

Review of Recent Demonstration Experiences with Paratransit Services

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Findings from a review of recent paratransit projects sponsored by the Service and Methods Demonstration program of the Urban Mass Transportation Administration are summarized to identify lessons that have been learned and that may be transferable to other communities that are considering establishing paratransit services. Paratransit activities are reviewed according to three service concepts: (a) demand-responsive transportation, (b) brokerage, and (c) ride-sharing. Based on a comparative analysis of project results, several operational and institutional findings are reported. The subject areas include quality of service, user response, operating costs, service substitution, agency role, participation of the private provider, fleet purchase, maintenance policies, and regulatory and institutional barriers to implementation. The major implications of the research effort are summarized, and transferable lessons that may be of interest to communities considering paratransit implementation are identified. Because the discussion is limited to government-sponsored projects, it may not be completely representative of all paratransit operations that currently exist in the United States.

With the increasing concern about energy consumption, traffic congestion, and air pollution and the consequent provision of alternatives to the single-occupant automobile, policymakers have been looking more closely at the potential offered by paratransit services. Another motivation for developing paratransit services is to make better use of existing transportation resources in the public and private sectors. This includes the operation of publicly owned vehicles as well as taxis, social service agency vehicles, school buses, limousines, commuter cars, and vans, which may be used more efficiently to complement existing transit operations.

Federally sponsored paratransit programs, particularly the Service and Methods Demonstration (SMD) program of the Urban Mass Transportation Administration (UMTA), have been developing and testing innovative forms of paratransit service. The SMD program has focused on paratransit implementation issues, operational features, economics, and public acceptance through the implementation of demonstration projects in various locations throughout the country (1,2).

The purpose of this paper is to review the paratransit activities of the SMD program for the purpose of identifying lessons that have been learned and that may be applicable to other communities that are considering establishing paratransit services. The findings and implications of previous demonstration experiences are also useful to the development of future paratransit programs. It should be noted, however, that, because this paper is limited to a discussion of government-sponsored projects, it may not be completely representative of all current U.S. paratransit operations.

DEMAND-RESPONSIVE TRANSPORTATION SERVICE

The concept underlying demand-responsive transportation (DRT) is that the service is requested by the user when needed and vehicles are routed on a dynamic basis to serve the requests currently on file. In areas of low population and/or trip density, DRT service can usually serve the travel needs of an entire community with limited resources (applications of DRT to service for the handicapped and the elderly have been the focus of another area of the SMD program and are not discussed in any detail in this paper).

Variations of DRT for the general public have

been demonstrated in four suburban communities of Rochester, New York, as well as in Xenia, Ohio; Westport, Connecticut; and St. Bernard Parish, Louisiana (1,3-7). The major distinctions between projects include the orientation of services, the type of service provider, the role of the lead agency, the funding structure, and a variety of operational elements. The differences in service orientation can be briefly described as follows:

1. Greece--DRT advance-reservation or immediate service, limited transfer coordination between fixed-route and DRT, 24-h advance-reservation service for the handicapped, prearranged group trips, computerized dispatching, fixed-route shuttle;

2. Irondequoit--DRT advance-reservation or immediate service, 24-h advance-reservation service for the handicapped, computerized dispatching;

3. Brighton and Henrietta--DRT advance-reservation or immediate service, limited transfer coordination between fixed-route and DRT, 24-h advance-reservation service for the handicapped;

4. Westport--DRT including subscription service, package delivery, information broker, 24-h advance-reservation service for the handicapped; and

5. Xenia--Many-to-many advance-reservation and immediate DRT, subscription service, charter trips.

Other differences among the projects are outlined in Table 1 (because only incomplete information was available for St. Bernard Parish, it is not included in the table), and all of these aspects are discussed below. Both shared-ride taxis and publicly operated demand-responsive transit services are referred to here as DRT service.

Quality of Service

Average ride times and passenger trip lengths were quite similar and reasonably good for all projects. Average response time exceeded average ride time in all cases. It is interesting to note that, although response times and ride times were similar for public and private DRT operations in Rochester, the variability of response times for the private operator was considerably lower, which indicates more reliable service.

Successful transfer coordination was shown to be a viable design concept. In St. Bernard Parish, almost all bus-to-taxi and taxi-to-bus transfers took less than 5 min. These results, coupled with the considerably improved transfer times reported for Rochester, demonstrate the advances made in the integration of services. These improvements have been particularly important in Greece, a suburb of Rochester, where almost one-third of the DRT passengers required a transfer.

