

A PARATRANSIT PERSPECTIVE ON EVALUATION OF URBAN PUBLIC TRANSPORTATION

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THE national urban transportation system needs much greater "mobility". The mobility needed, however, is not just the ability to move people and goods but rather the flexibility in providing forms of service that respond to the articulated needs and demands of the traveling public. Formal evaluation is not likely to do very much to improve that aspect of system mobility.

THE MARKETPLACE AS AN IMPLICIT EVALUATION MECHANISM

If there were a sufficiently responsive market environment and one that included a pricing system that internalized the costs imposed on the general public by the various transportation systems, then there would be little need for explicit evaluation. That would clearly be a preferable situation, because of the many inadequacies of the evaluation process: Evaluation tends to assume that values are homogeneous over the population because of the technical difficulties in accounting for the diverse values associated with different segments of the population. Evaluation tends to identify components of individuals' utilities and then to find some artificial functions (usually linear) with associated weights (usually constant) on each of the component measures to create a scalar score for a system. This is clearly less than a fully satisfactory way for representing what is clearly a messy distribution of highly nonlinear evaluation functions over the traveling public.

But we use it because we know of no better way when we delegate the public interest to some agency responsible for the function (e.g., in providing national defense) or where the decisions involve regulation of the general public (e.g., in operating the police and judiciary functions). Resort to such evaluation mechanisms should not be necessary in providing a service consumed directly by the public. The market mechanism provides a far more natural means by which each individual articulates his own values by the consumption choices he makes. Certainly this is a much more appropriate form of evaluation within the American context. What is needed for it to occur is a setting in which there is an opportunity for new forms of public transportation to emerge; then, the public by its consumption choices will provide the best possible evaluation. The closer we can come to an urban transportation system that uses the marketplace for implicit evaluation rather than some formal explicit evaluation mechanism, the closer that evaluation will reflect the true needs and demands of the traveling public.

The paratransit industry is particularly well situated for fostering such a market process. The industry already includes such varied participants as taxis, jitneys, gypsy cabs, limousine services, commuters who carry regular riders, and car pools. Most segments of the industry are characterized by low capital requirements and an associated ease of entry by new suppliers. This is a condition that should naturally give rise to high competition and thus high efficiency and market responsiveness.

This is in sharp contrast to providing the service by a governmental or quasi-governmental agency. Government is inherently a poor provider of service. In contrast to the commercial marketplace, the incentives that drive government agencies tend not to be those of efficiency or of responsiveness to public demand. Furthermore, when government provides a service, it tends to create and perpetuate a monopoly in providing that service, thereby inhibiting the entry of competing services and the

generation of new alternatives.

Of more visible concern recently is the degree to which governmental services have been shown to be particularly vulnerable to increasing labor demands. Their monopoly position makes a strike particularly severe in its public impact. The agencies' ability to draw on the public treasury makes them far more responsive to labor demands than a commercial supplier limited by his revenues and profitability.

Despite these inherent disadvantages, government is often used to provide services because an efficient market cannot be organized. Examples of this situation would include services related to joint needs, which people do not individually consume; such services include defense and fire services. Government also manages services that involve compulsory authority over individual citizens, as in police or correctional services. Even in such cases, however, privatization is being considered, with appropriate subcontracting of some correctional functions to private organizations.

Government also traditionally has provided services like education associated with the common interest in the development of "human capital". Government provides the service when individuals might have considerable difficulty in evaluating competing suppliers or when their individual choice may be less than fully consistent with the larger social good. Even in elementary education, however, various forms of voucher concept are being considered in order to restore more individual choice into the educational marketplace.

None of these considerations applies to urban transportation, particularly to the modes below rail transit, which involve independent vehicles of bus size or smaller operating on an existing road network. This is especially true for paratransit service, which can benefit appreciably from its commercial character. The appropriate role of government, therefore, should not be one of providing the service, but rather of regulating its provision to ensure that proper safety is maintained by all the suppliers. In addition, market regulation should be maintained to preclude monopoly control, to foster competition, and thereby to derive the efficiency benefits of the open market. Creating a regulated monopoly is entirely appropriate when there is a high capital cost of a distributed network in order to avoid the inefficiencies of redundant networks. (It would make little sense, for example, to have multiple parallel rail transit systems.) But there is little benefit to be derived from precluding competition among taxi companies, whereas the competition can provide considerable value in terms of price control and market responsiveness.

