

## RESEARCH NEEDS OF THE TRANSIT OPERATING INDUSTRY

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The great need facing the transit industry today is an increased capability to respond fully to public desires. This capability can be achieved if transit receives proper funding, improves its management, and increases the quality of its service.

A current administration report, not yet submitted to Congress, discusses the problems that the transit industry has been facing since World War II. One sentence, which follows, is particularly significant: "The cycle in which transit is caught results from its failure to adapt to new patterns of urban development, respond to changes in public preferences and expectations, and compete effectively with the private automobile."

Although this report may be revised before it is issued, the quoted sentence shows that the administration is aware of the problem transit has had in effectively competing with the private automobile.

Transit has been faced with this problem since the 1920s when the automobile came into nationwide use. Financial problems resulted immediately as ridership began to decrease. Following the stock market crash in 1929, bondholders in many cases took over operation of the transit companies. Their main concern during the Depression was to retain as much of their investment as possible. Then followed the boom years during World War II. After the war, the great cost-price squeeze occurred, and, once again, the owners were faced with the problem of attempting to retain their investment. During the 1950s and 1960s, most privately owned transit companies went public. On the west coast today the largest privately owned transit system is in the city of San Jose, a system that comprises 50 to 60 coaches. All other systems, in major west coast cities, now are publicly owned.

As transit became increasingly publicly owned, in many cases it took the public to approve and to fund it, indicating a gradual awakening on the part of citizens that transit is a necessity. Also there is now public concern about the effects of new freeway programs on urban environment.

As a result of public concern, Congress, in 1964, took action to provide capital funds for transit to use in acquiring equipment. Last year the Congress added several billion dollars for use by public transit. Citizens themselves, through their state legislatures, city councils, and direct vote, have approved property, household, and retail sales taxes as well as bridge tolls for transit. In short, transit has become a public concern, and I think there is a growing willingness on the part of the public to use it.

Yet, if we look at national statistics, ridership on a nationwide basis still is declining. What is needed? In my judgment, research is a vital need. We also need improved management in the transit industry, management that is enlightened, competent, enthusiastic, innovative, and creative.

In looking at the role of research in the transit industry, I separate it into 2 distinct categories: (a) research that affects the riding public or the potential rider of the service, and (b) research pertaining to in-house activity, i. e., lowering costs, increasing productivity, and improving the efficiency of operations.

First I will comment on a few areas that pertain to the role of research as it directly affects the public.

Routing, for example, is a critical factor that needs to be researched. A bus line that serves the University of California at Berkeley travels through a neighborhood area on the edge of the campus. Ridership on the line has been decreasing since 1960, but the transit scheduling department is not able to state why with any degree of conviction. Perhaps what is needed is a survey of citizens who live along the line to determine what can be done to increase ridership. Perhaps an origin-destination survey would be useful. Perhaps an intensive interview of citizens on a selective basis would reveal psychological problems that may be involved in the public's rejection of that line.

A research and planning official has said the following about trying to research routing: "...transit planning has one handicap almost too difficult to surmount, which is that most plans are processed on the basis of cold, statistical estimates—which might be satisfactory in some industries. However, in the transit industry, where the business is to provide service for people's needs, all efforts in research and planning should take into consideration the needs and wishes of the people served. The very nature of our business makes it difficult to determine our customers' desires and needs because of a lack of personal contact."

Transit routes that follow old streetcar lines exist in every major city in the United States. Such routes serve a purpose because commercial and residential developments grew up along those lines. Yet, some research time should be spent determining whether people along these lines could be better served. The routing of transit in new neighborhoods is another area that needs research.

The use of dial-a-bus is possibly an answer in some service areas. Yet, in the next 10 years, if labor costs continue to increase and if ridership does not grow, we will have to use driverless vehicles to escape financial failure. This is especially true if we lose public support.

How important are headways to a prospective customer? AC Transit uses 90-sec headways during commuter hours on one line; on another line, during midday, the headway is 1 hour. I do not think that an hourly headway is adequate, but I do not know whether the public is dissatisfied.

The bus line having an hourly headway will be serving a rapid rail station in the near future. The line operates every hour during midday, whereas the rapid rail line will run every 12 min. If the line operated every 30 min during commuter hours, as it currently does, the rapid rail line would run every 6 min. On the surface, this does not sound like good service, but what is it? Meeting every single train may not be financially feasible. What is needed is basic research of the feelings of the people who will use the line.

