

New Concepts in Public Transportation

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INTRODUCTION

Smaller urban areas having a low density population have been experiencing problems in public transportation over the past several years. This has been the case in almost all urban centers throughout the United States. As real income has risen and with the urban sprawl taking place, tremendous problems have crept into the transit industry. In some smaller urban areas, there has been a reduction in ridership of more than 50 percent. This decline in patronage has resulted in a decline in service offered by bus companies. Because of the lack of passenger revenue, bus companies have had to curtail, to a great extent, the services offered in many urban areas. At the same time that service has been decreased, there has also been a rise in fares. Thus, a rise in fares and a reduction in service has led again to a reduction in patronage. It seems that this phenomenon becomes a vicious cycle of which no one understands exactly where it will stop.

In addition to the reduction in the number of riders using public transportation, there has been a large increase in labor costs associated with operating transit systems. At the same time there has been a substantial increase in cost of equipment and of the maintenance of that equipment. As a result, the equipment has been allowed to deteriorate and become almost unacceptable to the general public. All of these deteriorations are not the fault necessarily of the transit industry, but are a result of the general environment under which they have had to operate.

The prime mode of public transportation in smaller urban areas is bus transportation. Buses generally provide the total movement of public transportation with exception of taxi service, and in the immediate future, it would be difficult to forecast any other means of movement of people other than by bus in the smaller low density urban areas. Thus, the picture looks depressing for those involved with public transportation. It is also depressing for those who have to rely upon public

transportation as their means of movement in an urban area. The prospects for a completely new and bright picture in this area are not great and it is doubtful that an overnight success in this area will come about. However, there have been some improvements in concepts and in technology which will hopefully lead to improvements in public transportation, particularly in smaller low density urban areas. It is these new concepts in public transportation that will be briefly reviewed in this presentation.

NEW INNOVATIONS IN SMALL BUS OPERATIONS

In the past few years there has been much attention directed toward one new concept in bus transportation. This new concept is referred to as "demand-scheduled-bus systems" (DSB), "dial-a-bus", "dial-a-ride", "demand-actuated systems", and/or "demand-responsive systems"; it is known by a variety of names. Essentially this service resembles a taxi service in that a rider may be picked up at his door and delivered to his destination. However, the difference is that several people, perhaps up to ten or twelve, will be utilizing the bus during its pickups and deliveries. That is, several people will be scheduled into a particular bus to be picked up and delivered to their destination. The level of service that is offered by a demand-scheduled-bus system is not as good as that of a taxi service. However, this service does not operate on any fixed route and schedule but simply develops a route and schedule based upon the demand for service. There has been much research directed toward better routing and scheduling and the optimization of demand utilization of this new concept of dial-a-bus. There have been a few installations within this country and in Canada within the past few years of some aspect of this type of system.

SOME PREVIOUS EXPERIENCE

The concept of using a small bus that will make frequent stops for pickups and deliveries is really not a new idea. Actually, in 1916, Atlantic City, New Jersey had a jitney operation. The system is composed of private owners of vehicles that have a franchise with the city. There are about 190 jitneys that operate along a four-mile route that parallels the boardwalk. These jitneys operate at approximately one-minute headways and each of the jitneys has a ten-seat capacity. No one has to stand in that a jitney will not stop to pick up someone unless there is an available seat on the jitney.

A demonstration project was conducted in Peoria, Illinois a few years ago in which the buses operated on a semi-fixed-route fixed-sched-

ule basis, but they did offer door-to-door service. This system provided what is commonly called a subscription service. A rider could purchase this service for a given interval of time, perhaps from one day upwards to a month or longer. The bus system would come to his house and pick him up and take him to his place of work. This bus system essentially served the work trip. It was routed through a residential area and served a predominantly industrial area.

There have been other projects as in Flint, Michigan and Menlo Park, California. The success of all of these past projects depends upon how one measures success. There has been a relatively good acceptance in most instances by the public although none of these have proved to be financially successful in terms of a profit margin.

Over the past two or three years, there have been several research groups that have contributed significantly to demand-scheduled-bus systems. There was a substantial amount of work done by a group of researchers at Northwestern University who developed perhaps the first simulation model for a many-to-many problem. This group viewed the demand-scheduled buses as serving low density areas as the only source of public transportation. During this time a similar study was being conducted by Westinghouse Air Brake Company (WABCO), and both of these groups reported favorable findings concerning design and operation of this type of system. The first work along developing this type of technology and design came about under the sponsorship of the Urban Mass Transportation Administration (UMTA) during the time that they were under the Department of Housing and Urban Development (HUD). HUD was sponsoring research activities which attempted to evaluate the feasibility of new concepts in public transportation. HUD sponsored some research projects with Massachusetts Institute of Technology and General Motors. One of the new concepts evaluated was a demand-scheduled bus system for a many-to-one problem; that is, many origins to one destination. It was essentially viewed as a collector system for long-haul rail lines.

