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Vol.: 21 No: 1 Mon/Yr: 1987
Pages: 81-84

Article Title: A note on fare policy in personal rapid transit

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Journal of Advanced Transportation, Vol. 21, Spring 1987.

A Note on Fare Policy in Personal Rapid Transit

J. Edward Anderson

The choice of fare policy is more flexible in personal rapid transit than in conventional transit and has some unique aspects. The implementation of fare policies as a function of distance are discussed, and, following a discussion of how the fare would be collected in a PRT system, consideration is given to whether the fare should be per person or per vehicle.

Introduction

This note elaborates on a brief discussion of fare policy given in a previous paper (Anderson, 1986). It is meaningful in consideration of "true" personal rapid transit, the adjective "true" indicating private-party, nonstop service between stations in a network of guideways. An economic derivation of "true" PRT has been developed (Anderson, 1984) as the result of efforts to find a set of transit system characteristics that minimize the total cost per passenger-mile.

Fare Functions

When considering fare policy, one usually thinks of the following: no fare at all, a zone-based fare, a flat fare, or a fare that is a function of distance. In certain single-institutional systems, it is possible that the institution will prefer to charge no fare at all, just as there is no fare involved in riding an elevator or an escalator. The reasons could be 1) to make it as easy as possible to use the system, or 2) to save the cost of buying and maintaining fare-collection equipment.

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In larger systems, it would seem necessary to charge a fare 1) to pay the costs of building and operating the system (a real possibility with true PRT), and 2) to control amusement riding. Many conventional transit systems use a flat fare because it is by far the easiest and cheapest policy to implement. In others, some sort of zone fare or distance-base fare is used because of recognition that the operating costs increase with distance and it is believed more equitable to charge in proportion to distance travelled. I have heard some people argue, however, that the longer-distance traveller should not pay more because it is through no fault of his own that he must travel further. Fare policy is thus a matter that must be settled by each agency that operates a system.

In true PRT, since each trip is nonstop it is easy to tabulate in the memory of a microprocessor at each station the fare corresponding to trips to all other stations. Since the operating costs are proportional to trip length, a person pays for what he uses if he is charged a fare proportional to distance. It is easy, however, to make the fare any other function the operator wishes.

Fare Collection in a PRT System

The best way we have found to collect the fare and to gain access to a vehicle is the following: Upon entering a station a patron encounters a map of the transit network showing the number of each station. Further on, out of the way of the map, two or more fare-collection machines are placed. Once the patron knows his destination number, he punches it into a console similar to a bank cash machine. The destination and corresponding fare are then displayed on a screen and for blind people transmitted by computer voice. The fare is paid by cash, credit card or prepaid card, whereupon the machine dispenses a plastic card or disc (a pass) containing in magnetic code the destination number or, for the convenience of network switching logic, the coordinates of the destination station. This pass is then taken to the first empty vehicle in a line of waiting vehicles and inserted into a slot in a stanchion next to the vehicle. The destination code is read and transferred to a microprocessor on board the vehicle, the door unlocks and opens, and the pass is recycled for the next user. The passengers enter the vehicle and close the door, indicating to the vehicle control system that it may proceed to the destination.

This procedure, in addition to collecting the fare, accomplishes the following: 1) It assures the patron that he or she gets on the vehicle that will be programmed to his or her destination (the destination can also be verified by computer voice aboard the vehicle out of earshot of other persons); 2) it reduces to one operation—insertion of a plastic pass into a slot—the action required of a patron in front of a vehicle where he or she potentially could hold up a line of vehicles; 3) it eliminates the need for turnstiles because no one can gain access to a vehicle without having very recently purchased a valid pass; and 4) it easily accommodates any fare policy.

Fare per Passenger or per Vehicle

In a true PRT system, in which the riders in each vehicle either ride alone or together by choice, there is one more variable in the selection of fare policy: The fare could be per person or per vehicle. I have previously (Anderson, 1986) argued that if the fare is per vehicle ride sharing is encouraged. If two or three people are going the same route to work every day, by ride sharing they reduce the number of vehicles required and increase system capacity. While the system wouldn't get as many fares, the costs are more closely related to vehicle-miles than to passenger-miles and the above-described fare-collection and vehicle-access procedure is simpler than if each person paid a fare.

Auto ride sharing lacks popularity because the driver must make a number of extra stops each day, phone calls are needed to commit to ride, and if the driver should wish to do errands at the end of the day, the passengers must have alternatives. In true-PRT ride sharing, the ride sharers need only agree to meet at a station within a certain time period. If one of them doesn't show up on a particular day, the only consequence is that the cost of that trip is increased. Ride sharing on PRT is thus more flexible and lacks the requirement of commitment for more than one trip.

With a fare per vehicle, the group need pay only once and receives one pass. Also the group can be however many people can fit into a vehicle—a mother, father and several small children; five 12-year-old girls; three 200-pound football players—whatever number of friends travelling together desire to squeeze into a seat 57 inches wide. If there are too many of them, they can take two or three vehicles and will arrive at their destination seconds apart. If each were to pay his or her own fare and receive a pass,

confusion arises at the stanchion in front of the vehicle because only one pass is needed to transfer the destination and open the door.

References

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