Speed is a frequently discussed factor, and I suspect that it is the most important quality sought by the commuter. In the San Francisco Bay Area, voters approved bonds for a rapid rail system in 1962. They agreed to tax themselves \$792 million plus interest to fund it. I believe that they voted affirmatively because of the speedy ride offered by a rapid rail system. A bus specification currently being developed by the Urban Mass Transportation Administration is indicative of the effort to increase speed capabilities. Additional speed can be acquired by changing the operating characteristics of the coach itself, by adopting better fare collection procedures, or by improving the general movement of people within the coach.

AC Transit's experience in replacing a local coach with express operation has been favorable. During midday AC Transit operates 12 lines between the East Bay and San Francisco; during the peak AC Transit operates 38 lines. This moves service on the freeways and eliminates transfers in many cases. As a result, passengers get home sooner.

AC Transit's experience indicates that speed is important. Yet, how can transit compete with the private automobile? An AC Transit employee made the following comment: "In competition with the automobile, one of the primary deficiencies that faces transit is the relatively slow travel time. Many factors that affect travel time involve things over which the transit operator has no control, and only cooperation with city officials and police departments can offer relief in these areas." Further research in providing better loading zones, preferential operating lanes, and traffic signal controls

would be most desirable, and it should be emphasized that local, public jurisdictions must cooperate with transit if service, in terms of speed, is to improve.

Controlling traffic signals from the bus has been discussed as a possible way of expediting service. Not much research has been done on this; yet it is this type of suggestion, and the research that follows it, that is needed to justify obtaining improvements from the cities in which we operate. Obtaining an exclusive curb lane along a street in the downtown area is in itself a very difficult task. The transit operation in Houston has been discussing this for quite some time with city officials and has finally received approval. Chicago has done quite a bit in this regard. I consider it an awakening on the part of the California State Legislature and the Congress when they agreed to set aside on freeways, built with gas tax funds, exclusive lanes for buses.

Fare structure is another matter that has not been given a great deal of extensive research. Several years ago in a west coast city a scheduling department employee interviewed riders. The riders' first priority was speed, and level of fares was about fifth. Generally, in this country, the transit industry has been trying to keep fares low. It was feared that, if fares were raised, business would decline. I am not sure that this fear is ungrounded. In Chicago, during the period when the fare was increased from 25 cents to 45 cents, nearly 25 percent of the ridership was lost. Certainly, some sort of research would be helpful to know how much of this loss was due to the fare increase. These are some of the answers we need to improve the planning of transit finances.

There has been some research done on the no-fare policy. Charles River Associates evaluated the effect of a no-fare policy in Boston. The objective of the no-fare policy was threefold: to improve job opportunities for people in ghettos, to help revitalize the downtown area, and to try to alleviate some of the freeway congestion during peak hours.

Charles River Associates projected the study results nationwide and concluded that a national no-fare policy would result in an annual deficit of about \$2 billion. Of that, \$1.7 billion would underwrite current service and \$250 million would be needed for additional capacity to handle new riders. The study estimated that ridership would increase some 32 percent if a no-fare policy were established. However, in its conclusions and in analyzing the cost-effectiveness of such a program, Charles River Associates felt that it might be better to use the same money to improve the quality of the service, headways, equipment, and routing—perhaps resulting in an even greater increase in ridership.

Let me give you an example of fare structures involving 2 cities in which AC Transit operates. Currently, the fare is 80 cents round trip. The contemplated fare structure on the rapid rail system that will serve those same 2 cities is \$1.40 round trip. If a customer also has to pay 50 cents round trip to ride a feeder bus to and from the rapid rail station, his total round-trip fare will be \$1.90, an increase of \$1.10 over what he is currently paying. It is uncertain how the public will respond to this additional cost.

The entire fare collection procedure is in need of a lot of work. Certain firms that manufacture fare-box equipment are doing work along these lines. However, not enough is being done. On BART's rapid rail system, and in all stations along the line, riders will be able to buy stored fare. The rider can put a maximum of \$20 into a machine and receive a card worth \$20 in rides. When the rider uses the system, he checks in and out, and, according to the distance between the stations, the machine automatically deducts the amount of the fare from the card. We should be able to use these stored-fare cards on buses as well as on trains.

