enrollment could result in higher future ridership. Conversely, lower corridor growth could keep the ridership near existing levels. With no population growth, and no changes in fares, the high-capital bus and light rail options were estimated to attract 17 percent more riders than the base service condition.

Changes in Lansing's economy over the last 5 years suggest that the initial 1985 and 2000 population and employment forecasts were too high. Therefore, it is not likely that the year-2000 ridership forecasts would be achieved unless dramatic changes in the economy take place.

IMPLICATIONS

The use of on-and-off transit counts and travel elasticity data in conjunction with population and employment change provides a reasonable approach to estimating corridor transit ridership for various service options. While the data is site-specific, the techniques can be applied in other urban areas.

The method is realistic for existing or short-range growth. The effects of service improvements alone, 17 percent over base conditions, appear reasonable. The method assumes that transit system ridership would keep pace with population and employment growth in a corridor. Such a condition, however, does not always exist; therefore, a broader application would require analysis of trends in transit's market share, and application of appropriate adjustments to the forecasted future trip interchanges. Given such adjustments, the methods then can be applied to estimate the ridership impacts of fare, service, and travel time changes.

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Transit Service Contracting: Experiences and Issues

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ABSTRACT

Public transportation's fiscal problems have stimulated interest in service contracting as a strategy for improving the cost-effectiveness of service delivery. This paper contains a review of available evidence on transit service contracting with a particular focus on: (a) the extent of service contracting, including who practices it and the types of services involved, (b) the motivations for contracting, (c) the estimated costs and subsidy savings that can be realized from contracting, and (d) the major obstacles to this strategy. Available information indicates that transit contracting is a widely used strategy for supplemental DRT service and for small transit systems in states where state funds are available to subsidize transit. However, despite the impressive numbers of contracted services, they represent a small percentage of transit expenditures. The motivation for contracting is almost invariably financial, and contracting can save substantial sums. Compared to public agency operation, private sector contracting can produce cost savings of 15 to 60 percent, and subsidy savings of 50 percent or more. Resistance from transit, labor, and management to service contracting constitutes the major reason these large cost and subsidy savings have not induced more public agencies to contract. Management is reluctant to relinquish operational control, fearing a diminishment of service quality, and labor fears a loss of jobs.

The recent fiscal problems of public transit in many large metropolitan areas have stimulated interest in alternative service delivery systems for public transportation. One strategy, that of contracting with private providers for public transportation services, has received particular attention. Private sector contracting is viewed as attractive because of its cost and subsidy savings potential--savings of 25 to 50 percent of public agency transit operator costs have been cited (1-3). The reality, however, is that relatively little transit service contracting currently takes place and that substantial political, organizational, and legal obstacles confront plans to increase the use of this strategy. In addition, little detailed information is available on the extent of service contracting, its economic benefits, and the institutional factors that affect its feasibility.

The purpose of this paper is to provide a review of selected experiences and issues of transit service contracting. The paper focuses on five major topics:

1. How widespread is transit service contracting, who practices it, and what services are involved?
2. Why do public agencies engage in private sector contracting, and what are typical situations in which they do so?
3. What is the magnitude of the estimated cost and subsidy savings that have been realized from contracting?
4. What are the major obstacles to service contracting and when are they able to be overcome? and
5. What issues involving service contracting require additional research?

These topics are explored with primary reference to service contracting experiences in California. In California, large numbers of local governments contract with the private sector to provide a variety of public transportation services. In addition, local governments and transit agencies in Arizona, Michigan, Minnesota, New York, and Virginia have engaged in service contracting with interesting results. Their experiences are also included in this analysis. Although the data are by no means exhaustive, it is probable that the experiences included in this paper are representative of the types of service contracting that occur, the economic benefits of contracting, and the problems this strategy encounters.

THE SCOPE OF TRANSIT SERVICE CONTRACTING

Service Contracting in California

Contracting for public transportation services is a nationwide phenomenon, but it has been particularly prevalent in California. Because relatively complete information is available on service contracting in California, that state's experiences are used to indicate the relative magnitude of contracting, the types of services that are contracted, and the local government entities that are most likely to utilize this strategy.

As of mid-1984, it was possible to identify 204 individual public transportation services or systems in California that used a private transportation operator as service provider. The large majority of these private providers are for-profit transportation providers, although a small portion (less than 10 percent) are not-for-profit organizations that, in most cases, initially provided social service transportation. Table 1 gives a breakdown of these 204 systems by type of service, total expenditures for that service category, and average expenditure per contracted service.

