Developing Markets for Transit Privatization for Suburban Travel in Large Metropolitan Areas

SNEHAMAY KHASNABIS, BHARAT B. CHAUDHRY, MARK E. NEITHERCUT, AND NEVA A. NAHAN

A procedure for identifying markets for transit privatization and a case study application are described. The procedure focuses on zone pairs with high travel demand and uses a set of explanatory variables to identify potential markets. Next, these markets are selectively merged to provide a set of viable sectors where transit privatization appears feasible. The procedure was applied on the Detroit metropolitan area to demonstrate its applicability. Initially, over 50 candidate markets for transit privatization for suburban travel were identified that were later narrowed down to 14. These 14 markets, when analyzed in detail, resulted in a total of five sectors where privatization appears feasible. A two-phase survey among local transportation providers was conducted to assess the interest and capability of private providers, and then to match providers with markets identified. The data requirements for the procedure include information on zonal network, land use, and congestion levels. Because most planning agencies are likely to have access to these data, transferability of the procedure to other metropolitan areas does not appear to be a problem.

During the last two decades, the mass transportation industry in the United States has undergone dramatic changes, many brought about by the nation's changing demographics, continued suburbanization, and gradual decentralization of urban activities. Although the relative prominence of the central business district (CBD) as an employment center continued, changing land use patterns were instrumental in the development of major focal points of activities in the suburbs. As a result, the urban travel patterns changed from radial desire lines to widely dispersed movements between many suburban centers to the extent that conventional transit services became ineffective in meeting travel needs.

Concurrently with the problem of changing travel patterns, the transit industry had to face another major crisis: financing. Shortfall in transit operations has grown by a factor of 15 during the last 20 years in spite of modest increases in ridership and in fare-box revenue. The estimated current annual deficit of $4 to $5 billion nationwide is covered by an array of federal grant programs and local and state tax subsidies. In brief, the cost of providing transit services in an environment of diverse travel desires and in an era of shrinking federal subsidies has grown much more rapidly than operating revenues.

The trend toward suburbanization, which started in the late 1950s after the advent of the Interstate highway program, is still continuing. Current estimates are that our suburbs contain approximately half of the U.S. population; this figure is expected to grow to 75 percent by the turn of the century. By the same token, employment opportunities in the suburbs have increased by a factor of two during the last decade; however, few individuals live and work in the same suburb. Other important demographic changes include a reduction in household size, and increases in automobile ownership and in median income. The combined effect of demographic and land use changes has been an overwhelming increase in suburban auto traffic.

The widely diverse travel patterns in our metropolitan centers, along with continued increases in operating expenses have posed serious financial problems to public transportation agencies. Transit agencies in the United States have been hard-pressed to meet the travel demands oriented to the central city, with little resources available to address the emerging travel needs between suburban communities. Privatization is considered by many as a viable tool for improving suburban mobility; however, there are not many examples of successful implementation of such programs in the United States.

On the basis of an analysis of current literature and review of case studies (*1*–3), it appears that the idea of delivering transportation through private contracting for suburban travel is viable provided these options are exercised under the appropriate institutional setting. A recent UMTA report (*4*) reviewed six examples of private sector involvement in four cities (Chicago, Cleveland, Dallas, and Los Angeles) including local business, community groups, major developers, and private providers. The study concluded, "All the cases can be characterized as promising innovation because obstacles both from governmental and the business sectors were overcome as planning processes with broader private sector participation were established."

This study also indicates that although privatization is a viable option, there remains a set of planning, economic, and institutional barriers that must be overcome before privatization receives a more widespread application as a tool for alleviating suburban congestion problems. These barriers include among other factors: lack of an organizational structure to promote privatization at the regional level, lack of any technique to identify markets for transit privatization, and lack of standardized monitoring techniques to ensure quality control of privatized transit services.

This list is by no means exhaustive; however, these represent typical barriers that must be overcome to ensure greater

S. Khasnabis, Urban Transportation Institute; B. B. Chaudhry, M. E. Neithercut, and N. A. Nahan, Center for Urban Studies; Wayne State University, Detroit, Mich. 48202.

application of privatization concepts (5). The broad purpose is to develop a procedure for evaluating potential transit markets between suburban centers in large metropolitan cities (6). The Detroit metropolitan area was used as a case study site for this proposed methodology. A procedure for developing markets for transit privatization (as developed in that study) is described along with a case study demonstration on a large metropolitan area.