SEGMENTATION OF THE PUBLIC TRANSPORTATION MARKET

These considerations suggest that we should look to the private sector as the source from which new alternatives of public transportation service can be generated in response to the needs of the consuming public. In this context, it is useful to segment the traveling public into three fundamental groups:

1. The "transportationally disadvantaged" (i.e., the young, the old, the poor, and the handicapped) who do not have regular access to a private automobile and who must depend on public transportation to meet their travel needs. Many in this group have already adapted their life style (e.g., choice of residential location) to the availability of mass public transportation. Others can well afford to use existing or potentially available paratransit services. Some need transportation to obtain various publicly provided social services (e.g., education, health, recreation), and the provision of the transportation might then be coupled to the social service. For others in this group, income transfer mechanisms (e.g., welfare payments, negative income tax) are needed to enable them to meet their transportation needs, permitting them to trade off their consumption of transportation against their other needs (e.g., housing, recreation, clothing) in terms of their own individual utilities. In addition, various activities might be undertaken to aggregate their market demand (e.g., providing shuttle buses from remote public housing projects, organizing transportation to recreation centers) to improve their individual efficiency in transportation consumption.

2. The individual who does have ready access to a private automobile and whose travel does not involve travel to a major activity center such as transportation terminals, universities, shopping centers, and the central business district. For this group, it is very unlikely that any form of public transportation will divert them from the convenience, reliability, and relatively low marginal operating cost of the private automobile, and it is not particularly socially desirable to do so. They could probably best continue to travel by auto.

3. The large population group who drive their automobiles as commuters between home and a major activity center in the morning and return in the evening.

THE RAC/MAC GROUP AS THE PUBLIC TRANSPORTATION MARKET CHALLENGE

The rush-hour automobile commuter to a major activity center (the "RAC/MAC") group represents the fundamental challenge to the public transportation system. It is socially desirable and increasingly urgent to divert them from their individual automobiles into some higher density mode of transportation. In their individual automobiles they contribute significantly to congestion on the main commuting arteries, to air pollution, and to fuel consumption. Each of these increasingly important aspects of the quality of life in urban areas will be improved to the extent that we can divert this group from their cars. This challenge is one that both the mass transit and the paratransit industries must attack cooperatively. And it is one they must deal with through inducement and enticement, since the RAC/MAC, in contrast to the transportationally disadvantaged, has the option to continue to use his automobile rather than to leave it at home. This, then, requires a marketing approach that offers him something he finds more desirable in terms of price, reliability, convenience, cumulative travel time, or some aggregate function of these in terms of his own interests and utilities. In providing such a competing service, it is necessary to recognize that the RAC/MAC has a major and perhaps compelling interest in the provision of direct point-to-point transportation that the automobile affords. Anything less than that, as typified by current mass transportation systems that operate on fixed routes, would probably be unacceptable. And providing such point-to-point service efficiently in the low-density suburban environment where the RAC/MAC lives requires some involvement of the paratransit industry, at least for collection and distribution, but more likely for the entire trip.

Even within the RAC/MAC group, there is considerable diversity in terms of their divertability from their own automobiles. At the high end of the group are those who absolutely insist on continuing to use their automobiles. These might include salesmen who must carry large sample cases, wealthy individuals who can afford and insist on the privacy of an automobile (which may often be driven by a chauffeur), and others with an intense psychological need that is satisfied only by driving their own automobile. Little could be done to divert these into a higher density mode. Instead of this hard core, the target should be the marginal group who could be diverted. That diversion is possible only with a service that comes close to matching the automobile in terms of reliability, door-to-door service, time flexibility, low marginal cost (or at least a perception of low marginal cost), and no status deprivation.

Even within this marginal segment of the RAC/MAC population, the needs and opportunities are diverse. The common features shared by all such services would be a variety of ride-sharing arrangements, each of which would provide the reliable, flexible, point-to-point service that is characteristic of the private automobile. These would include multipassenger feeder and distribution extremities to link the low-density residential areas to the mass transit arteries. They would also include facilitation of voluntary organization of car pools and van pools, and, to the extent that reliability or flexibility problems inhibit these, an association with a commercial paratransit system could provide enhanced reliability by using taxis or other vehicles as a backup.

In general, then, what is needed is a much richer variety of possible ride-sharing arrangements. We might structure these arrangements in terms of the method by

which the arrangements are organized, or the "calling method"—here we might consider three variations: (a) the prearranged, regularly scheduled ride-sharing, (b) the call for a trip, and (c) hailing on the street—and the method by which payment is made—including (a) no cash exchange, (b) a fixed price, or (c) a metered fare requiring some form of computation. The various combinations of these calling and payment methods are given in Table 1. Some are the conventional arrangements conducted by private individuals or by the conventional taxi industry. Some reflect new services that should be generated by the paratransit industry, and some reflect services that could be performed better with an appropriate level of coordination.