TABLE 1 Expenditures for Contracted Public Transit Services

Type of Service	No. of Systems	Total Expenditures (million $)	Average Contract Expenditure ($)
Fixed-route transit	46	17,178	373,400
DRT and general public	79	18,117	238,700
DRT, elderly, and handicapped	79	14,481	183,300
All systems	204	49,768	244,000

To place this table in perspective, California contains approximately 375 public transportation systems, counting separate systems individually. [That is, a transit agency that provides both fixed-route transit and demand-responsive transit (DRT) would be credited with two systems.] During 1982-1983, approximately $1.3 billion was spent on public transportation operations in the state. Therefore, while although $50 million is being spent on privately contracted transit services, this represents less than 4 percent of all operating expenditures for transit in California. Because the contracted services are small scale in nature, they represent only a small fraction of the transit service delivery system, even though they comprise more than one-half of all public transportation services in the state. Virtually every large scale transit service is operated directly by a public organization.

It is unlikely that the magnitude of California's use of transit contracting can be extrapolated to the national level. A direct extrapolation would indicate nationwide expenditures of more than $500 million on privately contracted services, but the actual (unknown) amount is probably considerably less. The reason is that local governments in California are almost certainly more prone to engage in transit service contracting than their counterparts in most other states. This is the result of both California's tradition of private sector contracting for a variety of local services, and the cost-effectiveness incentives built into the state's transit subsidy program (4,5). Nonetheless, the evidence from California implies that transit service contracting is not a rarity, but, rather, a relatively common occurrence for small transit systems and supplemental DRT services. This service delivery mechanism probably accounts for at least $100-200 million in nationwide expenditures on public transportation.

Types of Privately Contracted Services

As Table 1 indicates, all types of public transportation services are contracted to private operators. DRT services are the most likely to be contracted, but 46 fixed-route transit services in California also use a private operator as service provider. Almost all of these are entire fixed-route systems, and in a few cases, commuter express service is the only contracted service. Outside of California, there are several important examples of fixed-route services being provided by private contractors. In Westchester County, New York, the entire transit system, which consists of 321 buses operating on dozens of routes, is operated by private carriers. In both Phoenix and the Tidewater, Virginia (Norfolk-Virginia Beach standard metropolitan statistical area) region, the regional transit agency contracts with a private transportation firm to operate small vehicles (vans or mini-buses) on low-density transit routes. In the Houston area, most of the regional

transit agency's park-and-ride express services are operated by private bus companies in a large contract service that uses 113 buses. The Dallas transit agency has just initiated a similar contract service involving more than 60 buses.

Transit service contracting is most frequently practiced with DRT. In fact, public agency operation of DRT is rare in California. Of the 85 general public DRT systems in the state, only 6 are operated by public agencies. This is a nationwide trend. Even transit agencies that initially operated DRT themselves, such as in Rochester, New York, and Portland, Oregon, eventually turned the service over to the private sector because of excessive operating costs. Some transit agencies have even substituted DRT for unproductive fixed-route services. For example, Phoenix Transit replaced its entire Sunday fixed-route service with a privately contracted DRT system, and Tidewater Regional Transit (TRT) has terminated several bus routes and replaced them with DRT services.

Who Contracts?

In California, transit service contracting is most frequently practiced by general purpose local governments, that is, by cities and counties. The following table gives data indicating that nearly two-thirds of all contracting entities are cities, and another one-fifth are counties. Although a relatively small number of regional transit agencies engage in service contracting, they represent over 40 percent of all regional transit agencies in the state. Transit agencies typically contract only for DRT services--only two urban or suburban transit agencies contract for any fixed-route service and, in both cases, this is express bus service into San Francisco, which, historically, has been privately provided.

Contracting Entity	Number of Entities that Contract Out
Municipality	104
County	35
Transit agency	16
Others (e.g., joint power authority)	6
Total	161

California's experiences thus tend to support the widespread perception that transit agencies only rarely contract out for fixed-route service although they are much more likely to contract out for specialized DRT services. The few transit agencies that do contract out for any type of fixed-route service--for example, Houston's Metropolitan Transit Authority (MTA), TRT, Golden Gate Transit (GGT), and Phoenix Transit--have received considerable national attention specifically because they are so unusual. It is much more common for cities and counties to engage in service contracting for fixed-route transit. Of course, such local governments are also more likely to contract for all types of public transportation services.

MOTIVATIONS FOR TRANSIT SERVICE CONTRACTING

Local governments contract for public transportation services for two interrelated reasons: service contracting saves money, and it forestalls the need to create or expand a public bureaucracy to deliver a local service (4,5). Not only does this usually also save money, but, it also gives the local government more flexibility in adjusting the service output level. Public officials recognize that cutbacks in public agency-operated services tend to be difficult to achieve partially because of the political influence of public employees.