The effectiveness of computer dispatching in improving service levels is a widely debated issue. Unfortunately, no strong, conclusive findings on computer dispatching can yet be reported. In the Rochester suburbs of Greece and Irondequoit, demand did not reach a high enough level to permit a comparison between previous manual dispatching and current computer dispatching. In the Rochester suburbs of Brighton and Henrietta, the transition to computer dispatching resulted in a 10-15 percent

Table 1. Overview of DRT demonstration projects.

Item	Rochester					
	Greece ^a	Irondequoit ^b	Brighton ^c	Henrietta ^c	Westport ^d	Xenia ^e
Service area (mile ²)	15	15	16.5	15.9	22	8.5
Population density (people/mile ²)	4530	3710	2125	1800	1300	3365
Extent of transferring	30 percent of DRT riders transferred to or from FR	16 percent of DRT riders transferred to FR	--	--	33 percent of daytime FR riders transferred (to another FR)	--
Economics						
Avg revenue (\$/passenger)						
DRT	0.67	0.73	0.65	0.75	1.15	0.79
Shuttle	0.23 ^f					
FR					0.20 ^g	
Operating cost (\$)						
Per vehicle hour						
DRT	20.52	32.66	13.30	13.30	12.33	11.17
FR					19.10	
FRS					12.33	
Per vehicle mile						
DRT	1.87	1.90	0.89	0.89	0.83	0.86
FR					1.18	
FRS					0.83	
Per passenger						
DRT	4.33	11.88	3.70	3.70	2.49	2.45
FR					1.01 ^g	
FRS					2.20	
Revenue/cost ratio						
DRT	0.16	0.06	0.18	0.20	0.52	0.38
FR					0.23	
Labor						
Driver (\$/h)	6.10	6.60			4.15	2.80
Dispatcher (\$/h)	--	--	3.50 plus incentives	3.50 plus incentives	4.75	3.00
Direct labor as proportion of operating cost (%)	68	62	--	--	60	62
Passengers per vehicle hour						
DRT	4.7	3.0	3.6	3.6	4.9	4.8
FR					18.7	
FRS					8.5	
Handicapped	2.7	2.7				
Group	22.0					
Shuttle	9.7 ^f					
Passengers per trip (DRT)	1.15	--	1.2	1.2	1.2	1.1
Level of service, DRT only						
Response time (min)	25	16	25.1	23.8	16.13 ^h	18.2
Avg wait time (min)					8.1 ⁱ	
Pickup deviation						
Immediate requests	5	6	2.8	2.4		
Advance requests	7	6	3.9	7.2		
Transfers						
DRT to FR	7					
FR to DRT	12					
Avg ride time (min)	16	10			11	13
Immediate requests			14.6	15.1		
Advance requests			15.3	17.2		
Avg passenger trip (miles)	2.8	2	--	--	3.5	3

Note: FR = fixed-route; FRS = fixed-route supplemental (Westport only).

^aService characteristics as of winter of 1975 and 1976.

^bService characteristics as of mid-1977.

^cService characteristics as of autumn 1978.

^dService characteristics as of autumn 1978.

^eService characteristics as of 1977.

^fShuttle data for January 1977.

^gIncluding transfers.

^hImmediate requests.

ⁱAll DRT trips.

improvement in pickup and response times. However, this improvement in service quality must be measured against the added costs of computerized operations. Fortunately, with the introduction of minicomputer dispatching, computer dispatching costs have decreased. In Rochester, for example, monthly computer costs have decreased by 30 percent since the switch from leasing a large off-site computer to the acquisition of an in-house minicomputer.

User Response

It is not surprising that ridership and productivity improved in Rochester and Westport in response to the more reliable service provided during their last

year of demonstration operations. The productivity of shared-ride taxi in Westport increased to almost 5 passengers/vehicle-h despite increases in service hours. Increases in DRT ridership were also reported in Rochester. In Xenia, although ridership decreased, productivity stabilized at 4.8 passengers/vehicle-h. Productivities for fixed-route and subscription services were, as expected, considerably higher than those for DRT for all systems.

