

variable pricing have exacerbated problems at airports. The first-in, first-out taxi-queue principle wakens the incentive for price competition while hindering the patron's ability to respond to lower prices. Modifications to airport taxi regulations have resulted, which include rate ceilings, a moratorium on permits, increased permit fees, and restrictions on taxi movements, whereas some port officials threaten a return to the exclusive-franchise approach. More interjurisdictional cooperation prior to implementing the new regulations might have prevented some of these problems.

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Retrospective View of Dial-A-Ride Service in Rochester, New York

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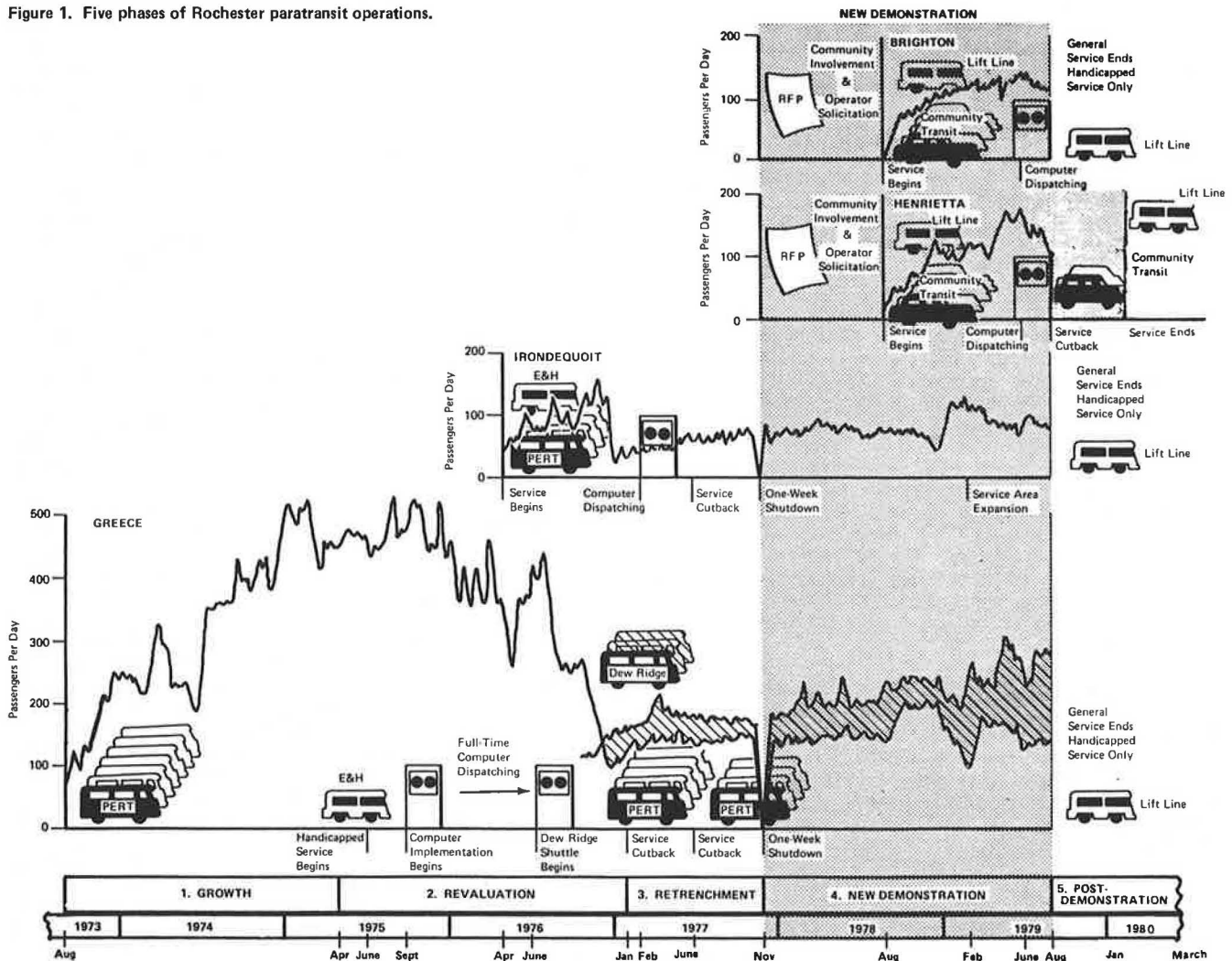
For one year, the Rochester-Genesee Regional Transportation Authority (RGRTA) offered dial-a-ride service to the general public in four suburbs under two different institutional arrangements. The public operator, Regional Transit Service, and a private operator, Paratransit Enterprises, each provided service in two communities. They also provided demand-responsive service to the elderly and the handicapped throughout Rochester. This unique arrangement was part of the Rochester community transit demonstration, an outgrowth of the earlier Rochester integrated transit demonstration, both projects funded by the Urban Mass Transportation Administration Service and Methods Demonstration program. The community transit demonstration was specifically designed to test cost-effective demand-responsive transit strategies. RGRTA sought competitive bids from paratransit operators and asked communities to fund a share of the operating deficits for postdemonstration services. Thus, the demonstration made it uniquely possible to compare service levels, ridership, and costs for public and private dial-a-ride that served both the general public and the elderly and the handicapped. By the end of the demonstration, three of the four communities found that they could not afford to continue paratransit services by using local subsidies. One town, however, developed an innovative funding strategy and supported dial-a-ride services for five additional months. By 1980, no general market dial-a-ride services were operating, although the cost-effectiveness of private operation was successfully demonstrated. Today, RGRTA supports privately operated paratransit services for the elderly and the handicapped throughout the county. The activities of the demonstrations are reviewed and implications are derived that may be useful to others considering implementing demand-responsive transit service.