These benefits of contracting represent necessary but insufficient conditions for its utilization. Local governments are most likely to contract out either when they cannot afford a transit service otherwise or when the monetary savings that result from contracting can be used for other government purposes or to keep taxes low. These conditions do not exist for many transit operations, particularly large regional transit agencies. A major reason that transit service contracting is so prevalent in California is that the state's transit subsidy program is structured in such a way that most local governments have a strong incentive to consider the monetary implications of service delivery mechanisms.

In California, funds for public transportation subsidies are generated by a sales tax on gasoline, of which most of the proceeds are distributed back to the state's cities and counties in proportion to their contribution to gasoline sales. Except in the State's ten most populous (and most urbanized) counties, these local transportation funds (LTF) can be used for either transit or highways, provided that no unmet transit needs exist. That is, once a basic level of transit service is provided, a city or county can use the remaining LTF for streets and highways. Because funds for street and highway repairs are in continual demand, local governments have a strong incentive to maximize the portion of the LTF that can be used for that purpose. Local governments have determined that the most effective way of minimizing transit expenditures while still providing an adequate level of service is to maximize the amount of service contracting. In the 48 counties where the LTF can be used flexibly, private sector contracting by cities and the county for transit services is the norm, not the exception.

The propensity of California local governments to contract out for transit services in order to use public funds most efficiently exemplifies the incentive for cost-effectiveness created by nondedicated transit subsidies. When the funds used to subsidize transit can be used for other local government purposes and are not dedicated exclusively to transit assistance, service contracting becomes a much more appealing strategy. TRT and Phoenix Transit, two of the most active contracting agencies among regional transit operators, both use nondedicated local subsidies, as do many municipalities and counties around the country that contract out for transit service.

Powerful incentives for transit contracting are also created by a relative paucity of funds for transit, even when these funds are dedicated solely to transit assistance. Local governments in Michigan and Minnesota have made extensive use of transit contracting and, in both states, the major source of nonfederal subsidies is state funds that are subject to annual or biannual appropriation and are quite limited in magnitude. Cities in these two states cannot afford to pay a high price for transit service, for to do so would mean no transit service at all. Similarly, Los Angeles County is rapidly becoming a stronghold of transit service contracting as the result of a local transit subsidy program (funded by a one-half-cent sales tax increment), which returns substantial sums to the cities in the county, but not enough to enable them to afford expensive transit agency service. For example, a city with a population of 50,000 receives over $400,000 annually for community transit services from this subsidy program. This is enough to purchase a large amount of contracted service but represents only a meager amount of public operator service. Consequently,

most communities that did not already have a municipal transit operator have contracted with a private provider for transit or paratransit services. There are now more than 25 privately contracted public transportation services in operation within the county.

One other motivation for employing service contracting is to implement transit services more rapidly than would be possible otherwise. The Houston MTA turned to private bus companies for its commuter express bus program when it became apparent that the transit agency lacked the buses and trained personnel to quickly respond to rapidly increasing demands for peak period service. Cities and counties in California often cite the lag time required to develop a public sector-operated service as an important reason to engage in service contracting. This factor is usually less significant, however, than expected cost savings from contracting and avoiding creating (or expanding) a public bureaucracy for transit service delivery.

Prototypical Service Contracting Situations: Regional Transit Authorities

Regional transit authorities have almost invariably contracted out for supplemental services--such as DRT, commuter express services, and low-density fixed-route services--when they have contracted out at all. Table 2 gives several examples of regional transit agency service contracting, including some of the best-known cases.

These transit authorities have engaged in service contracting for one of three reasons. TRT, Phoenix Transit, Omnitrans, and GGT face strong subsidy minimization pressures because of their use of nondedicated local subsidies. Orange County Transit Department (OCTD) has provided DRT service since its inception, and has always contracted out for such service because of a recognition that to do otherwise would lead to unacceptable costs. If OCTD wished to provide this service at all, and it was subject to strong community pressures for DRT, then contracting was a necessity. Houston's MTA contracted for its commuter bus service because this was the only feasible method of implementing the service in timely fashion, and the agency was under great political pressure to expand its peak period services.

In general, these transit agencies have established relatively clear-cut demarcation lines between services that are subject to contracting and those that are not. None of the agencies contract out with the private sector for all-day transit service using standard size transit buses. TRT, however, has contracted with one of its constituent local governments to provide fixed-route service in that city using TRT buses. TRT is also unusual in that it has converted unproductive bus lines to privately provided fixed-route van service--none of the other agencies have replaced their own fixed-route service in this fashion.

