AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
http://ageconsearch.umn.edu
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

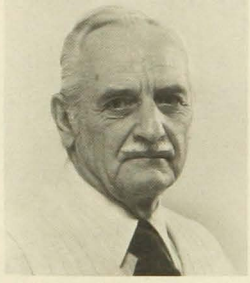
AGRICULTURAL EXTENSION SERVICE • UNIVERSITY OF MINNESOTA

Minnesota AGRICULTURAL ECONOMIST

NO. 588
APRIL 1977

Developing a Transportation Program for Older Rural Americans[1]

Steve Levy



Harald Jensen

William Easter

Jerry Fruin

Steve Levy
Harald Jensen
William Easter
Jerry Fruin[2]

The Problem

One main objective for Americans is to maintain a high degree of independence and dignity in a home environment as they grow older. A frequent obstacle to this objective is lack of transportation, which can place severe limitations on shopping for groceries and clothes. Limited access to grocery shopping can lead to poor diets and poor health. Lack of transportation reduces opportunities for medical services: this can lead to institutionalization and dependency. Absence of transportation restricts contact with people, participation in social programs, and ultimately contributes to loneliness.

In short, lack of transportation for older Americans can severely limit quality of life.

These transportation deficiencies are more acute in rural than urban areas, for at least two reasons. First, scattered households or sparse population characterize the countryside. Second, a rural transportation system is difficult to organize to provide daily services, such as getting to and from work. Since population sparsity limits passenger volume and because transportation needs tend to be irregular, rural areas are unlikely to be able to support commercial people-transportation, such as buses and taxis.

Absence of traffic congestion and available parking facilities makes the private auto a convenient transportation mode in rural areas; however, many older Americans do not or are no longer able to drive cars. Many do not have adequate incomes with which to buy or maintain a car.

It follows that rural areas usually have a large number of older Americans without private or public transportation which puts severe limitations on their physical and social environment.

Purpose of the Study

This study is designed to provide information to anyone planning a transit system for rural older Americans. Costs of six alternative transportation modes are analyzed. These costs are calculated in the context of a combined fixed route and demand-responsive transit system.[3] Given this information the least-cost mode can be selected.

---

[1]This study, funded under Title V of the Rural Development Act, was in response to the high priority that people in Region 6E placed on improving transportation. This study is about people-transportation and follows two other transportation studies in Region 6E, one on costs of truck transport and one on seasonal road restrictions. Another transportation study is underway dealing with least-cost mode or modes of shipping bulk commodities, particularly grains.

[2]Steve Levy is research assistant, Harald Jensen and William Easter, professors, and Jerry Fruin, research associate in the Department of Agricultural and Applied Economics, University of Minnesota.

[3]In a demand-responsive system, such as a commercial taxi service, the service is available only on demand. However, in a fixed route system, the vehicle follows a fixed route on a fixed time schedule. Commercial buses, trains, and planes use fixed route systems.

The analysis was done in Meeker County (60 miles west of the Twin Cities on highway 12). But even though it applies to a specific county, the data can be applied to similar kinds of analyses in other counties.

The framework of analysis for this study is consistent with the findings of previous studies investigating rural transit systems.[4] Investigation of 15 rural transit systems in areas of low population density showed that fixed routes and schedules were desirable and that transport systems for rural areas existed primarily to serve the needs of older Americans, low income households, and the handicapped. Usually such systems are not profitable private business ventures and are established and operated primarily as public ventures.

Demand for Transportation Services

To meet the transportation needs of older Americans, local, state, and federal agencies have sponsored demonstration programs for various transportation systems.[5] Reflecting community needs and financial resources, the progams vary from systems of volunteer drivers with private cars, to demand-responsive services with vans or small buses, to fixed routes with small or large buses. Funding for the demonstration projects generally runs for 3 years with varying levels of local support. After the 3-year period, the community either assumes all of the costs of operating the system or lets the project drop.