Certainly the way in which we get the money from the fare box to the bank could stand a great deal of improvement. Also, the simple business of trying to transfer between 2 vehicles, especially between bus and train, could stand improvement.

On-time performance is one of the most exciting developments that is being worked on. Not only will it help ensure on-time performance of transit, but also, if it is developed correctly, it will help meet immediate demand.

There are many amenities, such as air conditioning, carpeting, and music, that may have significance to prospective customers. What must be determined before these amenities are purchased is the degree to which they will increase transit ridership.

How much space per individual should be allotted on a bus? At present, buses capable of seating 53 passengers are being built. General Motors Corporation has done research on seating capacity and space. It was determined that, if each customer was given the same amount of space on a bus that he has on a first-class airline ride, the seating capacity of buses would be reduced by about 40 percent. More equipment and operators—resulting in a higher cost per passenger—would be necessary to ensure that each rider is given a seat.

Efforts are currently being made to reduce sound levels inside and outside of the coaches. Again, how significant is this in attracting new business? Should transit do a better job with regard to noise reduction? The same questions can be asked concerning cleanliness. AC Transit now has automatic washers that expedite exterior cleaning of the vehicles. Inside cleaning of the vehicles, however, is still a hand operation. AC Transit has some automatic vacuums, but they are as yet unsatisfactory. We need to know what, if any, relation exists between vehicle cleanliness and level of ridership.

Another area that needs research is operator attitude. Should we, as an industry, be putting greater emphasis on prospective employees' attitudes at the time we hire them? Perhaps we need screening tools to help evaluate how a man will treat the public under the conditions that an operator has to face.

What effect does vehicle appearance have on level of ridership? I personally dislike advertising signs on buses, yet AC Transit receives about \$200,000 in revenue from those signs every year. If AC Transit eliminated such advertising, would the improved appearance of the coach attract enough additional riders (2 percent would be needed) to offset the loss of revenue? We do not know the answer to this question.

So much for the various factors of AC Transit's research operations as they directly concern the public. As far as our in-house problems are concerned, they are strictly one of cost and operating efficiency. AC Transit's driver wages have increased 100 percent during the past 10 years, with practically no increase in operator productivity. How does a transit system cut costs? One way is to increase bus capacity. AC Transit has been studying the use of an articulated 77-passenger coach to cut costs. Another way is to increase bus speed. Greater use of the computer can also help to reduce expenditures.

Improved equipment is sorely needed to save money and improve operating efficiency. Research has given us fast fueling, which has been of help; however, each night we still run our buses through a fuel island. Why can't we have electronic movement of buses in the yards—something similar to the way freight cars are moved about in a rail yard?

Research on 2-way radios has been helpful in improving operating efficiency, which is proved by the fact that the transit industry now is installing or using 2-way radios in various operations.

In the area of power plants, a great deal of research has taken place during recent years. There has been substantial improvement in the emission control of the diesel engine.

Gas turbine engines (60 are currently being produced), which have lower maintenance costs, greater power, and lower rates of pollution emission than do conventional engines, will benefit the transit industry. The gas turbine engine meets the 1975 emission standards. The steam bus, currently under research, also meets 1975 emission standards. Research also is taking place concerning the conversion of diesel engines to liquid natural gas in an effort to meet 1975 emission standards.

Greater research is needed in the field of safety. Operators have difficulty in accurately measuring distances and changing perspectives as the vehicle moves. New devices and training aids are needed to help operators more accurately judge distances and perspectives.

Promoting the use of public transportation is also a very important part of the transit operation. Essentially what we must do is sell satisfaction to the public—a very subjective matter. At AC Transit approximately 1.6 percent of operating income is spent in promotion of service, including the use of newspapers, billboards, radio, and television. Yet adequate research is needed on the effectiveness of these promotion techniques in converting the public to transit use and also in providing the public with adequate information so that they can better utilize the system.

In conclusion, the main job facing the transit industry today is to promote greater use of transit by attracting automobile users. To accomplish this, 3 requirements need to be met. First, a positive public attitude must exist, as demonstrated through greater financial assistance and through greater use of the transit systems. Second, more research is required to improve our capability of attracting new customers to transit and in improving the efficiency of our operations. Third, the thinking of transit management must be changed such that it can take advantage of research activities and accommodate changing public attitudes.