What is most needed now is the development of a variety of new modes of paratransit services addressed at the market segments not yet receiving satisfactory service, either from the individually organized private arrangements or from the conventional taxi industry. These include, for example, services like an "occasional taxi", which would be a service provided by individual RAC/MAC commuters on their way to work. With special authorization (perhaps through a taxi franchise), an individual RAC/MAC commuter could transform his private automobile during the rush hours into a taxi carrying passengers at a reasonable price (perhaps 50 cents to \$1.00, depending on the distance involved) into his destination zone. Such a service would smooth the peak rush-hour demands on the transit industry, thereby permitting transit to operate at more efficient capacity levels (which might well be lower than its current capacity). It would also permit the individual commuter to leave his car at home with a reasonable assurance that he would find a ride to work and home again. If the commuter demand for such service exceeded the supply at any time, that would provide incentive to more individuals to function as occasional taxis. Conversely, if the supply exceeded the demand on any route, more people might thereby be encouraged to leave their cars at home and ride an occasional taxi to work.

A major hindrance to the introduction of such new services is the variety of regulatory constraints that currently inhibit extension of paratransit service. These constraints restrict entry into the market and inhibit the creation of new (especially multi-passenger) modes of paratransit service. The need for franchises and licensing implies a major front-end cost, which effectively excludes most potential suppliers. Service boundaries structured around political jurisdictions rather than demand corridors effectively limit the development of service. Regulations often specify in detail how fares must be computed, thereby requiring certain expensive equipment in the paratransit vehicle. This may preclude the use of more elaborate computing technology at a central processing unit that serves a variety of sensors and display terminals in the individual vehicles. Paratransit vehicles have a variety of cosmetic requirements, such as lights, lettering, and signs, which might inhibit individuals who would be willing to function as occasional taxis but do not want to clutter up their cars with permanent displays; perhaps a magnetically affixed and removable sign would serve that purpose.

One major constraint on the provision of paratransit service is the requirement that restricts the provision of multipassenger services to a bus company. Various forms of symbiotic relationships can be established between bus companies and the paratransit industry. These include the use of smaller paratransit vehicles along the low-density bus routes to provide more frequent service than would be efficient with

Table 1. Ride-sharing arrangements.

Calling Method	Payment Method		
	No Exchange	Fixed Price	Metered Fare
Prearranged	Car pool	Daily rider	Standing cab order
Call	Friend's pickup	Jitney	Dispatched metered cab or dial-a-ride
Hail on street	Hitchhiking	Zone-fare taxi or "occasional taxi"	Cruising taxi

regular bus operations. Also, low-density periods such as nights and weekends could be served more efficiently by a paratransit vehicle than by a bus. Such a vehicle could even provide off-route service to the destination with negligible increase in cost or time, thereby stimulating service demand on the route by improving the quality of service.

It should be clear from the simple examples discussed here that much more potential exists for extending, expanding, and improving public transportation services through the use of paratransit modes of ride-sharing. One might evaluate these in terms of conventional measures like aggregate travel time (including waiting time), air quality impacts, energy consumption, and system costs. And such pre-evaluations should be conducted prior to the introduction of new services. It can reasonably be expected that many such paratransit services would be found to provide significant improvements over existing available services. But it makes little sense to post-evaluate operating services explicitly in terms of these individual components. It makes much more sense to conduct the evaluation by letting the traveling public express its own market preferences. Thus, rather than formal evaluation, what is needed is the development of a process whereby new paratransit modes are developed and tried in the marketplace of public demand. Those that attract RAC/MAC passengers can be judged to be successful; those that fail to do so, regardless of their performance on explicit evaluation criteria, cannot be considered successful.

This requires the introduction of models of service that are fundamentally experimental. They must provide a service mix that includes regular taxis, dial-a-ride multiple-passenger taxis, and group ride-sharing arrangements like car pools and van pools. Integration of these will permit standby arrangements that provide backups to ride-sharing arrangements that are individually made.

In that experimental mode, it is necessary to test the elasticity of identifiable segments of the RAC/MAC market to the various service parameters such as price, total travel time, delay, and reliability. This requires an experimentally oriented and innovative taxi company and a cooperative government regulatory agency, both committed to this approach to innovation and service improvement. At Carnegie-Mellon University we have taken a first step in that direction by acquiring control of a previously bankrupt taxi company, the Peoples Cab Company of Pittsburgh. Using this cab company as our laboratory, we plan to conduct experiments with new paratransit service in the Pittsburgh marketplace. We hope thereby to provide some models of improved point-to-point transportation service that will appeal to this fundamental RAC/MAC constituency. Once their attractiveness has been demonstrated in our marketplace, we hope that that will lead the way for other communities to establish similar services.

Even better, we would hope that other communities will use this experimental marketplace approach, both for improving paratransit service and as a much more appropriate paradigm for evaluating public transportation services.

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