In fact, only TRT and Phoenix Transit have directly substituted any type of privately provided service for their own agency-operated services. Omnitrans, despite operating one of the largest paratransit contracting programs in the country, is resistant to proposals to convert agency-operated fixed-route services into privately operated fixed-route or paratransit services. This is in spite of the agency's farebox recovery ratio on some of its fixed routes being less than 10 percent, and the average subsidy per passenger being in excess of $4.00 on these routes. GGT is similarly uninterested in contracting out services it now provides. It plans to operate all additional commuter express service itself, even though the agency's unit cost for such service is more than 35 percent higher than that of the private bus companies it uses for its contracted subscription bus program. The major reasons that agencies have established fences around contract services are (a) potential labor problems, (b) perceived service quality problems with contracting out regular transit services, and (c) the antagonism of some transit managers to relinquishing operation of mainline transit service.

Prototypical Service Contracting Situations: Municipalities and Counties

Table 3 gives several examples of city and county transit service contracting. As is apparent, these

TABLE 2 Examples of Regional Transit Authority Service Contracting

Agency	Type of Services Contracted	Magnitude of Service Contracting
TRT	General public DRT, fixed-route with 3 vehicles	13 vehicles in 8 DRT modules; 2 fixed-routes
GGT	Commuter express (subscription)	27 buses on 15 routes
Houston MTA	Commuter express	113 buses on 13 routes
OCTD	General public DRT	130 vehicles in 5 regional DRT modules
Omnitrans	General public and specialized DRT	35 vehicles in 11 municipal DRT modules and 20 vehicles in 2 regional specialized DRT services
Phoenix Transit	General public DRT, fixed-route	3 DRT services with 20 vehicles; 1 fixed-route with 2 vehicles

TABLE 3 Examples of County and Municipal Service Contracting

Agency	Type of Services Provided	Magnitude of Service Contracting
Westchester County (N.Y.)	Entire fixed-route system	321 buses
Los Angeles County (Calif.)	Fixed-route, commuter express, and specialized DRT	30 fixed-route vehicles; 6 DRT vehicles
Yolo County (Calif)	Entire fixed-route system	12 vehicles
San Diego County (Calif.)	Fixed-route and specialized DRT	19 fixed-route vehicles, 5 DRT vehicles
El Cajon (Calif.)	DRT (entire local transit system)	22 vehicles
Carson (Calif.)	Fixed-route and specialized DRT	4 vehicles, subsidized taxi service
Hayward (Calif.)	Specialized DRT	Subsidized taxi service
Tucson (Ariz.)	Specialized DRT	12 DRT vehicles

local governments are likely to contract out for entire transit systems, not just supplemental services, although there is a considerable amount of contracting for specialized DRT services by cities and counties. These cities and counties typically use nondedicated local sources of subsidy, and thus have compelling fiscal reasons to practice service contracting. In addition, the California counties that contract out have no desire to operate public transit themselves, and the only question was whether they would contract with a private or public operator. Competitive bidding resolved this question in favor of the private sector, as the relevant public operators invariably submitted a much more expensive bid than the competing private providers.

El Cajon and Hayward are typical of literally dozens of California cities that contract out for either general public DRT or specialized service for the elderly and handicapped. Because they are located in large metropolitan counties, these two cities cannot use state transit subsidies for nontransit purposes. In neither case are the available funds so abundant that the city can afford expensive transit services. El Cajon, for example, would have to pay the regional transit agency more than 2.5 times as much per vehicle mile as it is charged by the taxi company that actually provides the community's DRT service.

The governments of Los Angeles and Westchester counties are among the largest general purpose governments in the country to contract out for transit service. Fiscal factors and a reluctance to become directly involved in transit service provision were the motivating factors in both cases. The Westchester County transit system is probably the largest contract operation in the United States, and one of the most interesting as well. Several private companies are involved in the system, each operating multiple routes and responsible for vehicle maintenance as well as vehicle operations. The contractors receive a fixed fee per mile for their services, provided that they meet certain performance standards (e.g., maintaining schedules). If performance is below par, the contractor's compensation is reduced. Los Angeles County contracts for much less service than Westchester County as its transit responsibilities are confined to unincorporated or unurbanized areas, but it has made no less of a commitment to this strategy. It contracts for all-day fixed-route service, commuter express service, and specialized DRT at costs far below comparable public agency-operated services. Both of these counties have contracted for transit service from the outset, and thus never confronted labor or management obstacles to this method of service delivery.

