

## REFERENCES

1. D. L. Weiss. Citizen Opinions on Public Transportation Roles, Service, and Financing. TRB, Transportation Research Record 590, 1976, pp. 5-8.
2. Methods for Measuring Rural Public Transportation Needs and Demand. Technical Council Committee 6F-10, Institute of Traffic Engineers, Transportation Engineering, May 1978, pp. 39-46.
3. J. E. Burkhardt and A. M. Lago; Ecosometrics Inc. Methods of Predicting Rural Transit Demand. Pennsylvania Department of Transportation, Harrisburg, 1976.
4. D. T. Hartgen and C. A. Keck. Forecasting Dial-A-Bus Ridership in Small Urban Areas. TRB, Transportation Research Record 563, 1976, pp. 53-62.
5. R. G. Knighton. Forecasting Fare-Sensitive Dial-A-Bus Demand Without Surveys. Planning Research Unit, New York State Department of Transportation, Albany, July 1976.
6. P. S. Liou. A Technical Review of a Ridership Forecasting Method: Dial-A-Bus in Small Urban Areas. Planning Research Unit, New York State Department of Transportation, Albany, Prelim. Res. Rept. 73, Feb. 1975.
7. E. S. Neumann and B. F. Byrne. A Poisson Model of Rural Transit Ridership. TRB, Transportation Research Record 661, 1978, pp. 21-27.
8. W. R. Ugolik and R. G. Knighton. Estimating the Effects of Alternate Service Levels on Rural Transit Ridership. Planning Research Unit, New York State Department of Transportation, Albany, Prelim. Res. Rept. 144, Aug. 1978.
9. R. Yukubousky and D. Fichter. Mobility Club: A Grass-Roots Small-Town Transport Concept. TRB, Transportation Research Record 559, 1976, pp. 89-100.
10. A. Pollock. City of Oneonta Dial-A-Bus On-Board Survey. Development Division, New York State Department of Transportation, Albany, Aug. 1978.

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*Abridgment*

# Analysis of Volunteer Driver Systems in Rural Public Transportation

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Rural public transportation systems that rely on volunteer drivers who use their own automobiles have been proposed and analyzed theoretically by transportation planners (1-3). Yukubousky and Fichter developed the concept of a volunteer driver system called the mobility club (1). More recently Weaver and Lundberg proposed a friends-and-neighbors rural transportation system supplemented by a conventional van service in North Dakota (2) as a demonstration project under Section 147 of the Federal-Aid Highway Act of 1973. A volunteer driver system has also been developed for the Chester County, Pennsylvania, Section 147 demonstration project (3). Human service agencies have already gained considerable experience in operating volunteer driver systems. Recent inventories of specialized transportation providers in Wisconsin and Texas showed that a significant proportion of the total service was being provided by volunteer driver systems (4,5). The purpose of this study is to evaluate the potential for continuing, and even expanding, volunteer driver systems in rural areas. Case studies of volunteer driver systems in two Wisconsin counties are used to test the hypothesis that volunteer driver systems can be a cost-effective, feasible means of providing high-quality, specialized transportation service in rural areas. In addition, the role of volunteer driver systems in relation to paid driver systems that use vans or buses is examined in terms of an optimum mix of service types. Finally, the implications for public policy in the implementation of the rural public transportation operating assistance program (Section 18 of the Surface Transportation Assistance Act of 1978) are examined.

## GROWTH OF VOLUNTEER DRIVER SYSTEMS

The growth of social welfare programs designed to meet the needs of low-income and handicapped people in recent years has made human resource personnel more aware that programs to provide medical care, nutrition, and other basic human services require transportation to bring the people to the services. Thus, human resource agencies have taken a leading role in the development of transportation systems in rural areas. Volunteer driver programs in which the volunteers use their own vehicles and usually are reimbursed for the expense of operating their vehicles [generally about 9.3-13.6 cents/km (15-22 cents/mile)] provide a low-cost means for human service agencies to meet the transportation needs of their clients.

A volunteer driver system has many advantages. The capital, maintenance, and operating costs of a van or bus system are avoided. Often the existing staff has had experience with volunteer programs so that additional personnel are not required, at least initially. Part-time, paraprofessional staff can be added incrementally as the number of volunteer drivers increases. Sometimes volunteers can also be recruited to aid in scheduling trips. Funds for reimbursement for the distance driven have been available from a variety of sources, including Titles XIX and XX of the Social Security Act of 1935, as amended; local support; and, in Wisconsin and other states, seed-money grants under Title III of the Older Americans Act of 1965, as amended.

