FORD MOTOR COMPANY'S ROLE IN DIAL-A-RIDE DEVELOPMENT: 1972 AND BEYOND

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Ford Motor Company recently announced its entry into the transportation systems business. The first product of this new venture is ACT, a driverless, computer-controlled vehicle that operates on lightweight low-cost aerial guideways. ACT is designed to transport people and goods within congested activity centers, to connect these activity centers, and to provide access from low-density suburban areas to central locations.

We realize that one type of system cannot provide for all transportation needs, however. In his announcement of the company's entry into the transportation systems business, Henry Ford, II, stated: "Ford is constantly looking for new ways to improve personal mobility and to transport goods. Improved mobility and better urban planning in the cities of today and tomorrow will require not one new system but a whole new family of flexible, convenient, and efficient transportation systems. We are working on other new systems that will be complementary to ACT." One such complementary system is dial-a-ride.

Dial-a-ride provides transportation in smaller communities and low-density suburban areas; in contrast, ACT serves high-density areas. Designed to serve relatively low-volume, diffused trip-making patterns, dial-a-ride offers the traveler doorstep pickup in response to a telephone request. He is taken where he wants to go, when he wants to go.

Dial-a-ride has been carried from the concept stage into practical applications. Several operating dial-a-ride systems have demonstrated conclusively that there is a better way of moving people in these low-density situations than with conventionally operated buses.

Ford's dial-a-ride program dates back to 1969; however, research on demand-responsive systems dates back to the early 1960's. We can now confidently predict 20 operating systems in North America by the first quarter of 1973 (Fig. 1).

Our own research and experience with operating systems (Table 1) has led to the following conclusions:

1. The operation of dial-a-ride public transportation service is totally feasible from a technical point of view;
2. The patronage of the public will be at a substantially higher level for this new kind of service than for the conventional fixed-route, fixed-schedule service; and
3. There is a significant diversion of travel to dial-a-ride from the private automobile.

The credibility for these 3 statements is found in the detailed descriptions of operating systems presented in other papers in this report. It is now generally accepted that dial-a-ride is a technical success and that market response is favorable. However, these conclusions fail to address the all important cost-revenue questions. Is Dial-A-Ride an economic success?

Figure 1. Existing and projected number of dial-a-ride installations.

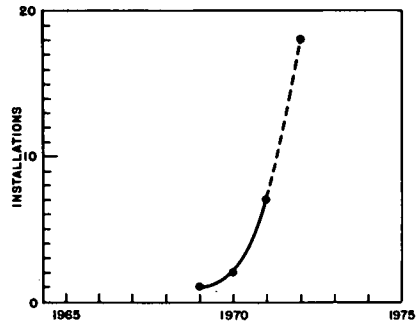


Table 1. Dial-a-ride systems in operation.

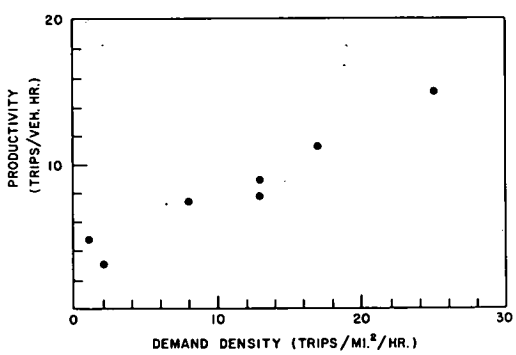
Location	Service Area Square Miles	Service Area Population	Riders per Weekday[a]	Trips per Vehicle-Hour	Trips per Labor-Hour[b]	Trip Cost ($)	Avg Fare ($)	Funding Agency	Funding Percent
Ann Arbor	1.36	10,000	214	7.7	5.4	1.35	0.50	Local	37
								State	63
Bay Ridges	1.34	13,700	463	11.3	7.6	0.60	0.25	Province	100
Batavia	4.75	17,300	455	6.7	6.6	0.61	0.50	Local	100
Columbia	6.00	17,300	54	4.4	3.0	N. A.	0.50	Local	100
Columbus	2.50	55,000	485	9.5	6.3	N. A.	0.20	Federal[c]	100
Haddonfield	6.50	16,000	333	2.6	1.8	N. A.	0.50	State	20
								Federal[d]	80
Regina	2.75	18,000	1,200	15.0	11.5	0.54	0.32	Local	100

Note: Data given represent a snapshot of 7 operating systems for the winter of 1972 and cannot be interpreted as an accurate representation of any system today. Most of the systems represented have since changed, ridership has increased, service has been expanded, and in some cases productivity has improved.