Although each community must demonstrate a transportation need before funding support for the project is granted, community leaders responsible for demonstrating this need often lack the technical training to anlayze and make reasonable estimates of the need, the expected use of the service, and the appropriate (cost-wise) transportation mode to meet the need. Without reasonable estimates in all these areas the project may be programed to fail.

Estimating demand is basic to establishing any rural transportation system. The system's ultimate success rests on the level of use and the costs of providing service.[6] Questions such as "Who will use the service?," "How often?," "Where to?," and "When?" need to be answered in the planning stages. But while demand estimation is basic in planning any transit system, it is also the most difficult part of the analysis. A large number of federally funded transit programs have failed, which suggests that more attention needs to be devoted to demand estimation.

Quantity demanded of a good or service may be defined as the amount consumers will buy in the market at a given price, other things remaining unchanged. The total amount of a good or service purchased is influenced by the price of the good, the consumers' tastes and preferences, their number, their income levels, and the price and availability of alternative goods and services. This definition suggests a schedule of demands measuring the quantity of a good or service that will be bought at various prices.

Need, in contrast to demand, is defined as what is "required" or "necessary." This definition may tell the meaning of need, but the difficulty with the term comes in quantitatively measuring need and weighing its value. You may need a bus to go to the ball game and you may need to go to the hardware store to get a fishing license. There is no generally accepted way of quantitatively measuring these needs and saying that one is so much greater than the other. Needs then are difficult to measure if they cannot be translated to market demand.

Must society subsidize the transportation need of a person incapable of satisfying that need by him or herself? Society has decided, through a variety of programs, that it is worthwhile to subsidize older Americans' needs for transportation. These programs accept the fact that transportation is a key factor in independence: physically, emotionally, and socially; and that particularly in rural areas, these needs are not being met.

What factors should be kept in mind in estimating ridership when planning a publicly subsidized transit system for older rural Americans? First, some portion of older rural Americans will prefer and can afford buying their own transportation services, either by hiring the services, for example taxis; or by owning and operating their own cars. Some will be able to rely on relatives, friends, or neighbors to provide the needed transportation. But many older rural Americans cannot afford the usual transportation costs of owning and operating a car or of hiring a taxi. With the increased mobility of the younger age groups in rural areas, some older Americans find it increasingly difficult to rely on relatives, friends, or neighbors for transportation. Second, because of population sparsity and distances from urban centers, private or commercial bus lines find it uneconomical to operate in rural areas.

What are some alternative ways of estimating ridership of older Americans in a rural area, such as a county? One way is to identify the population of older rural Americans as all people age 65 and older. Sample this population so that transportation needs can be estimated for the sample and aggregated to the larger population. There are at least three problems with this approach. One is that it is difficult to identify The population. Second, to plan a public transportation program based on interviews with people to find out how often they would use a transit system were one established, can lead to large errors in planning and program investment. Actual use is usually less than surveyed use. Finally, personally interviewing a sufficiently large sample for planning is expensive.

Another way of estimating ridership is simply to assume in planning a transportation system that the ridership will be small. Then the initial capital expenditure for the transportation system is also small, but can be expanded as needed and as experience is gained.

In this study we are primarily interested in determining how the level of ridership influenced costs and how costs may affect the choice of transportation. We, therefore, assumed three different levels of ridership. Our ridership was drawn from the total population age 65 and older in Meeker County, excluding Litchfield. Latest U.S. census data showed that population to be 1,758.[7] The lowest level of weekly ridership we set at 6 percent of 1,758 or

[4]See Office of Policy and Plans Development, "Rural Transit Operations and Management," memo report, Secretary of Transportation, Washington, D.C., est. date 1972 or 1973.

[5]Later in the discussion a distinction will be made between "need" and "demand" for transportation services.

[6]Costs of transportation services are treated in the following section.

[7]Litchfield's population of age 65 and older is 1,027.

