lieve the taxicab industry has the flexibility, the diversification, and the expertise to provide a great portion of this door-to-door service.

In 1966 the City Council of Huntington Park, which has a population of 33,000 and is located 7 miles southeast of Los Angeles, became transportation conscious. The mayor at that time made a survey of what facilities the citizens needed, and public transportation was high on the list of needed services. That was rather strange because the Southern California Rapid Transit District runs 7 bus lines with approximately 700 buses a day through Huntington Park. It is a transportation hub.

Redwood City is close and has a fixed bus system that is operated by private carrier under contract to the city. Huntington officials thought this might be its answer, but realized after a year or so of study that door-to-door service would be more applicable.

In July 1973, the city asked for bids on a DRT program with 2 vehicles. The All American Cab Company was the low bidder. Because of my belief in shared riding, I wanted this program; and we bid at $8.25/hour. The only other bidder, the Southern California Rapid Transit District, bid $23.25/hour. I wish I had known that. We included no profit at all and no salaries for dispatchers or order takers because they were already on the job.

The DRT operation is so compatible with the taxicab operation that it is second nature. It took no more than 3 hours for our people to become adjusted to the program and after that it was as though they had always been dispatching, taking orders, and handling DRT.

The city uses federal revenue sharing funds to buy our services. [In Los Angeles County, we are part of the Southern California Rapid Transit District (RTD). RTD has the first choice of funds from state gasoline tax that can be used for transit.] We supply the vehicles and the drivers and maintain the vehicles. The city pays on an hourly basis and promotes the program. The original advertising and promotion was good and then it declined. However, the program is running fairly successfully.

The rates started at 25 cents for children under 12 and senior citizens and 50 cents for adults and are now 25 cents for everybody. We operate 2 buses from 9:00 a.m. until 6:00 p.m. We average about 95 passengers/day/bus, 75 percent of whom are senior citizens. During the RTD strike, we were allowed to put a third bus on and ridership increased considerably. As the ridership grows, we should add a third bus; otherwise, growth stops. But the city has no funds for the third bus.

We had planned to use a taxicab, but the city wanted a different vehicle, and we have a 16-passenger van with air conditioning and music.

My conclusion after 9 months of operation is that, no matter how high the volume is, at our rate structure we will probably never have a profitable operation. When I first submitted my bid, I thought that at some time it would be, but we now have the highest ridership we can possibly have during the 9 hours we operate. During the RTD strike, we handled approximately 100 passengers/day/vehicle and our subsidy per passenger dropped to 60 cents, which is still not a profitable operation.

We are now trying to add a van with a lift for handling of the handicapped, particularly those in wheelchairs. But we must find funding.

Ronald F. Kirby, The Urban Institute

A number of services that could be offered by taxicabs are currently prohibited in U.S. cities by regulations enacted by public service commissions. Although relaxation of such restrictive regulations has been advocated on numerous occasions by transportation researchers, planners, local government officials, and taxicab operators themselves, little regulatory change has occurred to date. Moreover, the taxicab industry is rarely considered a potential provider for publicly supported transportation services where these are deemed socially desirable.

One of the major reasons why little innovation has taken place in the public regulation

of taxicabs appears to be that little experience is available that regulators and policy makers can use to evaluate proposed changes. In a recent study (1), which reviewed experience and assessed the potential for transportation services referred to as paratransit, the authors concluded that a demonstration program was needed to evaluate the potential of taxicabs for providing various paratransit services. (Paratransit includes all intraurban passenger transportation that is available to the public, is distinct from conventional scheduled bus and rail transit, and can operate over the highway and street system.) This paper pursues this conclusion further and specifies in general terms a program of empirical investigation and experimentation designed to test and evaluate promising service innovations for taxicabs.

