Federal Register, Volume 47, October 1982.

U.S. Environmental Protection Agency and U.S. Department of Transportation (1978), Transportation - Air Quality Planning Guidelines, Washington, D.C.

Wachs, Martin (1981). "Pricing Urban Transportation: A Critique of Current Policy." Journal of the American Planning Association 47 (June): 243-251.

Weisbrod, G.E.; and E.S. Eder (1980). "Evaluation of the Minneapolis Ride-sharing Commuter Services Demonstration: Final Report." Report No. UMTA-MN-06-0008-80-1, to the Transportation Systems Center, Washington, D.C.: U.S. Department of Transportation.

W.E. Upjohn Institute for Employment Research (1973). Work in America. Report of a Special Task Force to the Secretary of Health, Education and Welfare, Cambridge, Mass.: MIT Press.

☆ U.S. GOVERNMENT PRINTING OFFICE 1984-421 428/277

NOTICE

DOT-I-84-14

-84-14