DRT services have demonstrated their appeal to a diverse travel market. Many travelers who have access to an automobile have been attracted to these services. Moreover, Westport's commuter routes provide evidence that tailoring services to particular commuting trips is an effective way of attracting

automobile users who may not ride conventional transit. Off-peak ridership in Westport was highly transit dependent: About 75 percent of off-peak riders were between the ages of 12 and 19, and 67 percent did not have a driver's license. In contrast, the commuter service, which accounted for one-third of the daily ridership, was made up almost entirely of adults who formerly drove or were driven to the train station.

The demonstration projects also provide an opportunity to assess the impact of transit availability on travel behavior. The impact on overall transit mode share has been very slight. For transit dependents, however, DRT services may represent the only form of transit that can be used to reach a destination or to gain access to conventional transit services. In Rochester, 33 percent of the dial-a-bus users surveyed indicated that they could not have made their trip without DRT.

Operating Costs

Differences in operating costs varied substantially among the projects, ranging from \$32.66/vehicle-h in Irondequoit to \$11.17/vehicle-h in Xenia. Driver wages, which constitute 60-70 percent of hourly operating costs, also varied significantly among projects; much of this difference was attributable to the use of union drivers in Greece and Irondequoit. Private operation of DRT services in Xenia and Westport probably explains the lower systemwide operating costs there and suggests that there may be significant cost savings in contracting with private operators for DRT services. The projects also differed significantly in terms of revenue/cost ratio, a reflection of the large differences in operating costs.

The SMD program has explored the role of private operators in the provision of DRT service. Private operators who have become involved in providing DRT service appear to be able to offer the service at lower costs, although this is sometimes done by lowering service levels. In Xenia, transition to private DRT operations resulted in a net reduction in project costs. The evaluation of the Rochester follow-up demonstration should reveal some interesting comparative findings on this subject, since both a private and a public operator were providing similar services in the same geographic region. The preliminary results support the Xenia findings.

Vehicle reliability and the effective use of available fleet are major components in improving passenger level of service and reducing operator costs. In Rochester, during the initial demonstration, an effort was made to acquire several different types of vehicles for DRT service to evaluate their relative performance. This approach resulted in serious problems with vehicle reliability, particularly during the winter of 1976. In addition to problems associated with the innovative nature of the vehicle designs and DRT service requirements, the problems in Rochester were attributed to difficulties encountered by Regional Transit Service (RTS) mechanics in getting acquainted with a variety of vehicle types and to restrictions on their ability to keep a satisfactory inventory of parts for maintenance. Consequently, in 1977, the Rochester-Genesee Regional Transportation Authority (RGRTA) retired their troublesome vehicles and simultaneously leased a number of vans from a local dealer. The economic benefits of using a single type of vehicle were apparent in the improved vehicle reliability and level of service that resulted.

In Westport, a conscious effort was made to

acquire a vehicle fleet composed of vehicles of different sizes, although with one vehicle type for each vehicle size. This vehicle mix, coupled with an effective maintenance program, resulted in a high degree of vehicle reliability and fleet availability for service operations. Westport could also freely substitute vehicle sizes at times of low demand, creating the possibility of a small savings in operating costs. Xenia also opted for a single vehicle type and hired a full-time mechanic to operate a preventive maintenance program, which helped to reduce downtime. Xenia also found that taxicabs were more economical to operate than minibuses, chiefly because of a \$0.03/mile reduction in fuel and oil costs.

The lessons of the Rochester, Westport, and Xenia experiences are clearly to select a proven vehicle type and to stick with one model for all the requirements of a particular vehicle size. Where a mix of fleet sizes is required, proper use of the available fleet can reduce operating costs without adversely affecting level of service. A strong preventive maintenance program can reduce vehicle downtime and perhaps extend the operating life of a vehicle fleet. Finally, agencies should consider using private operators, since they appear to have the potential to keep operating costs down.

Replacement for Fixed-Route Service

One role proposed for DRT service is that of replacing underused fixed-route segments that can potentially be operated at lower cost and with better coverage as part of DRT service. This concept was tried, with mixed results, in Rochester and Xenia.

In Rochester, off-peak fixed-route service was cut back in Greece and Irondequoit and replaced with DRT service. After the change, ridership dropped significantly. A survey of former fixed-route users indicated that many either switched to other fixed-route lines or traveled during time periods when fixed-route service was still in operation. A financial analysis revealed no significant operator cost savings associated with the service substitution. It should be noted that DRT is a different type of service, providing doorstep service and more coverage than the service it replaced. DRT fares were also considerably higher.