SERVICE INNOVATIONS AND FARE STRUCTURES

In most U.S. cities service standards and fare structures for taxicabs are designed to facilitate regular taxi service, in which 1 or more travelers hail or phone a taxicab to convey them directly from one location to another. Fares are usually computed by a meter, which typically registers 50 cents for the first ½ mile or 0.8 km and 10 cents for each additional ⅙ mile or 0.3 km (while the cab speed exceeds 10 mph or 16 km/h) or for each minute (while the cab speed is less than 10 mph or 16 km/h). For group riding, in which 2 or more passengers travel between the same origin and destination, the total fare is computed as the meter reading for the first passenger plus a flat rate of perhaps 40 cents for each of the additional passengers. In some cities the fare structure is based on geographical zones, and fixed fares per passenger are set for travel between each pair of zones. In these cases fares for group riding are usually set at a flat rate per passenger and are 10 to 30 percent lower than the single passenger rates.

Regulations seldom deal adequately, however, with the various shared-ride services that taxicabs can provide. Four types of shared-ride services can be identified (1):

1. Jitney, in which the vehicle travels relatively fixed routes on short (but unscheduled) headways and is hailed by prospective passengers;
2. Dial-a-ride, in which the vehicle is requested by telephone, and vehicle routing is determined as requests are received;
3. Hail-a-ride, in which the vehicle is hailed, but travels no fixed route, and may display a destination sign or simply stop to request a potential passenger's desired destination; and
4. Subscription, in which passengers agree to ride together on a regular basis along a route determined by prior arrangement between the travelers and the provider.

A number of variations to these service types are possible: Dial-a-ride services, for example, require that requests for service be made at least 2 hours in advance of the trip time to facilitate matching of riders, and hail-a-ride services might make use of taxicab stands and depart on relatively fixed schedules.

The zone or meter fare structures for regular taxicab services are almost always set to ensure that revenues cover costs and yield a profit to the taxicab operator. This is in sharp contrast to conventional bus and rail services in the United States. Revenues of these services generally fall far short of costs, and the resulting deficits are covered by public funds. In almost all cases where small buses are used to provide dial-a-ride, subscription, and scheduled services, fares are also set well below the level that would produce sufficient revenues to cover costs, and again public funds are used to supplement fare-box revenues.

The use of public funds to subsidize public transportation services has been justified as a means to achieve 2 widely accepted social objectives:

1. Attract private automobile drivers to public transportation and thus reduce congestion, pollution, and fuel consumption; and
2. Provide adequate mobility for those who are unable to use a private automobile, especially the young, the elderly, the poor, and the handicapped.

But though these objectives are widely accepted, the way in which they can best be achieved is still the subject of much uncertainty and debate. In particular, it has been argued (1) that taxicabs should be given greater consideration as potential providers of publicly subsidized transportation services.

Since taxicabs are operated entirely by the private sector, they have not been eligible to receive public funds under the major federal subsidy program, the UMTA Capital Grant Program, which may disburse funds only to "public bodies and agencies thereof," according to the Urban Mass Transportation Act of 1964, as amended through October 15, 1970. Technically, a public body could acquire capital equipment for taxicabs (such as vehicles, meters, and radios) and then lease that equipment at low rates to private operators, thus passing on the subsidy. Apparently UMTA capital grants have never been used in this way, however, and neither public transportation authorities nor taxicab operators have expressed much enthusiasm to date for this subsidy mechanism.

Two more promising subsidy mechanisms, however, have been implemented in a few locations. Under the first mechanism, the public body negotiates a contract with a transportation provider to offer certain specified services at reduced fares; public funds are paid to the operator to supplement fare revenues. This mechanism is particularly useful where the public authority can readily specify the services required, such as the operation along a relatively fixed route or on a fixed schedule, for monitoring the performance of the transportation provider under these circumstances is relatively easy. However, where the services, such as regular taxi, dial-a-ride, hail-a-ride, and even jitney, are required to respond to traveler requests, the provider can ignore some requests in favor of more profitable ones, and this kind of response (often termed the service-refusal problem) is rather difficult to police.

A second subsidy mechanism that should fairly well overcome this problem is the use of transportation tickets sold to target group travelers at reduced rates and redeemed at the full fare value by the transportation provider after use by the travelers. This mechanism has a number of advantages for subsidizing services provided by taxicabs.