The history of paratransit in Rochester can be divided into five phases: (a) growth (August 1973 to April 1975), (b) revaluation (April 1975 to January 1977), (c) retrenchment (January 1977 to November 1977), (d) new demonstration (November 1977 to August 1979), and (e) postdemonstration (August 1979 to May 1980). The timing of each of these phases and the key activities in the four Rochester suburbs most affected by the paratransit operations are shown in Figure 1.

GROWTH

The initial growth period lasted from service initiation in the suburb of Greece in August 1973 until early 1975. During this period, the Greece service area expanded several times, fixed-route bus services were eliminated, the demand-responsive vehicle fleet nearly doubled, operating hours were extended, and dial-a-ride ridership grew steadily. Work and school subscription services were offered in addition to the basic dial-a-ride service. All services were operated by the Regional Transit Service (RTS), the major operating subsidiary of the Rochester-Genesee Regional Transportation Authority (RGRTA), and were advertised under the acronym for personal transit (PERT).

Figure 1. Five phases of Rochester paratransit operations.



REVALUATION

By April 1975, when the original Rochester integrated transit demonstration began, the system was entering a period of transition and reevaluation. Although expansion continued by the introduction of services for the elderly and the handicapped, the extension of service into the suburb of Irondequoit, and the implementation of computer control in Greece, several serious operating problems developed. Operating costs proved to be much higher than predicted, whereas demand was lower. In addition, passenger resentment grew over the replacement of fixed-route services with flexibly routed dial-a-ride services. The vehicle fleet, which consisted of several different models of small buses and vans, proved to be very unreliable, and service was further disrupted by the introduction of computerized dispatching. In addition, management disputes arose between RGRTA (the system developer) and RTS (the system operator).

RETRENCHMENT

As these problems developed, PERT's service reliability deteriorated and ridership dropped. At the same time, RGRTA was confronted with a transit funding crisis that not only threatened PERT expansion plans but also jeopardized future local fixed-route services. RGRTA responded by cutting PERT services drastically as part of a retrenchment process and by

developing alternative strategies for reducing the financial burden of the dial-a-ride program.

NEW DEMONSTRATION

During retrenchment, RGRTA also applied for and received a new demonstration project to test innovative and more cost-effective funding options and to complete portions of the first demonstration delayed by service delivery and computer development problems. Publicly operated services continued under the new community transit demonstration, while competitive bidding introduced private, lower-cost dial-a-ride services to the Rochester suburbs of Brighton and Henrietta in July 1978. Lift Line services for the elderly and the handicapped were also expanded throughout Rochester's metropolitan region by using the same private operator. PERT's ridership increased slightly, dispatching functions were transferred to a new minicomputer, additional vans were leased, and Irondequoit expanded service town-wide. During the first few months, community transit's ridership increased rapidly and then continued to rise slowly in Brighton while it fluctuated in Henrietta. During the final six weeks of the demonstration, all dial-a-ride services operated under computer control.

POSTDEMONSTRATION

In the summer of 1979, each town evaluated dial-a-

ride operations. RGRTA continued subsidizing paratransit for the elderly and the handicapped, but only Henrietta decided to fund dial-a-ride services during the postdemonstration period. In August 1979, PERT closed its offices, RGRTA negotiated an extended contract with Paratransit Enterprises that increased the hourly Lift Line service rate from \$13.20 to \$16.60, and Paratransit Enterprises moved into the Henrietta Town Hall. RGRTA reissued requests for proposals, and in December 1979, a new private operator, Beacon Transportation, Ltd., was selected at \$17.70/h of vehicle service. As a result of higher costs and limited local travel needs, Henrietta discontinued dial-a-ride services, but privately operated Lift Line services continued to operate throughout the Rochester metropolitan region.