In Xenia, fixed-route service was initiated in 1974 and replaced by DRT service in 1976. Evaluation results indicated that both systems operated at similar service levels. Although DRT ridership was only 33 percent of fixed-route levels, much of the discrepancy was caused by higher DRT fares and the discontinuance, when DRT was instituted, of bus passes that allowed multiple trips by passholders. Cost per passenger and deficit per passenger were lower for fixed-route service, as expected. DRT Sunday service was quite successful in Xenia, and weekday DRT service catered to a more diverse market than the youth-oriented fixed-route service.

The Rochester and Xenia experiences suggest that careful analyses should be done before DRT replaces existing fixed-route service, particularly if the fixed-route service has been available for several years and well-defined corridors and trip patterns have developed around the routes. Results from the projects indicate that DRT service often attracts a different mix of riders than the replaced fixed routes and that, whenever possible, DRT service and conventional transit should be designed to offer complementary rather than competing transportation services.

Role of Sponsoring Agency

The role of the sponsoring agency in the provision of DRT services can have a significant impact on the potential for successful implementation and operations. Despite setbacks in structuring the implementation process, Westport, which kept the closest contact with operations, had a relatively successful record of service implementation and operational performance. In Rochester, DRT services in Greece and Irondequoit were hampered by several problems, some of which may have been attributable to the RTS management position of placing higher priority on fixed-route operations. Xenia and St. Bernard Parish opted to turn operational responsibilities over to private operators, and it appears that this was a successful approach to keeping operating costs down. RGRTA also adopted this approach in Brighton and Henrietta.

These results suggest that the agency that sponsors a DRT service program should maintain a close working relationship with the service provider. When the agency's level of DRT operations is small relative to total system operations, it may be more difficult to establish this type of relationship. It appears that some level of cost containment can be achieved when private operations are involved.

TRANSPORTATION BROKERAGE

The transportation broker identifies the transportation needs of various market segments in an area and then matches these needs with the most appropriate and efficient transportation resources available. Brokers have promoted carpooling and vanpooling and arranged for social service agency transportation as well as paratransit services in low-density areas. Through identification of travel needs, the broker is also able to suggest modifications to the fixed-route system. In addition, the transportation broker often takes an active role in removing barriers to more efficient use of existing resources.

Broker Applications

Since most brokerage operations have been instituted to serve a particular client group--i.e., commuters, the elderly and the handicapped, or the general public--differences in the application of the broker concept are examined here by target group.

Commuter brokers are responsible for arranging options to driving alone for work trips. Demonstrations of this type have been implemented in Minneapolis (8) and Knoxville (9). Both brokers provide a matching service for carpools and vanpools as well as identify fixed-route service available to commuters.

There are a variety of brokerage arrangements for service to the elderly and the handicapped. In Knoxville, the Knoxville Commuter Pool (KCP) has also served as a social service agency broker. KCP activities began with a survey to identify agencies that offered or were interested in offering transportation service to clients; interested agencies were then handled individually.

The Pittsburgh paratransit broker, under contract to the Port Authority of Allegheny County, negotiates contracts with selected providers, markets the coordinated system to social service agencies and interested individuals, and monitors the performance of the providers and the overall system (2). In Kansas City, the city is offering the elderly and the handicapped a subsidy for shared-ride services provided by private carriers (2). Reservations for trips are made through the city, one day in ad-

vance. The city then allocates the trips to participating providers, which include both private taxi companies and nonprofit agencies.

To date, there has been only limited experience with brokers serving the needs of the general public. The Knoxville brokerage was designed to evolve in this direction but, because of limited staff, it has concentrated on commuter service, giving some attention to the needs of social service agencies.

In Chicago, the Northeastern Illinois Regional Transportation Authority has established itself as a broker for services in suburban communities (2). In its role as a paratransit broker, the authority solicits service proposals from local governments within its jurisdiction and then funds the most promising ones. The local government is responsible for arranging to provide service, either by operating the service itself or by contracting with a local provider. By decentralizing the planning and operation of service, this broker structure allows communities to determine their own transportation priorities and to arrange for service as efficiently as possible.

Travel Impacts

Even though the transportation brokers have all provided alternative travel options to large numbers of their target populations, they have not yet had a measurable impact on overall travel by commuters or by the elderly and the handicapped in their regions. Travelers who have used the brokerage services have benefited from reduced travel costs and the ability to make trips they would otherwise not have been able to make.