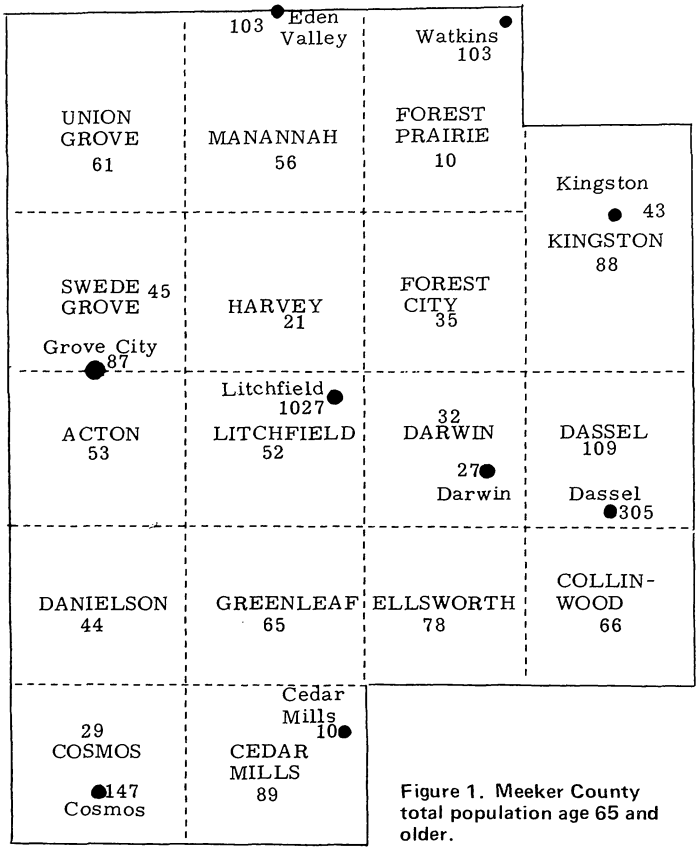


Figure 1. Meeker County total population age 65 and older.

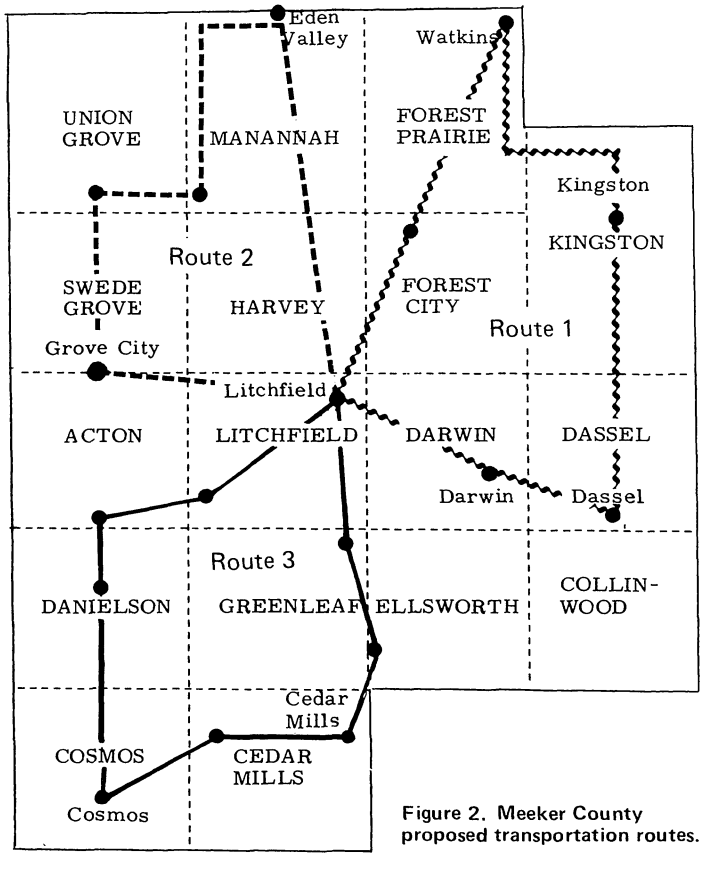


Figure 2. Meeker County proposed transportation routes.