ECONOMIC BENEFITS OF SERVICE CONTRACTING

The economic benefits of transit service contracting are the primary reason for its appeal. Private sector contracting usually saves money compared to public agency operation of a transit service; however, the magnitude of the savings are subject to considerable uncertainty. Several comparisons of public agency and private operator service costs are presented here, but these comparisons must be treated cautiously. Only in the case where a private operator replaces or is a substitute for public agency operation of an entire public transportation service can any precision be attached to cost savings. For example, if public and private operators bid $40 per vehicle-hour and $20 per vehicle-hour, respectively, to operate a city's entire fixed-route transit system, then it is possible to conclude with high confidence that the municipality saved 50 percent by contracting.

In many situations, however, only a portion of a transit system will be contracted to private operator. In such cases, cost savings are less clear cut. This is because the cost to the public agency of operating the relevant service can only be estimated through the use of a cost allocation model, and cost allocation methods do not necessarily produce reliable estimates of avoidable or incremental costs. Consequently, in those cases where cost models are used to determine public agency costs, there may be an overestimation of cost savings that result from contracting. On the other hand, private operators are often required to supply the vehicles for a contracted service, and the absence of capital expenses in public agency service costs will lead to an underestimate of cost savings in these cases.

All-Day Fixed-Route Services

Table 4 presents six different cost comparisons of comparable public and privately operated fixed-route services. These services all operate the entire day--none are peak-period-only operations. As is apparent, substantial cost savings are indicated for private-sector contracting ranging from 22 to 54 percent of public agency unit costs. As might be expected, cost savings are greatest for regional transit agencies and lowest for municipalities. Small municipal bus operators typically have lower unit costs than regional transit agencies as a result of lower wage rates, lower peak-to-base ratios, and the ability to share overhead expenses with other municipal services. Even compared to such

TABLE 4 Difference between Public Agency and Private Contractor for Fixed-Route Transit Services *(1,3,6)*

Type of System	Cost Difference (%)	Basis of Cost Comparison
18 small municipal systems in California	-22	Direction comparison
Phoenix Transit bus route	-62[a]	Agency unit costs versus private service costs
Yolo County transit system	-37[a]	Competitive bids
TRT	-48	Agency unit costs versus private service costs
2 New York City suburban transit systems	-32	Direct comparison
San Diego County transit system	-34[a]	Competitive bids

Note: Data obtained from government agencies responsible for transit planning and provision, and from private operators.

[a]Cost savings are understated because a private contractor was responsible for vehicle provision.

TABLE 5 Estimated Cost Savings for Commuter Bus Services Operated by Private Contractors *(1,2,7,8)*

Public Agency Sponsor or Potential Sponsor	Cost Difference (%)	Basis of Cost Comparison
Golden Gate Transit[a]	-25	Private operator actual costs and cost models for public agency
Los Angeles County[a]	-38	Private operator actual costs and cost models for public agency
Houston[a]	-35	Private operator actual costs and cost models for public agency
Cleveland[a]	-58	Private operator actual costs and cost models for public agency
SCRTD[a]	-51	Analytical cost models
Boston (MBTA)	-50	Analytical cost models

Note: Data obtained from government agencies responsible for transit planning and provision, from private operators, and from a February 1984 memorandum written on the cost of peak-hour service by W. Cox of the Los Angeles County Transportation Commission.

[a]Cost savings are understated because a private contractor was responsible for vehicle provision.

municipally operated fixed-route services in California, however, similar privately contracted services are more than 20-percent less expensive.

Commuter Express Bus Service

Proponents of transit service contracting often cite commuter bus service as a particularly promising application of this strategy. As a supplemental service, commuter express operations are believed to avoid some of the labor constraints that confront contracting of all-day transit services, particularly for expansion of commuter service. In addition, the cost-saving potential of contracting for peak-period-only services is believed to be great as these are a transit agency's most expensive services due to severe labor inefficiencies. Table 5 gives data on cost comparisons for the relatively few commuter bus services that have been contracted to private operators, as well as data on cost savings estimates derived from studies of public versus private provision.

The studies and direct comparisons revealed that large cost savings are indeed possible with contracting, provided that enough service is involved to enable the public agency to reduce overhead expenses when contracting out existing services or to forego additional overhead expenses in cases of service expansion. If only one or two bus runs are contracted by a public transit operator, the savings will probably be minor or nonexistent.

The magnitude of cost savings also depends on whether or not the contractor must supply the vehicles. This is a common requirement for commuter services, but can add substantially to the private operator's costs as a result of the high costs of suitable buses and the difficulty of achieving other utilization of the vehicles. It has been estimated that the capital costs of the vehicles added as much as 30 percent to the service costs of private operators in Houston, where new or recent buses were required to be used by the contractors (2).