[a]Winter 1972. [b]Includes dispatcher. [c]Department of Housing and Urban Development. [d]Department of Transportation.

To answer, we must first look at system productivity, which is the key to dial-a-ride economics. Figure 2 shows how actual productivity in the field, as experienced in the winter operating season of 1972, relates to demand density. Because dial-a-ride costs (largely labor) are most accurately accounted on an hourly basis, the number of passenger-trips served per vehicle-hour is a direct and very meaningful method of comparing systems. In this case, the actual experience coincides very closely with the predictions made in the M. I. T. research work of 1968-69. This relation tells us very simply that dial-a-ride is more efficient if the distance traveled between stops is decreased, that is, if more people request service in a given geographic area. Therefore, to operate at maximum efficiency, dial-a-ride must generate a relatively high demand—more than 10 trips/square mile/hour. Only the 2 Canadian systems have regularly achieved this productivity, although Batavia, Ann Arbor, and Columbus have all done so on occasion.

Figure 2. Dial-a-ride operating experience.



The problem here is not a technical but rather a marketing issue: how to generate more demand from a given area. Most existing dial-a-ride systems do have the capacity to produce productivities in excess of the averages shown. We thus observe that, although almost every operating dial-a-ride system has demonstrated a greater ability to attract passengers than conventional bus service, in some cases the demand has not been high enough to produce really efficient operation.

The second element of economic viability of dial-a-ride is actual costs, which are made up primarily (60 to 75

percent) of driver and dispatcher labor. The actual cost per ride is obtained by dividing total hourly system cost by total hourly productivity. Because hourly labor rates vary so greatly among communities, no generalizations on cost are possible. We do find differences among systems in their use of dispatching labor, however.

So that dispatching and overhead costs can be kept in line, low-cost manual dispatching techniques have been developed. Some manual dispatching systems for small projects are "overdesigned" at the expense of operating efficiency. There is no need for 2 dispatchers when 1 will do. Elaborate visual dispatching aids (colored maps, lights, and markers) are impressive to visitors, but they can actually get in the dispatcher's way. The responsibilities of the dispatcher and his interactions with the driver deserve careful study and, when properly defined, can make the dispatching operation much more efficient. This is one area where a qualified professional with experience can be of great value in designing a new system.

Data given in Table 1 do not show that even one small-scale dial-a-ride operation is covering all of its costs. (Batavia is coming close and with added revenue sources does hope to break even.) Dial-a-ride is a very important service improvement and is highly attractive to the public, but it is not a short-term cost cutter at the present scale of operations. The actual level of subsidy required in a given community depends on local labor rate, fare structure, and demand for the service. An important observation here is that many communities have elected to provide dial-a-ride service at public expenses, and many are considering expansion of services on the basis of results obtained so far. The matter of public funds for support of public transport should remain a local issue for each community to address in its own way.

We also must reflect on fare structures (it may be desirable to price dial-a-ride service to more closely cover costs) but this again is a local decision.

Our principal findings from pursuing dial-a-ride research, then, are listed below.

1. The concept is becoming readily acceptable to transit operators, and more small-scale systems go on line every day. The "missionary work" has been accomplished; dial-a-ride has credibility and is becoming an important part of the transportation scene.
2. The operation of door-to-door, dynamically dispatched public transportation is totally feasible from a technical point of view.
3. The public is responding favorably to this type of service, from a standpoint of patronage, willingness to pay (directly and indirectly), and diversion to public transport from automobiles.
4. At the present scale of small systems and at present fare levels, dial-a-ride cannot be operated on a break-even basis, i.e., fares cover all costs. This, however, has not discouraged many communities from planning expanded systems.