110. The two higher weekly levels we set at 12½ percent and 25 percent of 1,758 or 220 and 440, respectively.

To plan a transportation system for a rural area it is helpful to know not only what to expect in total ridership but ridership distribution (residence locations). Figure 1 shows the distribution of persons age 65 and older by municipality and township for Meeker County. This distribution appears to lend iteslf well to a combination of fixed route and demand-responsive systems. All towns or villages (with the larger population of riders) designated as pick-up or drop-off points, can be connected by fixed routes, and vehicles can then travel these routes on fixed time schedules. Riders residing in the townships but outside the towns and villages will need transportation to the pick-up points (drop-off points) along these routes and on the return trips transportation from the drop-off points (pick-up points) back to their residences. This can be done most economically through a demand-responsive system organized and operated with volunteer drivers and their automobiles. The drivers would receive a fixed payment per mile. A system can be developed where riders either contact the local volunteer drivers directly for rides to the pick-up points or contact a coordinator who makes all the necessary arrangements between riders and volunteer drivers.

Keeping in mind the importance of beginning a transportation service in a small, low-cost, but flexible way, we considered providing older residents of Meeker County with one ride per week to Litchfield, the county seat and largest city, as the minimum service. If this level of service fails to meet the medical, business, and social needs of the riders, the program can be changed later.

On the basis of the foregoing information and reasoning we developed three fixed routes (figure 2) based on several important considerations. First, each route follows existing paved highways. Second, there are pick-up (drop-off) sites in all the municipalities in the county, as well as at various intermediary points along the routes. Third, all townships have pick-up (drop-off) points either within or close to their borders. Fourth, the longest one-way time for any of the routes is 2¼ hours so

that most riders will not have to spend an excessive amount of travel time (table 1).

Table 2 shows the number of riders who will be traveling the routes, assuming three different levels of ridership. Riders are identified by township and municipalities, excluding Litchfield.

Least-Cost Mode for Each Level of Ridership.[8]

The six modes of transportation for which costs were computed follow:

- the standard auto with volunteer drivers,
- the standard auto with paid drivers,
- the 11-passenger van with paid drivers,
- the 12-passenger school bus with paid drivers,
- the rented 44-passenger school buses with paid drivers,
- the owned 44-passenger school buses with paid drivers.

Later in the analysis, the standard auto with paid drivers was omitted since it was too costly compared with the standard auto with volunteer drivers. The 12-passenger school bus also was omitted because it was more costly than the 11-passenger van, but had little capacity advantage over the van.

We mentioned earlier that the transportation system that appears to fit Meeker County needs best is a combination of fixed route and demand-responsive systems. Tables 3, 4, and 5 summarize the costs only for the fixed route portion. To these costs must be added the costs of bringing the riders from their homes to the pick-up points and returning them from the drop-off points to their homes. This is the demand-responsive portion of the system, i.e., riders either contact the drivers directly or contact a coordinator for rides to the pick-up points on the fixed routes. The least-cost mode for the demand-responsive service in a sparsely populated rural area is the standard auto with volunteer drivers. Without knowing where in rural Meeker County riders live, we can only make some rough estimates of the costs involved in providing the demand-responsive service with standard autos and volunteer drivers. As a minimum, we assumed that a volunteer driver will need to travel 1 mile for him or herself and for each passenger, plus 1 mile to the pick-up site on the fixed route for a total of 5 miles one-way or 10 miles round-trip. Since townships are about 6 miles square, we assumed that a volunteer driver will need to travel a maximum 48 miles round trip. These two mileages provide a range in possible costs from $33 to $158 for level 1 and higher costs for the higher levels of ridership. The costs are estimated on the miles per trip times 15 cents per mile times number of trips needed to transport the riders in the township. The demand-responsive system costs are independent of the fixed route system costs.