The following table gives a more detailed comparison of the cost and subsidy requirements for commuter express bus service provided by GGT and the private operators who furnish its contracted subscription service. At the time of this comparison, 27 buses were used in the subscription bus program, operating on routes of 20 to 60 miles in length. GGT's service costs were calculated by applying the transit agency's cost model to a route that was the same length as the average route in the subscription program. Other aspects of the two services were also similar. Because the 27 buses then involved in the subscription service represented approximately 11 percent of GGT's peak bus fleet, it is likely that the overhead expenses implied by the cost model would come into play if the transit agency were to take over the privately provided services or contract out a similar amount of commuter service. The indicated 25-percent cost savings and 50-percent subsidy savings are probably conservative, as the private operators must supply their own vehicles. Depreciation charges would add at least 5 to 10 percent to the private operators' total service costs (the buses are not new, having an average age of 10 years), whereas the transit agency purchases its buses with public subsidies and thus does not include depreciation in its operating expenses. Despite the conservative estimate of cost savings, this comparison indicates that GGT saves approximately 5 percent of its annual subsidy requirements by contracting for its subscription services rather than operating these services itself. (Note that the data in the table were obtained from Golden Gate Transit.)

Provider	Cost	Subsidy
Private Bus Company	$1,589,510	$ 575,480
Golden Gate Transit	2,123,260	1,167,790
Difference	533,750	592,310
	+33.6%	+102.9%

DRT

DRT is the transit service most commonly contracted out to the private sector. Because service contracting is so pervasive for DRT, it is difficult to identify publicly operated DRT systems for cost-comparison purposes. The scattered evidence that is available, however, indicates that large savings are also possible for this transit service when it is privately contracted. Table 6 reveals that cost savings of approximately 50 percent are the norm for regional transit agencies, and such savings may even be conservative as the agencies included are relatively low-cost by national standards. On the other hand, several of the comparisons involve the replacement of fixed-route bus services by small vehicle (van or mini-bus) DRT operations, and the added dispatching costs of the latter may be more than offset by the higher vehicle maintenance and fuel expenses for large transit buses. Nonetheless, the cost savings will always be large.

TABLE 6 Cost Savings for General Public DRT Services Operated by Private Contractors

Public Agency for Comparison Purposes	Cost Difference (%)
Phoenix Transit	-54[a]
Rochester-Genesee Transit Authority	-45[b]
Orange County Transit District	-49[a]
Omnitrans	-55[a]
TRT	-49[a]
4 municipal systems in California (compared to 21 taxi company operated systems)	-12[b]

Note: Obtained from agencies responsible for transit planning and provision, private operators, and from References 3, 6, 9, and 10.

[a]Represents DRT service costs versus bus service costs for comparable service areas.

[b]Represents comparable DRT services.

Large subsidy savings are also possible by substituting DRT for unproductive fixed-route services. Phoenix Transit estimates that it has saved $700,000 annually by substituting DRT for its Sunday fixed-route services (1). This represents nearly 5 percent of total agency subsidy. TRT has reduced subsidy per passenger by as much as 64 percent in particular conversions of fixed-route transit to privately contracted DRT (3).

Although much lower cost savings are indicated for municipally operated DRT services in California, this is because the few cities that operate their own DRT systems also engage in the same cost-reduction practices as private providers. They pay low driver wages, they use part-time labor, and they share overhead with other municipal services. These are not unionized transit operations, and thus all wage rates are more reflective of private sector conditions. In contrast, the small, municipally operated, fixed-route bus services cited in Table 4 are about twice as expensive as privately operated DRT. Thus, it appears that it is possible for public agencies to save upwards of 50 percent by contracting for DRT service. Even the most cost-conscious public operators cannot match the service costs of private providers.

INSTITUTIONAL OBSTACLES TO SERVICE CONTRACTING

There exist several potentially significant obstacles to transit service contracting. First, transit managers tend to view service contracting unfavorably. Second, transit labor unions are almost invariably strenuously opposed to contracting. Third, when subsidy sources are dedicated exclusively to transit, as is often the case for large transit agencies, transit policy makers usually lack the incentive to support contracting. Fourth, the service quality of private operators may be below public agency standards, creating dissatisfaction on the part of both the sponsor and transit riders. Fifth, finding a suitable private provider may be problematic, and maintaining a potentially competitive situation for contract renewals may also be difficult. Finally, although the monetary savings from contracting are impressive in percentage terms, they may not represent large enough dollar amounts (because such a small amount of service is contracted) to induce a transit agency to overcome other reservations concerning this strategy.