1. Passengers with tickets look like other customers and, therefore, receive as high a level of service as other passengers.
2. Tickets can be issued at different discounts to different target groups, thus offering a great deal of flexibility for directing the transportation subsidy to particular groups of travelers.
3. Because the provider receives no subsidy funds unless service is provided to target group travelers, he or she is motivated to tailor service carefully to the demand.
4. It can easily be ensured that the provider is compensated fully for each service offered. If costs are higher to serve the handicapped (because of the need to handle wheelchairs, aid passengers, or use special vehicles), for example, the provider can be allowed to redeem tickets issued to the handicapped at higher values than those for other groups.
5. The possibility of fraud can be policed relatively easily by numbering the tickets, recording the ticket numbers issued to each individual, and monitoring where and when tickets are used.

Meyers (2) has suggested a variation on this second mechanism that would ensure high-quality service to certain groups and offset losses on other services: Allow the provider to redeem certain tickets at a premium value significantly above the cost of the service offered. The difference between this premium and the cost, which would probably exceed 50 cents/trip served, would be a provider bonus and would have to be used by the provider to cover the costs of other unprofitable services. Just how the use of these bonus funds should be monitored is unclear at present, however, and the merit of this technique relative to other subsidy schemes is the subject of a separate inquiry being conducted for UMTA by the Urban Institute (3).

The fare structures corresponding to the 2 subsidy mechanisms described above might be quite different.

For the contract case, a public agency can ensure through the contract rate that the

taxicab operator receives adequate compensation for the services provided. The fare revenues might be part of that compensation or might simply be turned over to the public agency and all of the taxicab operator's revenue might be received through the contract rate. In either case, the fares could be set fairly well independently of the cost of the services provided; a flat fare of 50 cents might be charged for all trips, for example.

For the ticket case, however, the costs of the various services provided should be known with some degree of accuracy, and the fare structure should be set to reflect these costs. Fares might be based on a meter or zone scheme, for example, and additional charges made for handling wheelchairs, assisting passengers, and so on. In the zone case, a surcharge may be necessary to reflect additional costs of operation during rush hours (handled under the meter scheme by the time element). The passengers "pay" these fares through the use of 50-cent tickets, say, which they purchase at varying discounts depending on the target group to which they belong. The taxicab operator then takes these tickets to the public agency in charge of the program and receives payment corresponding to their face value. The passengers thus pay a proportion of the cost of the services they use. As a result, they should be motivated to use the least costly service that meets their needs (which is usually not the case under a flat-fare system).

BENEFITS AND POTENTIAL PROBLEMS

Service specifications, subsidy mechanisms, and fare structures can be designed in a variety of different ways, and each is likely to offer certain benefits and some real or potential problems. For most of the shared-ride services mentioned earlier and for the subsidy mechanisms discussed, the nature and magnitude of the benefits under different urban conditions are uncertain, though they appear to be sufficiently large to warrant full investigation and evaluation. Some potential problems with these services and subsidy mechanisms are readily apparent, and others will surely arise when a public agency attempts to have them implemented. In the following paragraphs the likely benefits and problems of these innovations in taxicab services are listed. The final section of the paper then discusses the kind of empirical investigation that appears to be needed to resolve the major uncertainties surrounding these innovations.

In providing jitney services, taxicabs could generate the following benefits:

1. Improved mobility along well-traveled routes, such as home-to-work corridors and streets within business and commercial districts;
2. Increased vehicle occupancy through a shift of private automobile drivers to high-occupancy jitney vehicles and consequent reductions in congestion, pollution, and fuel consumption; and
3. Reduced crowding on rush-hour buses through a shift of some bus riders to jitneys.

The following potential problems are associated with jitney services, however:

1. Street congestion and accidents might increase because of an influx of taxicabs pulling to and from the curb to discharge and pick up passengers;
2. If jitney services have to operate without public subsidy, potential riders might find the fares too high relative to bus fares, and the service might fail financially; and
3. Transit authorities might protest the operation of jitney services along transit routes and might be able to persuade regulatory authorities to retain existing regulations prohibiting taxicabs from offering formal jitney services.

Dial-a-ride and hail-a-ride services provided by taxicabs also offer some important benefits:

1. Improved mobility within suburban and small town areas (dial-a-ride) and within business and commercial districts (hail-a-ride),

2. Lower costs per trip than those of dial-a-ride services provided by small buses, and
3. Potential for substitution (along with regular taxi services) for poorly patronized conventional bus routes.