**Table 1. Service measures for volunteer driver and van systems.**

Service Measures	Volunteer Driver		Van Systems	
	Dane County	Grant County	Dane County <sup>a</sup>	Grant County
Persons eligible for service (age 65+)	7746	6130	4351	7746
Trips per month	1310	230	1890	1450
Annual trips per capita	1.2-2.8	0.038	5.2	2.2
Vehicle kilometers per month	15 680	11 520	3700	6080
Number of drivers	158	90	-	-
Vehicle kilometers per trip	12.0	21.3	2.0	4.2
Trips per vehicle hour	1.4	82.6 <sup>b</sup>	5.0	4.4
Cost per trip—travel cost (\$)	1.11	2.08	1.68	1.11
Total trip cost—including administrative costs (\$)	1.72	7.68 <sup>b</sup>	1.81	1.20
		9.84 <sup>b</sup>		

Note: 1 km = 0.62 mile.

<sup>a</sup>Rural area only.

<sup>b</sup>Trips to destinations outside of Grant County.

In many rural areas the growth of volunteer driver systems has been restrained by the lack of a continuing source of operating assistance; however, volunteer driver systems are not affected by abrupt changes in funding as much as are van or bus systems that have paid drivers. Also, the volunteer systems can be more easily funded from a variety of sources because of the ease of allocating and recording the funds spent.

Potential problems faced by volunteer driver systems include recruitment and retention of volunteers, reliability, safety, and insurance. In order to maintain an adequate roster of volunteer drivers, the professional staff must devote a substantial amount of time to the recruitment, training, and retention of volunteers. The turnover rate among volunteers often is high; however, the rate can be reduced by a regular program of public recognition of the volunteers' contributions.

The reliability of services provided by volunteers was not found to be a problem in the two Wisconsin systems that were studied in depth. As long as volunteers are only called on to provide the amount and kind of transportation service they agreed to initially, a high level of performance can be expected. A screening process should be used to select volunteers who will be safe, competent drivers. In addition, the users of the system quickly recognize the less-than-competent drivers and refuse to ride with them. If the volunteer driver system is part of a larger volunteer program, the less-competent drivers can be shifted to some other area of the program.

Insurance has been a continuing problem because the lack of claims experience for volunteer driver programs represents an unknown risk. Insurance companies, in some cases, react by canceling the insurance policy or raising the rates. Excess personal liability coverage purchased by the agency responsible for the volunteer program to cover the volunteer has been difficult or even impossible to obtain. The Wisconsin Commissioner of Insurance has advised counties that have volunteer driver programs that the primary question that affects insurance rates is "whether the volunteer driver is 'driving for profit'. In that circumstance, the driver would be considered as operating a 'livery' and would not be covered under his or her private passenger automobile policy" (6). The commissioner recommended paying only the actual expenses of these drivers based on a set rate per kilometer driven by the volunteer. Furthermore, in Wisconsin insurance rates for volunteer drivers should not change solely because the person is a volunteer driver.

### EXAMPLES OF VOLUNTEER DRIVER SYSTEMS

In order to provide insight into the role that volunteer driver systems can play in providing specialized transportation service in rural areas, systems in two Wisconsin counties are analyzed and compared with van or small-bus systems. The Dane County system is one of the few systems in Wisconsin that is operated under the Retired Senior Volunteer Program (RSVP) of ACTION, the federal domestic volunteer program. The RSVP program is administered by a full-time coordinator, who spends most of her time in recruiting and volunteer recognition activities. Medical trips receive first priority, but about 40 percent of the trips are for nonmedical purposes, such as shopping, eating at the nutrition program meal site, and personal business. In contrast, the Grant County system is administered by the county department of social services. A social worker spends about 50 percent of his or her time on program support. Nearly all of the trips are for medical purposes. Many of the trips are to medical facilities in Madison, which is more than 125 km (80 miles) away.

Service measures for the two volunteer driver systems are presented in Table 1. Both systems generate a large number of vehicle kilometers of travel each month. Because of the long average trip lengths of the Grant County system, the number of trips served in Grant County is much smaller than in Dane County. The differences in average trip costs for the two systems also reflect the differences in average trip lengths. The total cost per trip for a volunteer driver system includes the cost of administrative and volunteer support services. As shown in Table 1, the overhead costs increase the cost of a volunteer driver trip substantially. The increase is particularly high in Grant County because so few trips are provided.

### VAN AND BUS SYSTEMS IN DANE AND GRANT COUNTIES

In contrast to the highly individualized, direct door-to-door service provided by volunteer drivers, van or small-bus systems provide group service. Individuals are still picked up at their homes, but, in general, several other individuals are also picked up on the same trip and taken to the same destination, typically the nearest Title VII nutrition program meal site. In rural Dane County almost 60 percent of the trips are nutrition program trips, 30 percent are shopping trips, and 8 percent are social or recreation trips. Only 2 percent are

medical trips. In Grant County the trip purpose distribution is even more heavily oriented to the Title VII nutrition program.