Today, under a revised and more clearly defined contract, Lift Line operates more smoothly. By comparing the first quarter of RGRTA's 1980-1981 fiscal year to the same period in 1979-1980, Lift Line services show a marginal decline in productivity and a 58 percent increase in ridership offset by a comparable increase in service supply. However, complaints have decreased dramatically, and the accountability of the contract vendor is improved from the perspective of RGRTA. The 11-vehicle system, of which an average of eight are operated daily except Sunday, transports approximately 5500-6000 persons/month at a productivity of just more than 2.5 passengers/vehicle-h.

LESSONS LEARNED FROM SECOND DEMONSTRATION

Because of the unique nature of the second demonstration, many of the experiences can be studied to derive implications that may be useful to other communities considering implementing demand-responsive transit services. These lessons are discussed in the following sections.

Local Involvement and Funding

In the first demonstration, transportation analysts made practically all service decisions and selected and implemented dial-a-ride services in Greece and Irondequoit without stipulating any local commitment. In the second demonstration, Monroe County could not continue to provide dial-a-ride support. RGRTA offered eight Rochester suburbs (not including Greece and Irondequoit) the opportunity of establishing a dial-a-ride service provided that 50 percent of the deficit be assumed locally at the end of a one-year demonstration period if service was to be continued. Of the eight suburbs, only two (Brighton and Henrietta) agreed to assume the service and the attendant funding responsibility. The other six suburbs were reluctant to participate because little local support was expressed, dial-a-ride ridership projections were low, and the local postdemonstration funding requirements were considered too great a burden. Officials in these communities feared that after the demonstration concluded they would have to eliminate dial-a-ride services, cut back other community services, or raise local taxes, none of which were politically attractive alternatives. Officials from Brighton and Henrietta subsequently designed their own dial-a-ride services.

Although the town involvement process was effective, these efforts were less than totally successful in generating the necessary operating funds. Given the poor revenue recovery rates experienced during the demonstration, both Irondequoit and Brighton considered the dial-a-ride service too expensive to justify local funding and voted against subsidizing the service when the demonstration ended. In both these suburbs, the dial-a-ride ser-

vice carried far fewer residents than the extensive fixed-route service operated by RTS. Officials from Greece contended that they were opposed to the concept of local funding from the start; they felt that dial-a-ride service was too expensive, poorly operated, and served too few residents. Consequently, the prospect of continuing dial-a-ride service under a local subsidy was never brought to a formal vote in this suburb.

Only Henrietta--a growing community that had an increasing tax base; a growing number of elderly, student, and transit-dependent residents; and relatively little fixed-route service--voted to subsidize continuing dial-a-ride operations from August until December 1979. To ease the local financial burden, service levels were scaled back to two vehicles, and Henrietta leased Town Hall space to the paratransit operator. At the end of the year, when Henrietta faced another funding decision, significant increases in costs, loss of operator rental revenue, and decreases in demand, local officials decided to discontinue subsidizing dial-a-ride operations.

The implication of this experience is that asking local towns to participate in short-term transit programs is probably not a feasible solution to financing transit programs. Even though demand-responsive transit may be more efficient than fixed-route service in areas that have low population density and diffuse travel patterns, demand-responsive services will probably have much lower vehicle-productivity levels than those of the overall fixed-route system in any major urban area. Consequently, they are likely to lose in a local political battle for scarce transit resources. It is often easier and more dramatic to eliminate a costly demand-responsive transit program than to isolate the least-efficient components of a fixed-route operation.

Most suburban governments rely on local property taxes for support, which provides a fairly limited tax base. In addition, these communities are likely to be more economically conservative; they favor limiting public services in order to maintain low taxes. As in Rochester, town officials may also feel that transportation should be handled at the county or regional level. Other local suburban officials might thus similarly sacrifice a desirable dial-a-ride service today to avoid making a politically undesirable funding decision in the future.

Labor and Operator Selection

Under the first demonstration contract, all operating and mechanical work was restricted to Amalgamated Transit Union (ATU) members. When the plan for a new demonstration based on competitive bidding was disclosed, the ATU local recommended against signing a 13(c) certification for the new project because they feared an erosion of union jobs. The new demonstration appeared doomed until an eleventh-hour agreement was reached with the International ATU. The agreement preserved current union contracts and prohibited the dial-a-ride services from competing with existing fixed-route services. Apparently, this reversal stemmed from national union concerns that long-term interests might suffer if it was accused of forcing transit services to collapse.