There are also some potential problems.

1. Diversion of a substantial number of passengers from regular taxi services might require an increase in fares for those services.
2. Accumulation of operating losses during the introduction of the services might cause severe financial problems for the taxicab operator.
3. Transit operators might resist the substitution of taxicab services for existing bus services.
4. Where ambitious dial-a-ride services are offered over wide areas, costs and fares might be almost as high as regular taxi services. A major problem might be deciding how to limit the services offered to keep costs down.
5. If a zone fare scheme is used for the shared-ride services together with a meter scheme for regular taxi services, shared-ride services for some short trips might have higher fares than those of regular taxi services and result in an awkward anomaly in the fare structures for taxicab services.

Subscription services provided by taxicabs appear to offer the following benefits:

1. Improved mobility for users making trips with regular routes and schedules, particularly during rush hours;
2. Increased vehicle occupancy during rush hours through a shift from private automobile use (although some riders might be diverted from buses) and consequent reductions in congestion, pollution, and fuel consumption;
3. Reduced parking requirements at employment locations served; and
4. Low fares achieved through negotiation (between the users and the provider) of special rates for regular, high-occupancy services.

There are some limitations on subscription taxicab services.

1. As for other prearranged ride-sharing services (car pool, van pool, subscription bus), the individual is faced with a route and a schedule that are essentially inflexible. Unless some convenient arrangements can be made for days when travel needs depart from the regular schedule, this inflexibility may make the service unattractive to many travelers.
2. If a large fraction of the users of subscription taxicab services are diverted bus riders, some increase in traffic congestion might result.

The 2 subsidy mechanisms discussed above, contract and reduced-rate tickets, offer improved mobility for those unable to use a private automobile, particularly the young, the elderly, the poor, and the handicapped. Each also has some potential problems.

1. For the contract option, to ensure that the target groups receive adequate service may be difficult. If the provider is being paid on an hourly or mileage rate essentially independent of the passengers carried, he or she has little incentive to tailor services to meet special needs of particular target groups.
2. For the reduced-rate tickets, the problem of fraud may arise. That is, passengers not belonging to the target groups may somehow obtain and use the reduced-rate tickets, or providers may obtain and redeem tickets without providing the required services. Further, many target group members may regard the use of such tickets as demeaning and refuse to use them, thus limiting the effectiveness of the ticket mechanism.

Substantial uncertainties surround each of the above innovations of taxicab services

at present and are likely to deter most public agencies and taxicab operators from attempting to implement these innovations. Steps need to be taken then to resolve these uncertainties so that those innovations that do offer significant benefits for urban residents will be well enough understood by planners, public agencies, and transportation providers to permit their implementation.

WHAT NEEDS TO BE DONE?

Transforming worthwhile innovations in taxicab services from the idea and discussion stage to implementation in urban communities involves 2 major steps:

1. Broadening the knowledge base about the benefits and problems of these innovations by empirical investigation of existing data on taxicab services, case studies of innovations already in operation in a few locations, and experimentation with innovations that have not been tried to date; and
2. Disseminating information on these innovations to planners, policy makers, and transportation providers by means of planning guidelines and, in some cases, exemplary demonstration projects.

For the service innovations and subsidy mechanisms discussed in this paper, we are still concerned with broadening the knowledge base, the first of these 2 steps. Specifically, we need to conduct detailed empirical investigations, through case studies or experiments, of the following forms of taxicab operation.

1. Taxicabs could be used to provide jitney services on short headways (less than 10 minutes) along well-traveled corridors. Ideally, the investigation should include some corridors that currently have transit services and some that do not.
2. Dial-a-ride and hail-a-ride could be introduced as new services to be provided by taxicab operators currently offering only regular taxi services. Regular taxi services would continue, and the shared-ride services, with new specifications and fares, would be introduced to supplement existing services.
3. Taxicab services (regular taxi, dial-a-ride, hail-a-ride, or possibly subscription) could be substituted for some poorly patronized bus routes.
4. Well-planned and well-promoted subscription services could be introduced.
5. Taxicab services, such as feeders to line-haul transit services, and convenient transfer mechanisms, such as sheltered terminals and joint fares, could be used.
6. Subsidy mechanisms, such as the contract and reduced-rate ticket schemes described above, could be used to provide high-quality service at low cost to target groups.
7. Taxicabs could be used for goods movement.

