Abridgment

Buying the Bus, or Lessons in Equipment Selection

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At the Institute of Public Administration, keeping track of the transportation equipment market and the operating experience of transportation projects has been essential from a planning point of view in order to understand why projects thrive or fail, what the problems are, and how services may be made to function more effectively and productively. We have observed over time a tendency among project managers to criticize the quality and performance of available equipment, especially small vehicles. As planners, we have often joined the chorus. Transportation systems have been needed so urgently (especially in rural areas), so much has been invested in organizing them, funding has been so tenuous, and expectations have been so high that it has been discouraging to see vulnerable operations jeopardized by problems with equipment. Today, however, small systems are learning to live more successfully with the equipment that is available to them.

It is very clear that the perfect vehicle for special transportation services—one that is sturdy, low-maintenance, fuel-efficient, easy to handle, and accessible and comfortable for the elderly and disabled—will probably not rise full-blown from the drawing boards. The market for vehicles designed for fewer than 30 passengers (for special services) is simply too diverse in terms of cost and design requirements and too limited in volume to tempt manufacturers into making the necessary investments in design, retooling, and marketing. What we are getting are small incremental improvements to existing types of vehicles and auxiliary equipment. This is a process to which thoughtful and informed consumerism can make its contribution.

Even at this stage of development, equipment need not be the Achilles' heel of operations, particularly in rural areas, if careful attention is given to the matter. There are many positive steps that will make a real difference in equipping a system. Some of the most useful are described below.

LEARNING THE TERMINOLOGY

Every vehicle with at least four wheels, windows, and accommodations for group seating is called a bus by its manufacturer. Rural transportation planners and operators should learn early on what that three-letter word means.

To the operator of a large mass transit system, a bus is a rugged vehicle that is unitized in construction; that is, the body and chassis have been designed and built as an integrated unit. Components have been designed and refined to give the longest possible wear over the life of the vehicle with the least possible maintenance. The vehicles last as long as 15 years or more, and the initial costs, though high, are spread over a long life cycle.

Measured against this standard, the small vehicles with which special transportation services are concerned must be called "bus type" vehicles. They are either automotive in design (vans) or adaptations of body-chassis designs that serve broader commercial markets such as school transportation, light trucking or delivery, and recreation. In one or more important characteristics, such vehicles inevitably fall short of meeting the full requirements of a small operation for durability and passenger comfort. However, it is less useful for operators to understand that there is no ideal vehicle than it is to understand clearly what there is to choose between, what trade-offs between choices must be made, and which equipment characteristics most nearly meet the requirements of a particular service and area.

Table 1 gives a brief comparison of some of the characteristics of vehicle types that have 30-passenger capacities. It indicates, for example, that a system that requires a vehicle to transport about 10 passengers would need to choose between a van and a small-vehicle design on a light truck chassis. In comparative terms, the van would provide an easy-handling, automotive type of vehicle with limited interior space and poor accessibility characteristics. The operator would be able to draw on a wide labor pool (including volunteers) to drive such vehicles, but would have to weigh the space limitations of the vehicle and the time and extra equipment costs that would be necessary to handle the elderly and the handicapped. On the other hand, the truck chassis vehicle would provide more room than the van but would give a "hard" ride in terms of its stiff suspension; among other modifications, this might require better bus seats for an elderly clientele.

Within each of these categories of vehicle design, there is also very little standardization of chassis components or options. Each delivery is a fresh adventure, in effect, and the burden is on prospective purchasers to know what they want, what they are getting, and what the cost implications of the alternatives are. Again, in the case of a hypothetical decision to purchase a van with standard light-duty components, it would be advisable to carefully cost out the labor alternatives. If the service plan calls for trips of great length, which is likely in a rural area, vehicle kilometers traveled may be a more significant operating cost. In such a case, in terms of the long-run operation of the system, a greater capital investment in heavy-duty chassis components may be more advantageous than minimizing labor costs.

DEVELOPING INFORMATION RESOURCES

The most useful information for the rural transportation operator is the experience of other users with different types of vehicles and different modifications to standard types of equipment. However, there is no one clearinghouse or universal source for such information, so the operator must make an effort to go after it.

Federal, state, and local programs have put many vehicles on the road in rural areas in the past few years, so the rural operator has more sources to turn to for relevant information. The problem will probably not be who to ask but finding the staff time

Table 1. Selected characteristics of small vehicles (< 30 passengers).