Volunteer driver costs in dollars per week

Ridership	10 miles per trip	48 miles per trip
Level 1	$ 33	$158
Level 2	66	317
Level 3	123	590

For costs associated with the fixed route system, the least-cost mode for the lowest level of ridership (level 1) is volunteer drivers with their standard automobiles (table 3). This mode assumes that volunteer drivers collect their riders at fixed pick-up sites on the routes and drive directly to Litchfield. It also assumes that each driver takes three passengers with extra passengers going in additional cars. Also each township and town or village is provided service to Litchfield once a week.

To compute the total annual cost for the system, the distance from the pick-up site to Litchfield is multiplied by the number of cars needed. One-way mileage is then doubled to get the round trip mileage. The round trip mileage is multiplied by 15 cents per mile to get the total weekly cost, then multiplied by 52 weeks to determine the total annual costs. Forty-one volunteer drivers, traveling a total of 55,692 miles per year are needed to transport the 110 riders of level 1 ridership to Litchfield and back to the pick-up points at a total annual cost of $8,354.

It may be unrealistic to suppose that 41 volunteer drivers can be found who will pick up riders at pick-up sites, drive them to Litchfield, wait there while the riders transact their business, and then return the riders to the pick-up points. Paid drivers with standard automobiles could be considered, but driver costs make this alternative more expensive than a school bus.

Table 1. Mileage and estimated travel for Meeker transit routes

	Route 1	Route 2	Route 3
Route mileage	49 miles	41 miles	47.5 miles
Number of stops	5	4	8
Total one-way time*	2 hours	1¾ hour	2¼ hours
Daily mileage	98 miles	82 miles	95 miles

*Assumes an average speed of 30 miles per hour and 5 minutes per stop.

Table 2. Assumed number of riders age 65 and older by route and level of ridership, Meeker County

	Total persons age 65 & older	Level 1	Level 2	Level 3
Route 1	818	52	101	206
Township	340	22	42	86
Municipality	478	30	59	120
Route 2	373	22	48	93
Township	183	11	24	45
Municipality	190	11	24	48
Route 3	567	36	71	141
Township	410	26	52	101
Municipality	157	10	19	40

Given these routes and levels of ridership, the least-cost mode of transportation for each level of ridership can be determined.

[8]Costs are based on 1974 data. Current costs are likely to be somewhat higher than those reported here, but the costs of one transportation mode relative to another are expected to remain unchanged. Hence, choice of mode should not be affected by recent changes in the absolute level of costs.

If the volunteer drivers with their automobiles is not a feasible alternative, then the owned 44-passenger school bus is the lowest cost alternative for level 1 ridership (table 3). The ridership demand at level 1 requires one trip per week on each of the three routes, a system that requires a paid driver for only 3 days per week. Total yearly mileage is 14,300, which when multiplied by the variable or operating cost of .235 cents per mile, yields a total variable cost of $3,361 for the year.[9] Adding the annual fixed costs of $6,648 to the $3,361 gives a total annual cost for the owned school bus of $10,009.

Because route 1 has 52 riders at level 1 and because the school bus can only take 44 passengers, 8 riders are left without bus transportation. They can be served by volunteer drivers with standard automobiles. If these 8 riders are located within 10 miles of Litchfield, the volunteer driver can transport them for a yearly cost of $468. Adding $468 to the $10,009, we arrive at $10,490 as total annual cost for this mode.

Since level 1 ridership requires bus service only 3 days a week, possibly the bus could be made available on 2 other days of the week on additional routes, for instance to St. Cloud and Minneapolis. Including these routes increases the total annual mileage by 11,232 and necessitates hiring a full-time driver. Total annual costs then increase from $10,490 to $15,605, but this reduces the average per mile cost from 73 to 61 cents because of the increased use of the bus.