Whether these obstacles in fact become manifest depends to a large extent on the type of public agency that is responsible for public transportation provision. When this is a city or county, the actual impediments to service contracting are usually relatively minor, unless the local government has operated a transit service itself for some time. As California's experiences indicate, general purpose local governments tend to view transit service contracting favorably, and frequently engage in this practice. Moreover, when a transit operator is subject to direct policy and fiscal control by cities or a county, particularly those cities or counties that do not dedicate financial support to transit, the transit operator, too, may embrace service contracting. Westchester County and the City of Phoenix are directly responsible for their transit operations, and city governments in the Tidewater and San Bernardino regions directly determine the amount of transit service they receive and the amount of local funds that will be allocated to the transit agency. In all four cases, service contracting is used far more than the national norm.

In contrast, many of the potential obstacles to service contracting become manifest when a relatively autonomous transit agency is the local entity with the greatest influence over transit decisions. The most important of these obstacles are rooted in the monopoly organization of public transportation in most large American urban areas. Monopoly organization, particularly when combined with dedicated transit subsidies, insulates transit managers from economic or political pressures to stress cost-effectiveness when making service delivery decisions. Even without such insulation, many transit managers would prefer to provide all services with agency personnel in order to maximize the size of the organization (usually a determinant of political influence) and to ensure maximal control over service quality. This combination of institutional arrangements and management attitudes blunts incentives for service contracting, and can represent an insurmountable obstacle.

The monopoly framework for public transit has also created serious labor constraints to service contracting. Section 13(c) of the Urban Mass Transportation Act, originally designed to protect transit workers from being displaced by capital investments, has been transformed into a powerful labor bargaining chip for preserving a monopoly on all jobs associated with transit service provision. The model agreement in Section 13(c) tacitly endorses transit labor's claim on all transit jobs, and many local labor contracts explicitly verify this claim. Labor contracts can thus represent an absolute legal barrier to contracting, unless they can be changed through collective bargaining. Although Section 13(c) itself is not an absolute barrier to contracting, and tough-minded transit managers have been able to contract in spite of labor resistance, it is a rare transit agency that can engage in service contracting without a major struggle with its labor force. Unless strong management and policy support exists for contracting, the prospect of a serious battle with labor may be enough to sink this strategy before it can be given a hearing.

Because of the Section 13(c) situation, service contracting is virtually out of the question if transit workers will be displaced as a result. This tends to limit transit agency applications to relatively small increments of service. Even some of the bolder uses of contracting, such as the activities of TRT and Phoenix Transit, have not been of a magnitude to require the agencies to lay off workers. The few truly large contracting activities undertaken by transit agencies, notably OCTD's DRT program (130 vehicles) and the Houston MTA's express bus program (113 vehicles), do not represent replacements of agency services, but are new services instead. As they do to affect existing transit workers, such new services are by far the easiest to contract to the private sector. However, relatively few transit

agencies have the fiscal resources for major service expansions.

Although the major obstacles to service contracting are most applicable to regional transit agencies, two other potential obstacles can affect any contracting entity. The first is the issue of the quality of the service provided by a private operator. Private providers may fall short of public agency expectations concerning service reliability because of their greater concern about keeping service production costs low. For example, the Southeast Michigan Transit Authority (SEMTA) has sharply reduced its use of contract services (it originally contracted for commuter express service and several DRT services) because of persistent service quality problems with private operators. Many of these problems were attributable to inadequate vehicle maintenance, which led to unreliable service. SEMTA staff believes that some contractors were simply not capable of providing the necessary quality of service, as they had never before operated in such a demanding service environment. TRT has also experienced service quality problems with its DRT contractors, and has tightened its contract requirements and administrative oversight in an attempt to prevent recurrences (6). On the other hand, other major sponsors of contract services have not experienced serious service quality problems, nor have the vast majority of cities and counties in California. Nonetheless, the fact that negative experiences do occur gives credence to the belief of many transit managers that service quality can be a problem in contracting.

The second potential problem is that of maintaining a suitably competitive environment to keep private contracting costs low. Private transportation providers with the necessary capabilities to operate a public transit service are often not abundant, particularly in small urban areas. Even in metropolitan areas, it is not uncommon for a public agency to have only one or two providers to choose from. For example, TRT was able to interest only one local transportation company in bidding on its contract services, and several of the largest DRT systems in California have never had real competition for the service contract.