As a correlative area of research, we at Ford have used dial-a-ride as a test case for learning about the process of innovation in public transport. We have found in this research that

1. Inertia and resistance to innovation are greater than we originally envisioned;
2. A sponsor, an operator, and technical support are required to implement a system successfully;
3. One can identify those character-

istics of a community that produce a favorable climate for innovation;

4. Design and implementation of dial-a-ride system can be a "do-it-yourself" project, providing proper tools are available (such as Ford's computerized system design models) and proper attention is given to all elements of the design; and

5. Each dial-a-ride system must be custom-designed to meet specific local political and social needs.

We have identified and are pursuing several promising areas for ongoing research.

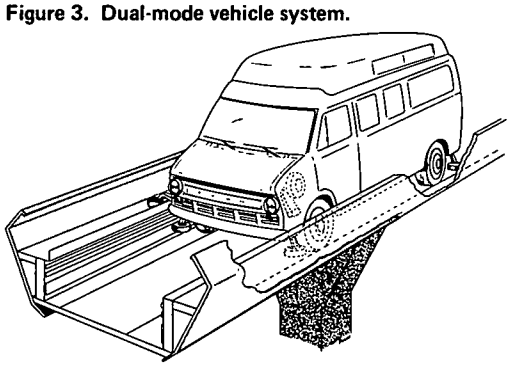
1. Economies of scale in larger systems. We can conclude that spreading dispatching costs and overhead over more vehicles will produce some benefits, but, more important, will larger systems induce higher demand densities?

2. Automated dispatching. Our own studies to date have indicated possible application in the automation of information flow as opposed to actual decision-making.

3. Digital communications. A pilot test is scheduled for the fall of 1972.

4. Dual-mode dial-a-ride (Fig. 3). In this system, the guideway and controls for the Ford ACT system provide the flexibility to use dual-mode vehicles, including dial-a-ride buses, that are operated on conventional surface streets and highways but are specially equipped to enter the guideway where they are automatically controlled, register a destination, merge into the main guideway, and then leave the guideway to operate on surface streets. Intuitively, the dual-mode concept is very appealing. One can imagine, for example, a future system where no transfer is necessary either to get on a line-haul mode or to get from the transit station to the final destination. Whether dual-mode systems can really work better than properly interfaced single-mode systems is a question that our future research will attempt to answer.

Figure 3. Dual-mode vehicle system.



5. Although it is the largest single component of total freight costs, urban goods movement has received very little study. There may be substantial spin-off from some of our dial-a-ride research into the field of local truck distribution systems, and we expect to launch a substantial research effort in this field.

An obvious area of Ford concern has been vehicle development. We all acknowledge that currently available small buses have design compromises that make them less than perfect for dial-a-ride application. The present low-volume market does not justify our tooling to produce a special vehicle, nor does the potential future market appear to warrant extensive research and development expenditures. Therefore, we expect to continue working with specialty manufacturers, basing small buses on standard product lines. We are making a Ford Econoline bus conversion, which is explicitly engineered and manufactured to meet transit system needs, available to the industry in the fall of 1972. This

conversion embodies strength and safety features that have not been available in small buses.

Ford will continue to actively promote the dial-a-ride concept as part of an overall commitment to better public transportation in urban areas. The present program calls for spreading design-implementation knowledge throughout the transportation community, making a stronger, safer vehicle available, and continuing research in larger, more sophisticated systems.

INFORMAL DISCUSSION

Question: Are there other sources of revenue for dial-a-ride besides the fare box?

Answer: Yes. Some of these sources are being developed in Batavia.

Question: How important is public attitude in general in convincing politicians to spend public money for a dial-a-ride system?

Answer: Sociological researchers tell us that, if a community is oriented in a public-spirited way toward one thing, it will tend to be oriented that way toward all things. If a community supports day-care centers, it will probably also support public transportation. There is a coalition in Ann Arbor right now between what I call the bicycle freaks and the transit freaks. They have motivated a large bloc of the community to stop additional road improvements in this current budget year. This is a fantastic development. It suggests how important public attitude is and that the people in the community must want something before politicians cause it to happen. If the people are indifferent, forget it.