The minimal impact of the Knoxville and Minneapolis commuter brokers on work-trip mode split (discussed further in the section on ridesharing later in this paper) is perhaps not surprising. Without major employer involvement and incentives, the potential for carpooling and vanpooling in these areas is simply not very great under current conditions. This is particularly true in Minneapolis, where factors such as adequate parking, uncongested regional highway and local street access, and relatively short commuting distances tend to favor drive-alone commuting. However, increases in fuel prices or fuel shortages could change these results substantially.

The Knoxville broker's activities in relation to social service agencies did not result in substantial changes to the social service agency transportation network. KCP did arrange service for two agencies at a cost lower than what they would have been able to obtain otherwise and helped a third agency to negotiate a better arrangement with a private provider. In most cases, however, the social service agencies either did not wish to provide service (probably because they could not afford it) or already had what they believed were satisfactory arrangements.

After only a few months of operation, the Pittsburgh broker is servicing more than 3000 trips/month, mostly for individual elderly and/or handicapped travelers (less than 500 of the trips are agency sponsored).

The Kansas City service, which deals directly with individuals, had 10 700 enrollees after one year of operation. (The elderly population in the region is about 60 000, and the number of handicapped is unknown.) The broker handles about 8000 trips/month.

Impacts on Service Providers

Brokers are intended to benefit providers as well as

travelers through their marketing of transportation services and identification of clients. They may be able to identify promising markets for expansion or alternative arrangements for inefficient service. Since many of the broker projects have only recently been implemented, there is limited evidence on this point.

The Pittsburgh broker appears to be benefiting providers by marketing service and finding clients. However, the demonstration is in too early a stage at this point for anyone to be able to document its impact on private providers.

In Knoxville, the broker enabled an intercity bus operator to eliminate an unprofitable route by placing the affected commuters in a vanpool and in carpools. Commuters also benefited because the ridesharing arrangements were cheaper and more convenient. The Knoxville broker also made it easier for the public transit operator to eliminate an unproductive route by placing the few affected riders in other ridesharing arrangements.

Institutional Effects

Despite mixed success in influencing travel behavior, all of the brokers have identified and promoted travel options. In addition, they have changed the institutional and regulatory environment to encourage innovative transportation arrangements.

By serving as an effective lobbyist for all forms of ridesharing, the Knoxville broker was responsible for removing commuter vanpools that carried 15 or fewer passengers from the authority of the Knoxville Public Service Commission, which had regulations concerning insurance and maintenance. Filing insurance with the Public Service Commission implied a common-carrier standard of liability to the insurance companies (like that of an intrastate bus operation) and resulted in either huge rate hikes or policy termination for vanpool operators. As a result of KCP efforts, insurance rates have been lowered for private vanpools nationwide.

RIDESHARING

Ridesharing has again aroused considerable public interest in the past half decade, particularly for trips that cannot be efficiently served by conventional systems. The greatest potential--and that receiving most emphasis in SMD program projects--is for commuter trips because of the regularity and frequency with which these trips are made.

The ridesharing demonstration projects have been prompted primarily by interest in the success of recent employer-sponsored ridesharing programs, by a need to explore alternatives to conventional transit (particularly in markets where conventional transit is inefficient and ineffective), and by the pressing need to reduce automotive air pollution and energy consumption. Demonstrations have been sponsored in Minneapolis, Knoxville, Norfolk, Virginia, and Marin County, California (north of San Francisco) (8-12). These four demonstrations encompass a variety of organizational and operational approaches, which are summarized in Table 2.

Marketing and Participation

Although most of the vanpooling and carpooling demonstrations are still in the midoperational stage, preliminary evidence provides insight into the circumstances in which vanpooling and carpooling are most effective. Table 2 gives the number of vanpools formed in each of the demonstrations. As the evidence presented below illustrates, large numbers of people were exposed to the concept but

significant barriers to ridesharing exist.

The demonstrations have taken different advertising approaches. The target for all of the projects has been the commuter market. However, because projects are implemented in different environments, different strategies have been developed for reaching this market.

In the Golden Gate project, which was aimed at forming vanpools in its corridor market, application material was distributed at tollbooths, in buses, and through newspapers. The most cost-effective means of distribution has been the tollbooth. The success in this project of the distribution of brochures at tollbooths is probably attributable to the fact that the project is corridor oriented and the congestion at the Golden Gate Bridge (over which the grantee has jurisdiction) is severe during commuting hours.