Although the annual cost of the rented 44-passenger school bus is about $1,600 higher than the owned 44-passenger school bus, the rented bus may be preferred where it is difficult to obtain money for capital expenditures. Renting a school bus does not involve a $14,500 outlay for the purchase of a bus.

Another alternative that may be worth considering is to operate a rented 44-passenger school bus on routes 1 and 3, but have volunteer drivers and their standard automobiles on route 2. The annual cost of the rented bus would be $2,345 less, for a total of $9,732, since its operating costs for route 2 would not be incurred. The volunteer

[9]Drivers are paid $3 per hour. Figuring 8 hours per day, 3 days per week for 52 weeks, the total annual wage is $3,744.

Table 3. Costs by route and mode for low level ridership, level 1

Mode	Route 1	Route 2	Route 3	Total
Volunteer drivers[a]				
Number of trips per week	19	9	13	41
Number of miles per year	23,400	11,024	21,268	55,692
Total cost per year	$3,510	$1,654	$3,190	$8,354
11-Passenger van				
Number of trips per week	5	2	3	10
Number of miles per year	25,480	8,528	14,820	48,828
Operating cost per year[b]	$2,293	$767	$1,334	$4,395
Additional volunteer driver cost per year[c]	—	$156	$156	$312
Fixed cost per year[d]	—	—	—	$8,464
Total cost per year	$2,293	$923	$1,490	$13,171
Rented 44-passenger school bus				
Number of trips per week	1	1	1	3
Number of miles per year	5,096	4,264	4,940	14,300
Operating cost per year[e]	$2,803	$2,345	$2,717	$7,865
Additional volunteer driver cost per year	$468	—	—	$468
Fixed cost per year[f]	—	—	—	$3,744
Total cost per year	$3,271	$2,345	$2,717	$12,077
Owned 44-passenger school bus				
Number of trips per week	1	1	1	3
Number of miles per year	5,096	4,264	4,940	14,300
Operating cost per year[g]	$1,198	$1,002	$1,161	$3,361
Additional volunteer driver cost per year	$468	—	—	$468
Fixed cost per year[h]	—	—	—	$6,661
Total cost per year	$1,666	$1,002	$1,161	$10,490

[a] Volunteer drivers are reimbursed at 15 cents per mile.
[b]Variable or operating cost is 9 cents per mile.
[c]Assumes extra passengers will be transported 20 miles per round trip by volunteer driver.
[d]Components of fixed costs are $6,219 for a driver, $1,845 for depreciation, and $400 for insurance.
[e]Variable or operating cost is 55 cents per mile.
[f]Fixed cost comprises one driver, paid $3 per hour, 8 hours per day, 3 days per week, 52 weeks per year.
[g]Variable or operating cost is .235 cents per mile.
[h]Components of fixed cost are: $3,744 for a 3-day per week driver for the year, $2,417 for depreciation, and $500 for insurance.

Table 4. Costs by route and by mode for higher level ridership, level 2

Mode	Route 1	Route 2	Route 3	Total
11-Passenger van				
Number of trips per week	9	4	6	19
Number of miles per year	45,864	17,056	29,640	92,560
Operating cost per year	$4,128	$1,535	$2,668	$8,330
Additional volunteer driver cost per year	$156	$312	$468	$936
Fixed cost per year[a]	—	—	—	$16,928
Total cost per year	$4,284	$1,847	$3,136	$26,194
Rented 44-passenger school bus				
Number of trips per week	3	1	2	6
Number of miles per year	15,288	4,264	9,880	29,432
Operating cost per year	$8,408	$2,345	$5,434	$16,188
Additional volunteer driver cost per year	—	$312	—	$312
Fixed cost per year[b]	—	—	—	$6,240
Total cost per year	$8,408	$2,657	$5,434	$22,740
Owned 44-passenger school bus				
Number of trips per week	3	1	2	6
Number of miles per year	15,288	4,264	9,880	29,432
Operating cost per year	$3,593	$1,002	$2,332	$6,917
Additional volunteer driver cost per year	—	$312	—	$312
Fixed cost per year[c]	—	—	—	$9,136
Total cost per year	$3,593	$1,314	$2,332	$16,365