The concern is that lack of competition could cause private operators to sharply increase their rates to the public agency. Although this may eventually occur, it does not appear to have become a serious problem to date. Service costs of most sole-source contractors are reasonable by national standards and far below comparable public agency costs. Private operators view contract revenues as desirable because they are a secure revenue source which, in most noncompetitive situations, they do not attempt to exploit (5). Occasionally, private operator rates do appear somewhat excessive (the Houston MTA initially paid all-day charter rates for its peak-period-only express services), but this does not appear to be a widespread problem. The public agency almost always holds the upper hand in contracting situations, as it can provide the service itself or encourage nonlocal firms to bid when the current provider attempts to exploit a monopoly position. Of course, private operator rates may be lower when many firms compete for a service, but the cost differential between public and private operators is typically so large that public agencies will find it advantageous to contract out in noncompetitive situations as well.

AREAS REQUIRING ADDITIONAL RESEARCH

This paper represents a reconnaissance of the current status and future potential of transit service contracting. As such, it does not delve deeply into some of the issues that are likely to determine just how widely this strategy will be used in coming years. It is possible, however, to identify three areas in which additional research is needed to help clarify the institutional feasibility and economic benefits of service contracting.

First, research is needed in determining the magnitude of the cost savings that result from service contracting. The cost comparisons assembled for this paper range from relatively sophisticated attempts to model public and private operating costs for the same service to straightforward but possibly misleading applications of agency cost models to commuter express services to comparisons based simply on unit costs for the same or similar services (1, 2,5,7, and 8; and a February 1984 memorandum written on the cost of peak-hour service by W. Cox of the Los Angeles County Transportation Commission). None of these approaches are without their deficiencies, although it is encouraging that they all yield estimates of cost savings that range from 20 to 50 percent. Improved approaches are necessary for more accurate estimation of the cost savings that would result from either contracting with existing public operator services or using private operators to provide additional transit services.

This need is most acute for supplemental services, particularly commuter express service, and for all types of substitution services. In these situations, cost savings are difficult to estimate because of the problem of accounting for relevant public agency overhead costs and, for commuter services, because of complicated labor scheduling interactions with off-peak transit operations. The magnitude of the research problem should be emphasized because cost models must: (a) be relatively straightforward to apply and not require substantial amounts of data, (b) adequately represent the cost implications of changing the inputs to the service production process as well as changes in the level of output itself, and (c) be capable of giving reasonably accurate estimates when applied at the route level of analysis and when used in analyzing different magnitudes of service contracting.

Research on cost differences is also needed to account for the effect of requiring private operators to supply the vehicles for a contracted service. For commuter express service, such effects can be profound--it is estimated that vehicle capital costs can represent as much as 30 percent or more of total private operator service costs in some situations (2,7). Without being able to take the vehicle cost factor into account, estimates of public-private cost differentials, such as some of those cited in this paper, will understate the private-operator cost advantage.

A second major area for additional research is determining how much of a deterrent to service contracting the labor situation in public transportation is. There can be little question that federal law, local labor contracts, and the desire of many transit agencies to have smooth labor relations all make contracting out quite difficult. Much too little is known, however, on why a few transit agencies are able to contract out for a variety of services whereas most of their cohorts are not able to contract out at all. Are labor constraints as much perceived as actual, or are they truly as formidable as they appear? How important are the generally unfavorable views of transit management toward service contracting in giving influence to labor opposition to this strategy? Is the incentive structure for transit service decisions as important as labor constraints in forestalling serious consideration of contracting? The answers to these and other

related questions have major implications for the institutional feasibility of service contracting by relatively large transit agencies.

Finally, research is needed on the question of how best to administer a service contracting program while maintaining consistency with an overall agency objective of minimizing service delivery costs. Some transit agencies, such as OCTD, have established a bureaucratic structure to administer their contract services. Although this ensures high quality of service as well as provider honesty, it is also quite costly--OCTD's administrative costs for its DRT program are 24 percent of the cost of service provision. But informal contract management can lead to problems, as has been learned by TRT. It seems that there are a sufficient number of transit agencies now engaged in service contracting such that a comparative analysis of their experiences would yield valuable insight into the questions of how much, and what type, of contract management is necessary.

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Abridgment

Simulation of Transit Route Operations

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ABSTRACT

Public transport managers and operators face increasingly difficult problems in providing adequate levels of service at reasonable social and financial costs. A greater demand exists for analytical techniques that would allow them to evaluate changes to operational strategies before committing themselves to implementation in the field. This paper contains a description of the development of a discrete event simulation model for the analysis of on-street transit routes. The structure of the model is described and details are provided of the types of events that are explicitly modeled in the TRAMS package. The input requirements are described, and the modular nature of the simulation model is highlighted. The various options for output format are described, including the use of a computer graphics real-time animation option.