In Minneapolis, the project is employment site based, and the largest number of applications was received after distributions to employees. Although these distributions were most effective in large firms, approximately 17 percent of the total applications were received through the mail from individuals who were not present when the material was distributed. This suggests that passive marketing tools, such as posters and tear-off applications, might be reasonably effective in attracting employees from small firms. By April 1979, a total of approximately 6400 applications had been returned. Of these, 80 percent received the name of at least one possible match. Of the individuals matched, however, fewer than 20 percent actually joined a pool.

A somewhat similar marketing approach was adopted in Knoxville, which had a regionwide market. More than 90 percent of the people who sought assistance from the KCP received names of potential matches. However, only about 5 percent of those who received a match list in the mail actually began ridesharing as a direct result of KCP activities. Both the Minneapolis and Knoxville projects are currently contacting by telephone potential poolers who have already received a match list to encourage them to establish ridesharing arrangements. This experiment is still in its infancy, and results are not yet available.

Barriers to Ridesharing

Obtaining names for the central matching pool was not a problem in any of the demonstrations, although the number of arrangements formed has been small. The varying rates of success in actual ridesharing arrangements formed are probably caused in part by natural barriers to ridesharing as well as by differences in the target markets. Since the Minneapolis project focused its efforts on several large industrial sites, all those in the pool had one of a few common destinations. In Knoxville, however, the matching pool contained individuals whose residences and workplaces were scattered throughout the region. More of the match lists provided in Knoxville contained "inconvenient matches"--matches that required large detours at either end of the trip.

In a survey of individuals who received match lists from the KCP and did not use them, more than a third claimed that they had changed their mind and no longer had any intention of pooling; another 22 percent claimed that the matches were inconvenient, and 15 percent already had satisfactory pooling arrangements. Only a very small percentage of the respondents indicated that they had moved or changed jobs.

Employer involvement also appears to be an

Table 2. Comparison of ridesharing demonstration projects.

Item	Norfolk	Golden Gate	Knoxville	Minneapolis
Management and organization	Tidewater Transportation District Commission (grantee)	Golden Gate Bridge, Highway, and Transportation District ^a (grantee)	Knoxville Commuter Pool at University of Tennessee; transferred to city of Knoxville (grantee) after July 1977	Metropolitan Transit Commission (grantee), consultant, and third-party van provider
Scope of demonstration	Vanpools and private hauler association	Vanpools	Vanpools, carpools, social service agencies	Vanpools, carpools, subscription bus, improvement of fixed-route bus schedules and ridership
Starting date of operation	September 1977	October 1977	January 1976	December 1977
Target group	U.S. Navy civilian and military employees at five bases	Corridor north of San Francisco in Marin and Sonoma Counties	Knoxville area	Seven multiple-employer sites
Marketing	Centered around Navy bases	Aimed at employers and riders; mass media used	Aimed at employers and riders; mass media used	Aimed at employers and riders; no use of mass media
Number of vans	50	35	51	63 ^b

^aBridge operator, highway lane control, transit operator of buses and ferries.

^bAs of summer 1979; since vans are leased as needed, the number varies.

important element in a successful ridesharing program. Some employers have expressed concern that pool participants might be less willing to work overtime when required. Other employers have actively promoted ridesharing and even offered incentives to those who carpool or vanpool. Employers are probably more inclined to promote ridesharing when there is an obvious need for it--for example, to relieve local congestion or a parking shortage. The number of employers promoting ridesharing is expected to increase as a result of the fuel shortage. Employees are undoubtedly more willing to rideshare when the organization offers ridesharing incentives.

Characteristics of Ridesharers

Ridesharing, particularly vanpooling, is a more attractive option for longer trips than for shorter ones. Evidence from the Minneapolis demonstration indicates that the percentage of commuters driving alone drops dramatically as trip distance increases. Round-trip distance for vanpools in Marin County, Norfolk, Knoxville, and Minneapolis averages more than 50 miles.

Evidence from these demonstrations suggests that the greatest advantage of ridesharing over driving alone--lower cost--is not the major determinant of mode choice for a majority of commuters. However, the market potential of ridesharing has been shown to be greatest for travelers for whom commuting costs are substantial. The preliminary results of the demonstrations suggest that, for most people, at least in the short run, carpooling or vanpooling is primarily a matter of convenience. If the increase in travel time is too large or if the ridesharing arrangements impose too many constraints, the cost savings must be very significant to induce commuters to shift to a ridesharing mode.