Vehicle Class (by capacity)	Basic Cost[a]	Type of Chassis	Vehicle Length ÷ Width (cm)
Small (up to 16 passengers)			
Van (converted)	Low	Automotive	447 - 538 ÷ 200.5
Special body, light truck chassis	Low	Truck	533 - 710.6 ÷ 188 - 243.6
Unitized	High	Unitized	599 ÷ 212
Medium (15 to 30 passengers)			
Motor-home adaptations	Low	Custom	609 - 761 (approx.) ÷ 243.6
School bus	Low	Truck	Varies
Special body, truck chassis	Medium	Truck	634.5 - 710.6 (approx.) ÷ 228.4 - 243.6
Unitized	High	Unitized	766.5

Note: 1 cm = 0.39 in.

[a]There is a difference of $5000 or more between each category of costs.

Table 2. Vehicle specifications (1974).

Manufacturer	Vehicle Designation	Nominal Seating Capacity	Ramp or Lift Available	Vehicle Cost ($)	Outside Dimensions (cm)			Door Opening (cm)	Inside Headroom (cm)	Step Height (cm)		Aisle Width (cm)	Turning Radius (m)
					Length	Width	Height			Standard	Special		
Minibus	MDH-159-10	14	Yes	24 000	726	238.6	273	63.4	191.6	33	20	104	8.8
Mercedes-Benz	039D	16	No	14 500	599.5	204	287	49.5	172.6			45	6.1
Highway Products	TC 25	25	Yes	18 100	771.5	243.6	274	76	198	35.5	20	56	7.9
	TC 31	31	Yes	20 000	863	243.6	274	76	198	35.5	20	56	9.1
General Motors	TDH 3301A	33	No		888	243	307	76	199	34.5		51	8.7
J. B. E. Olson	D-100	17	No	18 600	617.5	243	274	61	197	35.5	30.4	38	
Unibus	MX3A	21	No		510	242	286	85	191	35.5	24	38	7.5
General Motors	Chevy Sparta	12	Yes	7 800					152		24	30.4	
Ford	Club wagon	11	Yes	5 000									
Volkswagen	Volkswagen bus	6	No	4 000	441.6	176.4	197.4					30.4	
Flxible	Flxette	23	Yes	19 500	648	228.4	266.5	61	190	35.5		40	7.6
Chrysler	Dodge Maxi-Royal	14	Yes	7 000	538								
General Motors	Chevy Deauville sportvan	11	Yes	4 500									

Note: 1 cm = 0.39 in, 1 m = 3.3 ft.

(always a scarce resource in a small system) to do the research. I would recommend to rural planners that as much time as possible be invested—perhaps by volunteers—in contacting state departments of transportation, federal managers of programs with a rural component, and especially other project managers in rural areas. Researchers should not hesitate to ask the marketing departments of manufacturers for references to purchasers of their equipment. The research itself requires no technical background, but some person in the rural transportation agency should become a resource on vehicle problems.

The following areas of information might be considered in such research:

1. Operating experience, including (a) recurring mechanical problems, (b) body or design defects, (c) ease of servicing, (d) safety hazards, (e) quality of the manufacturer's service organization, (f) warranty claim experience, and (g) availability of parts;
2. Passenger-related experience, including (a) access problems such as steps, doors, headroom, handholds, seats, and aisle width; (b) reactions to design characteristics; and (c) comfort-related items such as heating, ventilation, air conditioning, weatherproofing, visibility, seats, size and padding, floor covering, noise, lighting, and vibration; and
3. Driver experience, including (a) handling characteristics, (b) position and operation of controls, and (c) visibility.

There is no way other than "talking around" to get at this sort of information; what operators or planners are reluctant to publish about equipment problems they are frequently willing to discuss quite freely by telephone.

In addition to using the telephone, I recommend building a small library by sending for manufacturers' brochures on vehicles, level-change mechanisms (for operators who plan to serve wheelchair passengers), and communications equipment. It will help to prepare a simplified table of information to compare some of the specifications of different vehicles. Table 2, a typical example, includes information on nominal seating capacity, ramp or lift options, costs, dimensions, door openings, headroom, step heights, aisle width, and turning radius. One might also add information on such items as estimated vehicle life cycle, delivery time, air conditioning costs, fuel capacity, and average fuel consumption.

KNOWING REQUIREMENTS

One of the main thrusts of the project planning process is to develop information for use in evaluating equipment needs. Basically, data are required to make four major decisions in selecting equipment: the size, number, and type of vehicles needed and the accommodations required to meet the special needs of riders.