[a]Ridership level 2 requires purchase of two 11-passenger vans.
[b]Fixed cost equals cost of one full-time paid driver.
[c]Fixed cost includes wage of one full-time paid driver.

drivers with their cars, however, would add $1,654 to service route 2. The total cost of this combination of a rented school bus and volunteer driver with their autos is $11,386, only about $908 higher in annual costs than for owned 44-passenger school bus system. Again this system does not require the capital expenditures of $14,500 for the purchase of a bus and requires only 9 volunteer drivers for route 2 service. Enlisting of 9 volunteer drivers is much easier than engaging the services of 41 drivers needed to service all three routes with volunteer drivers and their autos.

The least-cost solution for level 2 ridership is the 44-passenger school bus. The 101 people on route 1 requiring transportation would be serviced by three bus runs per week (101÷44=2.3); the 71 people on route 3 receive two runs per week and the 48 people on route 2, one bus run per week. Since the bus capacity is 44 passengers, 4 of the 48 people on route 2 would have to be serviced by volunteer drivers with autos. If these 4 live only 10 miles from Litchfield, they can be brought to Litchfield and back to their homes on a weekly basis at an annual cost of $312. The total cost of transporting the level 2 riders by bus and by volunteer drivers is $16,365 annually (table 4).

Level 3 ridership requires moving 440 people per week from rural Meeker County and town and village pick-up points to Litchfield and return. The least-cost mode is the purchase of two 44-passenger school buses. The 93 riders from route 2 would be serviced by two runs per week. Five of these (93-88=5) can be transported by volunteer drivers with cars. The 141 riders on route 3 need three bus trips per week, with volunteer drivers transporting 9 people. Route 1 with 206 riders requires five runs per week by bus. The 440 people can be transported by the two buses, supplemented with volunteer drivers with autos for a yearly cost of $30,527 (table 5).

With the feeder system and the three routes for Meeker County established, then the transportation needs of the senior citizens in Litchfield must be considered. Since Litchfield has 36.8 percent of the people age 65 and older in the county and since many of Meeker County's senior citizens will be coming to Litchfield weekly, some combination of shuttle and demand-responsive service may be warranted within the city limits. The size and scope of such a service should be determined by the demand and budget. One insight is offered by the experience of the Willmar Senior Citizens Busing Programs. The City of Willmar, in cooperation with Kandiyohi County and the Willmar Chamber of Commerce, leases one regular school bus from a private company, and runs a schedule on Mondays, Wednesdays, and Fridays. The operating cost of the programs was $6,844 for 1974 with the bus leased for $50 per day.

The average ridership per week for 1974 was 395, or approximately 22 percent of the people age 65 and older in Willmar. If we assume that the needs of the people in Litchfield are similar to those in Willmar, service in Litchfield could expect a minimum of 226 riders per week (1,027 x .22). This, of course, does not include the people

who will be transported to Litchfield by the Meeker County transit system. Service in Litchfield could provide in-town rides for medical care, for personal business, for congregate meal programs, for meetings, and for shopping.

A safe and relatively low-cost solution for Litchfield in the short-run is a service similar to Willmar. This would entail no fixed vehicle costs and a minimum of fixed administrative overhead. A trial run of 6 months could be implemented to determine the local citizenry's acceptance of such a service. After the initial reaction is analyzed, a more informed judgment can be made about the possibility of purchasing a full-time vehicle for Litchfield.