A request for proposal (RFP) to provide flexible, affordable community transit services in Brighton and Henrietta and expanded services for the elderly and the handicapped was publicly advertised in local newspapers and sent to 17 potential bidders. A bidders' conference was held to answer any questions, and RGRTA staff was available for additional infor-

mation. Despite these efforts, only three firms responded, and only two of these offered competitive cost estimates.

RTS did not submit a bid because it felt that its high union driver wage rates made it impossible for them to compete with private operators. Most of the other locally solicited operators were small, privately owned and operated taxicab companies. In general, they felt that the bid specifications were unclear, they were inexperienced in dealing with government agencies and public funding procedures, and they lacked the expertise needed to prepare a formal bid and the first-instance money required to set up the services. Most of the out-of-town operators solicited did not submit bids because they felt that Rochester, New York, was not within practical geographical distance from their existing management operations and that it would not be profitable to develop, hire, and establish on-site management and services for a one-year contract.

After the demonstration, RGRTA again publicly advertised and distributed RFPs for continued Lift Line and possibly dial-a-ride services. Although four operators expressed an interest in providing service, only one local operator attended the RGRTA bidders' conference and only two bids were received--one from Paratransit Enterprises, the demonstration contractor, and one from Beacon Transportation, Ltd., a local private ambulance company. RGRTA contracted with Beacon Transportation to provide Lift Line service in 1980 and 1981.

Other communities who wish to enter into contracts with private operators for paratransit services may face a similar limited choice of operators. Obviously, this will depend on the amount and quality of local talent available in or near the particular service area; larger cities typically have a wider variety. Small and medium-sized cities may simply not have any providers or only marginal providers that are not well respected by potential users.

As the Rochester experience has shown, there are currently very few paratransit firms that are capable of competing on a national scale. An increased number of qualified private operators may be interested in providing paratransit services outside their immediate locale now that Rochester has shown that it can be economically profitable for them to do so. However, Rochester's postdemonstration service award to a new local contractor may deter other paratransit operators interested in providing longer-term services.

Local operators should have a competitive advantage over out-of-town providers because they are already locally established and thus need not incur new overhead costs and because they are more familiar with prevailing wage rates and supporting services, such as insurance agencies and vehicle maintenance services. Local providers would also be more familiar with the local physical environment and with potential users of the service, so they would be preferred, particularly for more-personalized services.

RGRTA's use of competitive bidding to select a new paratransit operator also succeeded in lowering local operating costs. RGRTA paid the private contractor a very significant 45 percent less than it paid for local public paratransit operations. Paratransit Enterprises' lower operating costs were primarily due to lower driver wages and maintenance expenditures. As demonstrated by Paratransit Enterprises' willingness to bid for the continuation of operations in 1980 at comparable rates (considering inflation, the reduced 1980 operation, and the aging of the vehicles), it appears that the firm also profited from the experience.

As the Rochester project demonstrated, an alternative to creating a new transit operation or to assigning demand-responsive services to an existing transit operator would be to competitively solicit and contract with private taxi or other operators for the provision of service. This can significantly lower local paratransit operating costs. Another alternative for decreasing costs would be to pay demand-responsive employees lower wage rates than conventional transit employees within the same transit operation. Several other transit providers, including Cleveland, Kansas City, and Bridgeport, have successfully established lower wage classifications for their paratransit service employees. These alternatives, however, may be opposed by existing local transit workers' unions, who, fearing an erosion of their positions and status, may try to prevent either alternative from being implemented.

Safety and Productivity Incentives

To encourage safe, high-quality transit services, a safety incentive of 50 cents/h was added to the wage rates of all Paratransit Enterprises drivers who avoided accidents for four weeks. An analysis of driver rates indicates about 70 percent of all drivers received the additional payment; of the remaining 30 percent, the majority were new drivers. Although a number of external factors prevent any conclusive statements from being drawn, an analysis of the total number of collision accidents recorded by Paratransit Enterprises and PERT drivers indicates that no significant difference occurred. However, both paratransit operators had substantially fewer accidents than did Rochester's fixed-route services.

In addition to the safety incentives, the size of the vehicle, the number of service hours, the individual driver's training and experience, and the way in which the safety incentive is presented and implemented may all affect accident severity and frequency. Instead of viewing it as a safety incentive, drivers may feel penalized if they are docked 50 cents because of an accident, which would contribute to a lower accident-reporting rate. Others interested in developing and implementing incentive or disincentive strategies are advised to try to foresee and control for possible abuses and adverse impacts that might result.

A productivity incentive between 15 cents and 50 cents per dial-a-ride passenger was also devised to encourage the private contractor to manage resources wisely. This additional payment schedule only took effect when average daily productivities rose above 4 passengers/vehicle-h of service. Average dial-a-ride productivity was 3.5 in Brighton and 3.6 in Henrietta, which resulted in relatively few productivity payments.