Experience from the demonstrations indicates that ridesharing has general appeal across socioeconomic groups. The demonstration projects have attracted ridesharers from a range of occupational and income groups. In Minneapolis, analysis of preliminary data does not indicate any significant differences between the drive-alone and carpooling population with respect to the sex of the traveler or household automobile ownership. An interim assessment of the project also revealed that, even when work-condition restrictions were severe, a sizable proportion of employees at a larger firm continued to choose carpooling. However, even moderate restrictions eliminate carpooling at smaller firms. This suggests that, in large firms, occasional work-shift changes

may affect a large group of employees homogeneously and thus may not deter carpools.

SUMMARY AND IMPLICATIONS

Providing alternatives to driving alone is emerging as a major concern in developing strategies to reduce energy consumption. The innovative paratransit concepts reviewed in this paper have demonstrated that, for some applications, paratransit services may be more efficient and/or effective than conventional transit in providing such alternatives.

The reported findings and implications of previous experiences with paratransit should be a major input in determining the direction of future paratransit policies and programs. Future programs should continue to examine the possible roles of paratransit service in urban transportation. Emphasis should be placed on refining service concepts, identifying the effectiveness and transferability of service elements, and clarifying the role of paratransit service in integrated transit systems.

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Recent Developments in the Revision of Taxi Regulations in Seattle and San Diego

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The nature of major taxi regulatory changes implemented in Seattle and San Diego during 1979 and the preliminary results of such changes are discussed. The changes substantially reduced fare and entry controls while retaining safety and insurance requirements. These changes are significant because taxis in most U.S. cities have operated under conditions of regulated fare and entry for 40 years or more. The reasons why major regulatory revision took place in these cities are complex and difficult to attribute to any single cause. Some prominent reasons were the "progressive" nature of the San Diego and Seattle City Councils and the desire to avoid frequent hearings on fare increases and other time-consuming regulatory matters. The generally unfavorable image of taxis in both cities did not aid the industry's vehement opposition to these regulatory changes. The implementation process involved the taxi industry, elected officials, and licensing and regulating authorities. The conditions of the taxi industry in both cities immediately prior to regulatory revision are described, and the revision process is examined. Explanations are offered as to why regulatory revision occurred in these cities, and the short-term and possible long-term impacts of the revisions are explored. Although the results are tentative, they should be helpful to those evaluating the desirability of regulatory changes in other cities.

The purpose of this paper is to examine some major changes in taxi regulation that took effect in the cities of Seattle and San Diego during 1979. These changes are significant because they reverse a policy prevalent in American cities for the past 40 years--that of strict control over the authority to operate a taxicab and the fares that may be charged. These revisions did not reduce "noneconomic" regulation of taxicabs; regulations concerning insurance, driver fitness, and vehicle safety remained unchanged or were increased. Because of the possible confusion between economic and noneconomic regulation inherent in the term "deregulation", the

term "regulatory revision" is used.

In January 1979, the city of San Diego began a policy of issuing new taxi permits to applicants at a rate of 6 permits/month (the number of permits had previously been frozen at 411 by City Council ordinance). In July, the city increased the rate to 15 permits/month. Fare control was substantially reduced in August by setting a maximum fare, at approximately twice the old regulated rate.

In May 1979, the Seattle City Council voted to entirely lift its ceiling on the number of taxis (which was based on a population ratio). Fare controls were also eliminated, although all fares (other than by contract) were required to be registered on an approved taxi meter. Both cities also revised their ordinances to make it easier to charge shared-ride rates (San Diego plans to implement a zone-based shared-ride rate; Seattle permits the alternative of a shared-ride rate, which must be meter based).

This paper highlights some of the key supply and demand characteristics of the taxi industry in both cities, documents the changes in taxi regulation that have been made, and considers some of the early impacts and their longer-run implications. The paper was developed primarily from information collected from city and consultant studies of taxi regulation and extensive interviews with key individuals who are familiar with the taxi industry. It should be noted that no new data were collected and that some issues could not be dealt with because of data limitations and the need to keep the paper reasonably brief. After only a year's experience with the new regulations, it is too early to