An alternative is to link the Litchfield systems with the Meeker County transit system. When not running fixed-routes, the county vehicles could be stationed in Litchfield and operated as a shuttle service. The costs of such a system would include minor administrative overhead, wages for drivers, and the variable cost of operating the vehicles. This is also an excellent method of determining ridership demand before committing funds to purchase of vehicles.

The study notes that several other municipalities in Meeker County have high concentrations of senior citizens and may be able to totally support or share the costs of some type of demand-responsive shuttle service in their immediate vicinity. According to the 1970 Census, Watkins and the portion of Eden Valley in Meeker County both have 103 people over age 65, Cosmos has 147, and Dassel has 305. These are also areas in the county where homes for aged, senior citizen centers, and congregate meal programs are located.

Two of the most important considerations in the design and operation of a rural transit program are community participation and flexibility. Transportation can bring a whole new atmosphere of independence and self-support to older Americans. It is vitally important that citizens be involved in the decisionmaking and evaluation of the transit program. Since local tax dollars will probably be used for some level of support, the entire community should be cognizant of the benefits as well as the costs of such a system. With a high level of local involvement, system coordinators, participants, and supporters should be asking themselves whether they are reaching the people in need with the best possible service. This means that a continual process of evaluation is necessary, and that the program itself must be flexible enough to adopt correct measures to help solve transportation problems for rural citizens.

Table 5. Costs by route and by mode for highest level of ridership, level 3

Mode	Route 1	Route 2	Route 3	Total
11-Passenger van				
Number of trips per week	19	8	13	40
Number of miles per year	96,824	34,112	64,220	195,156
Operating cost per year	$8,714	$3,070	$5,780	$17,564
Additional volunteer driver cost per year	—	$312	—	$312
Fixed cost per year[a]	—	—	—	$33,856
Total cost per year	$8,714	$3,382	$5,780	$51,733
Rented 44-passenger school bus				
Number of trips per week	5	2	3	10
Number of miles per year	25,480	8,528	14,820	48,828
Operating cost per year	$14,014	$4,690	$8,151	$26,855
Additional volunteer driver cost per year	—	$312	$468	$780
Fixed cost per year[b]	—	—	—	$12,480
Total cost per year	$14,014	$5,002	$8,619	$40,115
Owned 44-passenger school bus				
Number of trips per week	5	2	3	10
Number of miles per year	25,480	8,528	14,820	48,828
Operating cost per year	$5,988	$2,004	$3,483	$11,475
Additional volunteer driver cost per year	—	$312	$468	$780
Fixed cost per year[c]	—	—	—	$18,272
Total cost per year	$5,988	$2,316	$3,951	$30,527

[a]Ridership level 3 requires the purchase of four 11-passenger vans.
[b]Fixed cost equals cost of two full-time paid drivers.
[c]Fixed cost includes cost of two full-time paid drivers. Ridership level 3 requires the purchase of two 44-passenger school buses.

Minnesota AGRICULTURAL ECONOMIST

Agricultural Extension Service
University of Minnesota

Issued in furtherance of cooperative extension work in agriculture and home economics, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Roland H. Abraham, Director of Agricultural Extension Service, University of Minnesota, St. Paul, Minnesota 55108. We offer our programs and facilities to all persons without regard to race, creed, color, sex, age, or national origin.

Jerome W. Hammond . . . . . **Editor**

Prepared by the Agricultural Extension Service and the Department of Agricultural and Applied Economics. Views expressed are those of the authors, but not necessarily those of the sponsoring institutions. Address comments or suggestions to Professor Jerome W. Hammond, Department of Agricultural and Applied Economics, University of Minnesota, St. Paul, Minnesota 55108.

NO. 588 APRIL 1977

Agricultural Extension Service
Institute of Agriculture
University of Minnesota
St. Paul, Minnesota 55108

Roland H. Abraham, Director

Cooperative Agricultural Extension Work
Acts of May 8 and June 30, 1914

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF
AGRICULTURE
AGR 101

U.S.MAIL

THIRD CLASS