Although PERT was not offered productivity incentives, dial-a-ride productivities averaged 3.4 passengers/vehicle-h in Irondequoit and a significantly higher figure of 4.3 passengers/vehicle-h in Greece. Thus, there appear to be other, more important factors that affect dial-a-ride productivities than incentive payments. Some of these factors include trip patterns, demand for individual trips, group and subscription service, service-area size, vehicle size, operating speed, service hours, and quality of service. Although no safety or productivity incentives were included in the postdemonstration private operators' service contract, both of these concepts may warrant further examination. Other communities should, however, be aware of the possible abuses and other determinant factors that affect operations.

Contracts and Contractors

From the initiation to the conclusion of dial-a-ride services in Brighton and Henrietta, a number of controversies developed between RGRTA and Paratransit Enterprises. Topics of contention included the accuracy of reported vehicle hours; ridership and service-quality data; driver uniforms, courtesy, and training procedures; vehicle maintenance; and availability of the on-site manager during operating hours. The record-keeping procedures of Paratransit Enterprises were the major bone of contention in these controversies. In trying to ensure that high-quality service was offered and because of the need to provide demonstration evaluation data, RGRTA insisted that contractual details regarding record-keeping and accounting procedures be rigorously observed. Paratransit Enterprises was often frustrated by the reporting requirements and level of detail imposed by the public authority. As a private organization, it would have preferred a more independent relationship in which it was responsible for supplying a specified level of service in return for a flat fee.

Having learned from this experience, RGRTA now requires more contractor accountability and specifies these requirements in the postdemonstration operator's contract. Changes included weekly random RGRTA inspections, financial penalties for noncompliance with the contract, withholding of payments until reports are completed, detailed maintenance schedule and responsibilities, elimination of safety and productivity incentives, and input into selection of the resident manager. The differences between these two types of contracts are highlighted in Table 1. RGRTA also selected a different locally based operator to continue providing Lift Line services. Because of these changes, RGRTA now feels that higher-quality Lift Line services are being provided.

From this experience, it is clear that if outside groups are required to assist in operations or management, they should have on-site decision capability and the authority to execute their responsibility. Most public transit agencies have developed their own standards of service, reporting procedures, and levels of accountability as a public operator. If these standards are to be met by outside contractors, all responsibilities and requirements should be detailed in the service contract and fully understood by both parties at the outset. Contract penalties or rewards may be included to encourage adherence, although considerable negotiation

and compromise may also be necessary to make private contractors adhere to the standards of the public operator. Readers should also understand that detailed Rochester operator information was necessary partly because of the collection of demonstration-evaluation data. Such detailed records may not be needed at other sites.

Operating Effectiveness

Average dial-a-ride vehicle productivity in Irondequoit, Brighton, and Henrietta ranged between 3.34 and 3.60 passengers/vehicle-h. Although these levels are less than the productivity goal of 4-5 passengers/vehicle-h set by RGRTA and markedly lower than those of other dial-a-ride systems in the United States (the productivity levels of which commonly range between 4 and 8 passengers/vehicle-h), trip-demand densities were also relatively low in these three suburbs. Vehicle productivity in Greece was somewhat higher; it averaged 4.25 passengers/vehicle-h, largely due to the greater demand density that occurred there.

The cost of service provided by the private firm, Paratransit Enterprises, was significantly lower than the cost of comparable service provided by the public operator, PERT. The average operating cost per vehicle hour for Paratransit Enterprises, measured by payments made by the RGRTA, was \$13.35. This ranged from \$13.06 for Lift Line service to \$13.53 for dial-a-ride service. Collectively, it was 45 percent lower than the average PERT operating cost of \$24.47/vehicle-h during the same period. This striking difference in cost can be traced to the lower driver wages and maintenance costs paid by Paratransit Enterprises. Driver wages and benefits for the private firm were estimated to be less than half the rate of \$12.62/vehicle-h paid to unionized PERT drivers. However, it should also be noted that maintenance costs were significantly lower because the vehicles were newer, many repairs were covered under warranty, and minor maintenance was often deferred. Between August and December 1979, the Lift Line hourly service rate increased to \$16.60 and in January 1980 it increased to \$17.70.

Although operating costs were considerably lower in the areas served by Paratransit Enterprises, all dial-a-ride and Lift Line services required substantial per-passenger subsidies. This was because vehicle productivities were also lower than anticipated, so that the target revenue recovery rates of 25-29 percent established by Brighton and Henrietta

Table 1. Contract differences.