The grouping of passengers makes more efficient use of the driver's time. Since the driver's wages are the major expense in operating a van or small-bus system, grouping of trips reduces the cost per trip substantially. A simple model for computing the total cost per trip for van or bus systems (including capital costs) is

$$\begin{aligned} \text{total cost per trip} = & [( \text{driver wage per hour} \\ & + \text{vehicle operating cost per hour} \\ & \div \text{trips per hour} ] \\ & + \text{administrative cost/total trips} \end{aligned} \quad (1)$$

in which all nonadministrative costs associated with vehicle operation are included in the hourly vehicle operating cost. A more complex cost model for rural transportation systems has been developed by Ceglowski (7), but the simplified model is adequate for comparison with the costs of volunteer driver systems.

For the Dane County van system, the parameters for the cost model are (a) hourly wage of \$4.80, (b) vehicle operating cost of \$3.60/h (\$0.22/km  $\times$  16 km/h), and (c) administrative costs of \$1000/month. If these parameters are assumed to be fixed in the short run, then the total cost per trip becomes a function of the productivity of the system (trips per vehicle hour) and the total number of trips served. Based on a productivity of 5.0 and 7650 trips/month (urban and rural), the total cost per trip in Dane County is \$1.81 (see Table 1). The total cost per trip in Grant County is even lower because the hourly wage is about \$3.00. Administrative costs are low because the drivers schedule passengers, handle vehicle maintenance, and submit monthly reports on system use.

The costs per trip for the Dane and Grant County systems are substantially lower than the costs reported for low-density systems operated as part of the Section 147 demonstration program (8). Average total costs per trip for two groups of low-density systems ranged from \$3.13 to \$4.19. Much higher costs can be expected if groups of passengers are transported to the same service in a relatively high-wage area, as shown by costs of \$7.62/trip in Barnstable County, Massachusetts (9), and \$6.53/trip in Washtenaw County, Michigan (10).

#### VOLUNTEER DRIVER VERSUS VAN SYSTEMS

The services provided by the volunteer driver and the van or small-bus systems are complementary. A van system cannot provide the high-quality door-to-door service appropriate for medical trips at the same low cost as does the volunteer driver system. In some cases the elderly need assistance throughout their stay at their destination. The cost of using paid drivers to provide such assistance would be prohibitive. A volunteer driver system, however, cannot provide the high volume of trips that can be served efficiently by a van service, which emphasizes group rides. The supply of volunteer drivers is limited. Thus, only the highest-priority trips can, in general, be served by the volunteers. The supply of volunteers can be increased somewhat by a vigorous recruitment and volunteer recognition program, as is the case in Dane County; however, a point of diminishing returns is probably reached very quickly.

A direct comparison of the costs per trip for the volunteer driver versus the van systems (as shown in Table 1 for Dane and Grant Counties) is misleading. The relevant cost comparison is the cost of providing the volunteer driver trips versus the cost of providing a van sys-

tem. By using Equation 1, the cost for Dane County, assuming a vehicle productivity of 2.0 trips/h, an operating cost of \$8.40/h, and a 10 percent overhead rate, would be \$4.62/trip. This is over 2½ times the current volunteer driver system cost.

The main impediments to the development of a mix of volunteer driver and van transportation systems in other rural areas are the lack of stable funding and, in some states, possible insurance problems. In Wisconsin the funding problem is less acute because a modest level of operating assistance is now available through grants by the state of Wisconsin to counties for elderly and handicapped transportation. Thus, in Wisconsin the experience of Dane County should be readily transferable to other counties. In fact, initial analysis of the county programs submitted for funding under the state's Elderly and Handicapped Transportation Assistance Program (Wisconsin Statute 85.08, Section 5) shows that a number of counties already have both volunteer driver and van systems in operation.

#### IMPLICATIONS FOR FEDERAL OPERATING ASSISTANCE

As demonstrated by the case studies of the systems in Dane and Grant Counties, substantial benefits can be obtained from volunteer driver systems. Benefits are obtained not only from the lower costs per trip but also from the increased social interaction of both the trip-makers and the drivers. Thus, federal operating assistance under Section 18 of the Surface Transportation Assistance Act of 1978 should be made available for volunteer driver systems. In general, a van or small-bus system would provide the basic service, but the volunteer driver system would meet the specialized needs of the elderly, handicapped, and others for medical and other high-priority trips. Maximum flexibility should be given to local and regional agencies in deciding what mix of specialized transportation services is most appropriate for each local situation.