There is some indication that decisions on the size and number of vehicles are significantly simplified in most rural situations. In the matter of size, for example, there is likely to be grouping of ridership by advance reservation to achieve reasonable levels of operating efficiency. Passenger loads are, therefore, more predictable than they are in an urban operation. Destinations are also apt to be more consistent because services, facilities, and shopping opportunities tend to locate in the towns. The character of rural trips and the service planned will, therefore, usually indicate fairly clearly an optimal size for vehicles.

Deciding on the number of vehicles needed is also relatively simple in a rural context. Routes are fewer, distances greater, and budgets often smaller. In most cases, a vehicle will be dedicated to, and be able to serve, only one—or, at the most, two—long-distance routes in a day's operation. Fleet size is usually determined by the size of the service area, the level of service the budget permits, and backup vehicle requirements.

The emphasis on inputs to equipment selection from the planning process for a rural system is somewhat different from what it is for an urban system. The interest often shifts from mode selection and the scope of operations (because those factors may be determined very early by the nature of the area to be serviced) to site-specific and client-specific research. It is clearly important in terms of vehicle selection, for example, to have daily estimates of vehicle distance traveled and information on difficult terrain, to take into account fueling locations and the location of maintenance and service facilities, and to get information on the nearest dealerships for some types of equipment and for the availability and delivery of spare parts.

It can be presumed that a rural system will serve a high percentage of elderly passengers. Rural operators that work with small fleets need to get from the planning process an indication of the number and, if possible, the locations of the elderly and the handicapped and which equipment accommodations will be required to give them access to the vehicles and comfort and safety on the road. As Table 1 indicates, trade-offs between passenger comfort, operating economy, and durability must be made in vehicle selection in every vehicle size range.

One of the most important passenger-related factors to be examined during the planning stage is how many vehicles need to be equipped with a level-change mechanism to serve wheelchair passengers. Lifts or ramps are costly in terms of both overall budgeting and the amount of passenger space they absorb. To make reasonable judgments on such equipment, rural planners need to examine carefully not only the number of handicapped persons to be served but also their locations and categories of disability.

Will shopping trips be an important function of the system? Then package racks may be required. Is the area subject to extremes of temperature? Then extra heating and air conditioning may be essential to serve the frail elderly. The questions can clearly go on forever, but the point is that, even for a very small system, there are choices to be made on equipment, and the time to research and evaluate the alternatives is in the planning stage.

A major fly in the ointment is the length of time it takes to get delivery on many vehicles and the additional time required to get modifications completed. In our experience, there is always great local pressure to short-circuit the planning stage on equipment and get the orders placed. Such pressure should be resisted if possible so that the most important equipment-related problems get resolved on paper—not worked out at heavy cost in operations.

LEARNING FROM EXPERIENCE

Experienced operators of rural transportation systems make the following suggestions:

1. Before ordering equipment, check out all funding agency, federal, state, and local requirements that may relate to equipment, whether for safety or design characteristics.
2. Draw up careful specifications. Other systems will usually be willing to provide guidance.
3. Deal with conversion shops that are experienced in configuring standard vehicles for group transportation.
4. Get agreements in writing. Notify suppliers of defects in writing. Keep funding agencies informed.
5. Try to develop a uniform fleet. Identical equipment makes it possible to cannibalize parts when necessary and perhaps order some parts in bulk for discount and also cuts down on maintenance time.
6. Build a preventive maintenance schedule into system operations.
7. Keep in active touch with developments. What one learns can improve system equipment and operations and perhaps make a contribution to improving what is generally available.

Notice: The Transportation Research Board does not endorse products or manufacturers. Trade and manufacturers' names appear in this report because they are considered essential to its object.

Abridgment

Role of the Intercity Bus in Rural Public Transportation

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In the past, the attention of transportation planners has been focused primarily on transportation problems within urban areas—and on grandiose and expensive schemes such as Amtrak. Little has been done to solve the transportation crisis within rural America.

The American taxpayer is rebelling against costly and ineffective public policy, which leads to the proliferation of government-sponsored programs that have no discernible benefit to our citizens. It is time to step back and analyze where we are and where we are going in the formulation of national transportation policies. The story of the intercity bus industry is one of an important transportation system that has grown and prospered over the years without the aid of national transportation policy, without the interest of national transportation policy makers, and with resources provided