Category	Contract Period	
	Demonstration (1978-1979)	Postdemonstration (1980-1981)
Incentive	Driver safety and contractor productivity	None
Inspection	No provision	Weekly random by RGRTA
Noncompliance with contract	Terminate contract	Financial penalties
Maintenance	General requirements	Detailed schedule, responsibilities, and requirements
Resident manager	Contractor solely responsible for selection	RGRTA can approve or veto contractor's selection
Special fuel purchase	No provision	Tax-saving purchases through RGRTA
Vehicle assignment	No flexibility on number in service	Flexible peak/off-peak assignment
Payment	No provision for withholding payments	RGRTA may withhold payments until completed reports submitted
Insurance	\$3 million liability	\$2 million liability
Contract length	One year	Two years; mutually renegotiable clause after first year

were not met during the life of the demonstration. In Brighton, revenues averaged 16 percent of costs; the corresponding figure for Henrietta was 18 percent. Because of the higher cost of PERT operations, recovery rates were still lower in Greece and Irondequoit; they averaged 15 and 9 percent, respectively.

The Rochester experience has shown that higher productivities can be completely overshadowed by lower operating costs. Private operators typically pay lower wages and maintain stricter control over finances, which results in lower operating costs than those of most public transit providers. Overall operating efficiency is attained when the maximum transit output is secured for the least amount of resources expended. At the same time, however, passenger revenues must also be considered. Other jurisdictions may therefore find it advantageous to invite competitive bidding for transit services while also reevaluating and possibly modifying their fare structure.

Vehicle productivities for Lift Line, the paratransit service for the elderly and the handicapped, averaged 3.20 passengers/vehicle-h for the PERT-operated service in the northern quadrant and 2.58 for the service operated by Paratransit Enterprises in the other three quadrants. Productivity of Paratransit Enterprises varied by quadrant; it ranged from 2.25 to 2.91 passengers/vehicle-h, in inverse relation to service-area size. This experience is consistent with that reported by other target market dial-a-ride systems operated in the United States. Since the four quadrants served by Lift Line totaled 341 miles², which is a significantly greater area than that of most other U.S. systems reporting performance data, there is reason to believe that the policy of operating Lift Line on an informal schedule to help consolidate demand was successful in boosting productivity.

Thus it appears that demand-responsive services that operate in large service areas cannot be expected to achieve high levels of vehicle productivity. Nevertheless, demand-responsive services, especially those that offer wheelchair-accessible door-to-door service, can provide significant mobility improvements for such transit-dependent groups as the elderly and the handicapped. Wherever possible, advance reservations should be required and trips should be aggregated to serve the demand more efficiently. Since users are typically quite appreciative, services should be offered by existing transit organizations, contracted operators, or subsidized taxis, depending on available local services and needs.

Computer Dispatching

The introduction of computerized dispatching and scheduling in Greece in 1975 was a lengthy and frustrating experience. For more than a year, system operations were seriously disrupted by hardware breakdowns and inaccurate scheduling caused by software errors. However, these problems were solved over time, and the subsequent conversion to computerization in Irondequoit (February 1977) and in Brighton and Henrietta (June 1979) was accomplished smoothly and with minimum disruption.

Conversion from a time-sharing system to RGRTA's minicomputer in January 1979 was also accomplished without major problems, and the minicomputer operated much more reliably during its seven months of use. Less than one hardware breakdown occurred each week compared with an average of 17 breakdowns per month under the time-sharing operation. Despite the relative ease of this implementation, both operators and staff were hesitant about accepting

and relying on the computer.

During the first demonstration, computer dispatching proved capable of generating high levels of service under low-demand conditions. But when the computer was being tested in Greece and Irondequoit, vehicle reliability improved significantly, which lowered vehicle productivity and raised service levels. Thus, much of this service-level improvement could not be related to computer dispatching.

During the final 1.5 months, computer dispatching was introduced in Brighton and Henrietta. Compared with that of manual dispatching, computerized system response time decreased by about 15 percent. At the same time, deviation in mean pick-up time increased considerably, although the variation decreased. In Henrietta, average ride time lengthened appreciably, and in Brighton no significant change in ride time was detected. In all cases, the service quality in Greece and Irondequoit, which had been operating under computer controls since 1977, was superior to the recently implemented computer services in Brighton and Henrietta. Although this suggests that computerized service quality may improve over time, these findings present a mixed overall picture of the effects of computerized versus manual dispatching on paratransit service quality.