The purpose of the present research effort for UMTA is to specify particular case studies and experiments that will permit empirical investigation of the above forms of taxicab operation and help to clarify the uncertainties and problem areas discussed earlier. The analyses conducted in these empirical investigations should ultimately provide a basis for the development of planning guidelines and exemplary demonstrations, the second essential step toward the implementation of worthwhile innovations in taxicab services for urban communities.

ACKNOWLEDGMENT

The contents of this paper reflect the views of the author, who is responsible for the facts and the accuracy of the data presented. The contents do not necessarily reflect the views of the Urban Institute or the official views or policy of the U.S. Department of Transportation. This paper does not constitute a standard, specification, or regulation.

REFERENCES

1. R. F. Kirby, K. U. Bhatt, M. A. Kemp, R. G. McGillivray, and M. Wohl. Para-Transit: Neglected Options for Urban Mobility. The Urban Institute, Rept. UI-4800-8-2, 1974.
2. S. Meyers. Turning Transit Subsidies Into "Compensatory Transportation." City Magazine, Summer 1972.
3. R. G. McGillivray and R. F. Kirby. User-Side Subsidies for Urban Public Transportation. Urban Institute, Working Paper 5032-4-1, 1974.

Stanley Hirsch, Orange and White Taxi Systems, Hicksville, New York

I am vice-president of the following enterprises: Orange and White Systems, which operates 100 shared- and group-riding taxicabs; White Carriage Corporation, which operates more than 100 school buses; and STAT Ambulance Service, which is the largest ambulance company on Long Island. All of these businesses are privately owned, and none of them receives direct subsidies. I and my associates are seldom accused of altruism. On the other hand, we are not money hungry. We are simply attempting to sustain a good living for ourselves and our employees. Economic and political pressures aimed toward destroying our profit-making ability are constant. Yet, in each of our transportation companies, we have managed to keep the ledgers in black ink.

I hasten to add that we are not tycoons of industry. Our growth beyond the taxi business has been forced on us, both to enhance our buying power and to achieve maximum economical use of facilities, personnel, and vehicles. We remain solvent by working hard—7 days a week and 365 days a year—at the things we know best.

We strenuously resist the trend toward socialization of transportation. We find that not all but a significant number of politicians are anxious to give away the same services that we sell. For example, last year several of our county legislators borrowed a van and ran a free DRT experiment in the Brentwood, Long Island, area. The experiment was conducted for 2 weeks during which time all volunteer workers were used. The program was not properly insured, was not properly licensed, violated the previous sanctity of a CB radio channel, and spent no money for salaries and employee benefits. All this was done in an area served by 2 taxi companies, who had no prior knowledge of the experiment and whose cooperation was not requested. When interviewed by reporters, the perpetrators of this farce termed the experiment a huge success in attracting riders. Thus, these unverified newspaper accounts succeeded in keeping the legislators' names in the newspapers. Thus encouraged, they even wrote a 60-page report that compared taxicab fares, transit fares, census tracts, and so on.

On a less grand scale, I would suppose that this sort of thing is repeated almost daily in the United States. Local politicians seem to love to get up and give away anything, particularly DRT systems. Even UMTA has published an operating manual, which I sometimes think was intended as a primer for politicians to learn how to get government money for anything.

The creation of such a climate, particularly on Long Island, has brought a bonanza to consultants and consulting firms. Unfortunately, some of these consultants are hired not to make professional surveys, studies, or recommendations, but to produce reports that will lend credence to the current boondoggle. Sometimes they do not even take time to ascertain entry regulations, jurisdictional rights, or local custom. Source material for demographic profiles is often years out of date. A favorite gambit for consultants during a developmental study is to form an advisory council of local business people and residents. These councils meet irregularly, if at all, but the names of the members are always used to dignify, by implied endorsement, the final published report. I know of one instance in which members of a technical advisory group were not even given the courtesy of receiving a draft and final copies of the consultant's report.