#### CONCLUSIONS

The two case studies of volunteer driver systems show that volunteer driver systems can provide high-quality, cost-effective transportation for the elderly in rural areas. Volunteer driver systems can provide lower costs per trip than all but the most productive van systems. Only a high-cost, taxi-like van system can approach the high-quality, door-through-door service of the volunteer driver system. Even then the volunteer driver system provides superior service because of the potential for personal assistance to passengers at their destination.

The feasibility of volunteer driver programs has been demonstrated over an extended period of time (six years in Grant County and three years in Dane County). With professional direction, potential problems of volunteer recruitment and retention, volunteer reliability, and driver safety can be minimized. Insurance may be a problem in some states, but in Wisconsin the insurance commissioner has stated that volunteer drivers should not have their rates increased or insurance canceled solely because of their volunteer driver status.

Volunteer driver systems should not be expected to provide for all of the public transportation needs in rural areas, but volunteer systems can provide high-priority trips (such as medical trips) at a high degree of efficiency. Van systems should be used for trip purposes for which extensive grouping of rides is possible.

Research is needed on how volunteer driver systems can best be integrated into a total rural public transpor-

tation system. For example, the potential for a volunteer driver system to serve as a feeder system for a regular fixed-route system needs to be examined.

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#### REFERENCES

1. R. Yukubousky and D. Fichter. Mobility Club: A Grass-Roots Rural and Small Town Transport Concept. New York State Department of Transportation, Albany, Prelim. Res. Rept. 69, Aug. 1974.
2. V. C. Weaver and B. D. Lundberg. Rural Public Transportation: North Dakota Case Study. TRB, Transportation Research Record 638, 1977, pp. 44-46.
3. D. J. McKelvey and R. S. Watt. Innovative Approaches to Rural Transportation. TRB, Transportation Research Record 661, 1978, pp. 1-6.
4. Transportation for the Elderly and Handicapped in Wisconsin: Report 1—Analysis of Specialized Transportation Services. Division of Planning, Wisconsin Department of Transportation, Madison, July 1976.
5. R. Briggs. Characteristics of Local Passenger Transportation Providers in Texas. Department of Community Affairs, University of Texas, Res. Rept. 45, Austin, Jan. 1977.
6. Memo from the Wisconsin Commissioner of Insurance to All Counties with Volunteer Driver Programs. Madison, March 14, 1978.
7. K. P. Ceglowski, A. M. Lago, and J. E. Burkhardt. Rural Transportation Costs. TRB, Transportation Research Record 661, 1978, pp. 7-14.
8. First Quarter 1978 Evaluation Data. Rural Highway Public Transportation Demonstration Program, Federal Highway Administration, Aug. 1978.
9. R. P. Warren and J. Collura. Second Progress Report on Barnstable County Rural Public Transportation Demonstration Program. Barnstable County Public Transportation Program, Barnstable, MA, Feb. 1978.
10. R. Perez and K. Guenther. Six Month Report on AATA Out-County Dial-A-Ride Service. Ann Arbor Transportation Authority Board, Ann Arbor, MI, Memo, Feb. 25, 1977.

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#### *Abridgment*

## Forecasting Experiments for Rural Transit Policymakers

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Four major groups are involved in the development of transit service in an area: (a) users, (b) management, (c) planning and funding agencies, and (d) the community. This paper addresses problems faced by transit managers and funding agencies. Such problems have been identified through the interaction of state and federal officials and during a review of rural transit systems in northern New England performed during the first part of 1978 (1). The authorization of more than \$24 million for FY 1976 by Section 147 of the Federal-Aid Highway Act of 1973 and \$420 million by Section 303e and Section 313a of the Federal Public Transportation Act of 1978 for FYs 1979-1982, will encourage the growth (in size and number) of rural transit systems. With this growth, the number of problems will increase.

Some of the first problems that transit managers face are in the initial application for funding and making plans based on socioeconomic and demographic characteristics of the service area. During the same period, federal subsidies for rural transit projects may be allocated to applicants based on the relative

merit of alternative proposals. The benefit/cost standards that a local community applies to the expenditure of federal or state subsidies can be somewhat different from those used for local subsidies; since the former are considered to be marginally free, the accrual of any form of benefit is a net gain to the community. In most cases this means that the effectiveness of the expenditures of federal subsidies depends heavily on an operator's internal evaluation of his or her service or on the external evaluation of the allocating agency.

These problems are further complicated by the urgency with which funding agencies expect to see results in order to decide about funding continuation and budget approval. Because of this urgency, state and federal officials often use single average values to describe system performance in order to make decisions about the long-term feasibility of rural transit operations. Such values are then compared against each other at the national level and decisions made about whether a system's performance is ac-