Capital costs were more than \$300 000; about \$240 000 was spent on converting from time sharing to the minicomputer and on implementing the computer system in Brighton and in Henrietta. Operating costs totaled approximately \$10 000. These costs translate into an additional \$1.27 per dial-a-ride passenger, which substantially exceeds any reasonable valuation of the improvement in service quality. In much larger dial-a-ride systems, computerization costs per passenger might be lower, but it is also possible that many of the high-demand conditions that would warrant a large dial-a-ride system might be more efficiently served by a fixed-route bus system.

Although the ability to schedule and dispatch dial-a-ride services automatically has been demonstrated, the benefit of computerization over manual operations is questionable for a system the size of Rochester's. This is because only a minor improvement in service quality was achieved, and the Rochester dial-a-ride operation was too small for any labor reductions to be realized.

It appears that dispatching can be effectively handled by a single highly skilled dispatcher when a system has fewer than eight vehicles, when demands are highly concentrated, or when the number of trips per vehicle hour is low. But as fleet size and demand increase and demand patterns become more diverse, computers may prove superior to human dispatchers, since they can continue to quickly process and retrieve the additional information. The inevitable phase-in problems and traditional operator reluctance to implement computerization probably outweigh its potential benefits for smaller systems.

However, computerized dispatching can also support a more sophisticated management information system than a manually operated system is able to provide. Demand-and-supply data are tabulated automatically, which simplifies the record-keeping process. In addition, data that are expensive to collect manually, such as service-quality measurements and trip-tour and origin-destination information, are continuously available. Better estimates of pick-up times and rescheduling of trips around vehicle breakdowns are then possible. In addition, quick access to such information enables the order processors to interact with customers more effectively. Although these advantages would be realized in a system of any size, they become more significant in larger systems. Although Rochester's rela-

tively small system was not able to test this concept effectively, a dedicated in-house computer was shown to improve system reliability compared with that of a time-sharing operation. It is also suspected that larger vehicle fleets and higher-demand systems could achieve even greater coordination and level-of-service improvements.

Although a different type of computer was tested in the second demonstration, significantly few implementation problems occurred. This suggests that previous experiences with computer hardware and software may be transferable to new applications and increases the importance of findings for others interested in testing different computer-dispatching systems. Another computerized dispatching system is now being tested in Orange County, California, in which a larger paratransit vehicle fleet and higher demand are present. This demonstration should provide additional understanding, coordination, and level-of-service and cost information.

FUTURE OF DIAL-A-RIDE SERVICES

Numerous lessons and experiences have been learned in Rochester from the different public and private paratransit operators and from the various operating strategies tested. Many experiences have been positive, whereas others have not been so successful. Hence, there are mixed attitudes toward dial-a-ride service as a transit mode, and the future of demand-responsive transit has not been clearly specified.

In general, there is probably less support for dial-a-ride service as a transit mode than for the use of private contracts for the provision of service. There is a strong feeling in Rochester that, in order to become more effective, mass transit must capture a larger portion of the modal split and increase the revenue/cost ratio. Although success by these standards may not be attainable without severe changes in economic conditions and cultural values, it has been made clear by the Rochester demonstration that paratransit operations are least capable of being effective by using these standards.

Today, no general market dial-a-ride service operates in Rochester, although it continues to be used effectively in the city of Batavia (population, 20 000) and in rural operations in neighboring Livingston and Wayne Counties. In the near future, general market dial-a-ride service is not likely to be restored to Rochester's suburban towns either, despite fixed-route transit's inability to provide intratown mobility. On the other hand, the use of dial-a-ride service to provide special user services in Rochester has continued, and there is widespread support for it.

Lift Line's demand-responsive service for the elderly and the handicapped has continued under a new private contract and has expanded throughout Rochester's Monroe County. It is now embraced as both efficient and effective when compared with the alternative of the mandated fixed-route accessibility required by Section 504 regulations. RGRTA's application for a waiver to these regulations on the grounds that Lift Line is more affordable, offers fewer operating problems, and provides greater mobility for senior citizens and disabled persons was denied in 1980.

A number of meaningful lessons were learned on the basis of activities during the second Rochester demonstration. They include lessons on funding, operator selection, contracts and contractors, operating effectiveness, and computer dispatching.

Funding

Asking local towns to participate in funding transit

programs with which they have not been involved may not be a feasible solution to public transit financial problems. Since most towns rely on a limited tax base from property taxes, town officials are often fiscally conservative. This suggests that transportation issues may need to be handled at the county or regional level.

Operator Selection

Local operators should have a competitive advantage over out-of-town providers because they are already established on location and are familiar with local operating conditions. The use of competitive bidding should also help in keeping operating costs down. Consideration should be given to having the local public transit agency provide service if competitive rates can be established. If the public operator is not used, care should be taken to assure that public transit rights are not violated.

Contracts and Contractors

If outside groups are responsible for managing operations, they should have on-site decision capability. All responsibilities and requirements should be detailed in the service contract and fully understood by both parties at the outset.