SOME INTENSIVE RESEARCH EFFORTS

In 1969, MIT under the sponsorship of UMTA, and General Motors under their own sponsorship began perhaps two of the more thorough studies of demand-actuated transportation systems that had been performed. These two studies were independent of one another but were similar in many respects. They used comprehensive computer capabilities to analyze demand-scheduled-bus operations and to explore through sensitivity analysis the overall concepts of design and operation.

The General Motors study evaluated various aspects of demand, economics, user preferences, styling, and general marketing information. The MIT study developed a sophisticated expertise in computer scheduling of buses. MIT also addressed themselves to the feasibility study of actual locations for demonstration projects. Both of these studies gave a favorable report for potential DSB systems.

During the time that MIT and General Motors were doing work on demand-actuated systems, Ford Motor Company designed and built a small bus that would hopefully serve a useful purpose in a DSB system. Basically, Ford made some modifications to their Ford Econoline to employ a seating capacity of about 12 passengers. They put one of these buses into operation in Mansfield, Ohio. In January of 1970, a field experiment in Mansfield consisting of dynamic routing with a fixed-schedule was undertaken. Essentially, the experiment was structured as a many-to-one type of operation with the downtown area of Mansfield being the central control point. A potential rider of the system could phone directly to the bus that operated on one route in Mansfield and have that bus deviate from its fixed route and come to the door for pickup. Or, a rider who boarded the system in the downtown area could have the driver schedule a drop-off at his exact destination.

This project lasted for about a year. There were slightly over 20 percent of the riders who elected to use the doorstep service. The revenue did not cover full operating expenses, but did experience about a 14 percent increase per household served during that time.

In July 1970 an experiment with the GO-Transit Rail Commuter Service was implemented in a suburb of Toronto. This system operates as an essentially many-to-one system, particularly during the peak periods, but goes to a many-to-many operation during the off-peak periods. Toronto has been perhaps one of the more successful of all the dial-a-bus systems that have been implemented. Ridership has continued to increase to such a point that, at the present time, there is an approximate break-even point on operations during the peak periods. This is not the case for Saturdays and Sundays and for certain other hours of the day.

Columbia, Maryland is one of the new towns under development in the United States. It has a current population of about 15,000 people and has intercity bus service to Washington and Baltimore. But service within the city has been restricted to two buses operating with fixed-routes and schedules. This bus system carried only about 40 to 50 passengers a day. In January 1971 Columbia instituted a dial-a-bus

service on a many-to-many basis. This system gained immediate acceptance by the general public. In approximately one month the ridership was averaging over 300 people per day and media response has been most favorable. However, the system at the present is being heavily subsidized.

PLANNED PROJECTS

There are several other projects planned using dial-a-bus concepts. There is a Haddonfield, New Jersey project planned which would be similar to Toronto's and would be a hand-scheduled system. There is a project being tentatively planned for Rochester, New York which would offer both many-to-many and many-to-one types of operation. However, this system would be completely computer scheduled. There is a planned demand-actuated system for Lafayette, Indiana to begin operation in 1971. This system will be a many-to-many system and will be the only available public transportation for certain periods of the day.

It will be a few more years before one knows how successful a demand-actuated transportation system can be. It is too early to know if a demand-actuated transportation system can be economically viable. However, the initial capital investment is not nearly so great and there are some indications that vehicle operating expenses may be relatively lower than traditional large buses. Capital investment for small buses is in the range of \$6,000 to \$8,000 as opposed to a possible excess of \$30,000 for large buses. However, it is questionable that as far as a profitable venture is concerned, dial-a-bus will ever be in that category. It is doubtful that any public transportation system will be an economically viable one. The trend in the past several years has been to subsidize public transportation because it simply is not able to generate sufficient revenue to provide adequate service. It is not likely that in the near future this trend will be reversed.

SUMMARY

Demand-actuated transportation systems offer many good advantages, particularly to smaller urban area. These advantages can be summed up in this manner:

1. The system requires less initial capital investment to begin an operation.
2. The system offers an extremely high level of service relative to a fixed-route, fixed-schedule system.

3. One can add and subtract from the system as the demand warrants without causing undue problems of design and operation. One can have a larger system operating during heavy demand periods and reduce the system to a very small amount of service in very low demand periods.
4. The system has the characteristics to provide for a better potential to attract passengers than any other presently proposed system of public transportation.

There will be many more of these systems tried throughout the United States. Many modifications and changes to the basic concepts will be made over a period of years until a very good and adequate system evolves.

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