Operating Effectiveness

Private operators may be able to offer service at significantly lower costs than those for comparable service provided by the public operator. Other jurisdictions may therefore find it advantageous to invite competitive bidding for transit services while also reevaluating and possibly modifying their fare structure. Demand-responsive services that offer wheelchair-accessible door-to-door service can provide significant mobility improvements for this transit-dependent group. Whenever possible, advance reservations should be required and trips should be aggregated to serve the demand more efficiently.

Computer Dispatching

As fleet size and demand increase and demand patterns become more diverse, the benefits of computer dispatching are more apparent. Although the ability to automatically schedule and dispatch dial-a-ride service was demonstrated, the benefit of computerization over manual operations is questionable for a system the size of Rochester's. However, a dedicated in-house computer was shown to improve system reliability compared with that of a time-sharing operation.

The lessons learned in Rochester, both from the successes and the failures, have, it is hoped, helped clarify the role of demand-responsive transit services in urban transportation. These findings and those from ongoing demand-responsive transit demonstrations should be used in determining the direction of future paratransit policies and programs. More-detailed information on these demonstrations is contained in a set of evaluation reports submitted to the Transportation Systems Center (1-5).

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Barriers to Coordination: Irrational or Valid Objections?

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Part of a larger study that focused on coordination of transportation resources in programs designed for the elderly is presented. The study attempted to determine the conditions under which local agencies and providers resisted coordination attempts and to evaluate the validity of their objections rather than simply styling them as "barriers." The study sought to identify the situations in which coordination models might offer more benefits than costs to participants and the conditions under which local agencies correctly and incorrectly assessed these outcomes. Legitimate objections to transportation coordination that actually arose in the 30 sites visited or surveyed and in recent research are identified and ways in which coordination proponents can objectively appraise those objections and, when appropriate, overcome them are suggested. When analysts and planners are certain that coordination in any community is the most sensible and efficient long-run approach to transportation delivery, they must be willing to provide time, money, and professional resources to convince local participants of this outcome and to help agencies cover costs. In addition, planners and analysts must recognize and address the very legitimate concerns that human-service agencies have about the quality of transportation services they wish delivered to their clients.

There is growing public concern over the unnecessary duplication of local transportation services and the fragmented nature of many types of human-service transportation projects. Two key U.S. Department of Transportation programs--Section 18 (rural operating assistance) and Section 16(b)2 (needs of the elderly and the handicapped) of the Urban Mass Transportation Act of 1964, as amended--have mandated a coordinated and cooperative approach to transportation delivery in programs that use their funds. The 1978 amendments to the Older Americans Act of 1965 reflect the concern of Congress with the efficient use of existing community resources in providing transportation services to the elderly; the act mandates a coordinated approach to transportation delivery (Federal Register, Vol. 45, No. 63, March 31, 1980).

The consolidation or coordination of transportation services at the local level is increasingly being seen as a way to reduce unnecessary duplication and to obtain economies of scale. Coordination can use existing resources more effectively and can capture the potential offered by underused vehicle and staff capacities. Analysts have identified several theoretical models of such coordination; the literature reports the experiences of some of the

more successful or notable experiences in coordinated transportation services (1-7).

Most discussions of transportation coordination assume, first, that there is a great deal of service duplication and abundant potential for greater vehicle use at the local level (5). Second, they assume that service coordination is a desirable and meritorious idea in almost every context. Because of these prevailing beliefs, many analysts and observers have styled all objections to or reservations about coordinated service delivery as "barriers." They often imply that such objections are never rational or realistic or are always extremely protective of traditional modes.

This paper reports on part of a large study of the coordination of transportation resources in programs designed for the elderly or funded by the Administration on Aging (AOA). Thirty selected planning service areas (PSAs) (a geographic unit defined by AOA) were visited or telephoned to evaluate the operational experiences of local transportation providers and their responses to proposed coordination projects.

This study attempted to determine the conditions under which local agencies and providers resisted coordination attempts and to evaluate the validity of their objections. This study also sought to identify the situations in which different coordination models offered more benefits than costs to participants and the conditions under which local agencies correctly and incorrectly assessed these outcomes (7).

Although the literature is full of complex models and potential coordination arrangements (3-5,8) it is only necessary to identify four broad classes of coordination models here. Each model may include variants thought to operate and behave in a similar manner. [The AOA study itself developed a more comprehensive typology, which is too detailed for the needs of this paper (7).] The first model is nonservice coordination, which includes a mutual or cooperative agreement for any activity other than direct provision of transportation service (for example, joint purchasing of vehicles, joint dispatching services, and joint maintenance programs).