RESEARCH METHODOLOGY

The experience of transit operators in the United States during the 1970–1990 era clearly suggests that it is virtually impossible to provide any type of transit services without public subsidy. Thus, it is unlikely that private sector involvement in the transit market will eliminate the need for subsidy. However, transit privatization may help attain improved quality of service, reduced need for operating subsidies, additional transit demand, and greater interest and participation among the local business community in the resolution of the transportation problem of the community.

This research approach is based on the premise that the prerequisite for a successful transportation program is the identification of specific markets; matching the market, the provider, and specific type of service; and ensuring that appropriate service standards are maintained once the program is implemented. The research approach has four major elements: (a) market identification, (b) assessing the degree of interest among providers, (c) matching markets with providers, and (d) development of operating plans.

A key ingredient to successful private participation is the ability of the transit agency to match unmet travel needs with interested private providers. The first step in this study is the identification of these unmet transit areas. The process of identification includes a review of the travel demand data at a regional level, updating the travel demand to reflect current land use and transportation features and identifying specific production and attraction centers within the study area that are instrumental in generating heavy travel. The journey to work census data, known as the Urban Transportation Planning Package (UTPP), was found to be an important source of information for work trips. The market identification process is built on two important hypotheses: (a) markets for privatization are likely to be those zone pairs that are at the higher end of the demand distribution, and (b) among zone pairs depicting the higher demand, those that represent high congestion levels and longer travel times are likely to be candidates for privatization.

Having identified the potential markets in the study area, the next step would be to place these in order relative to their success potential in privatization efforts. This rank ordering requires the development of a set of criteria and applying the criteria to the candidate zone pairs. An empirically based methodology was developed to rank the candidate zone pairs in terms of their success potential for privatization.

Next, in an effort to assess the degree of interest in participating in privatization efforts, a two-stage telephone survey was conducted among private transportation providers in southeast Michigan. Stage I of the survey was directed toward the development of a data base of potential providers and understanding their capabilities, preferences, and perceptions. Stage II was conducted only among a small subsample of respondents from the first survey and was directed toward obtaining route-specific information. These two surveys are discussed in greater detail in the next section.

The markets identified following these procedures were compared with provider interest in these markets. This process resulted in a subset of the prioritized markets with greater potentials for success because of provider interest. Operating plans for a number of the viable market-provider combinations were developed, including projected ridership, fares, routes, schedules, and fleet size.

DETROIT CASE STUDY

The Detroit metropolitan area was chosen for applying this methodology because it typifies in many ways the changes in land use and travel patterns that characterize today's growing metropolis in the United States. Further, concerted efforts are currently underway by the regional planning agency, the Southeast Michigan Council of Governments (SEMCOG), as well as the regional transit agency Suburban Mobility Authority for Regional Transportation (SMART) to plan and operate public transportation services on a selective basis through private contractors.

Study Area

The Detroit region lies in southeastern Michigan and was ranked as the fifth largest urban area in the United States in 1980 with a population of approximately 5.0 million people. It also ranks as the seventh in terms of population density of urbanized areas. Detroit is the focus of the U.S. automotive industry with the three largest automobile manufacturers having their corporate headquarters within the region. Although it ranks 7th in terms of population, it also ranks 18th out of a total of 20 relative to transit service, as measured by the number of vehicle-miles of transit service per capita, as well as by local transit dollars per capita.

In spite of the lack of transit dominance, public transportation throughout southeast Michigan served more than 77 million riders in 1987. Fixed-route large bus service accounted for the bulk (97 percent) of this service, the remaining 3 percent being carried by a variety of small bus and taxi operation programs, collectively referred to as paratransit services.

Travel Demand Estimation

The first step toward market identification for privatized transit service was an assessment of projected travel demand in the study area for the year 1990. A decision was made at the outset of this project to use work trip (journey to work) data that are available from the census reports through the use of the UTPP files. The decision was based on the premise that the markets for privatization are more likely to be focused around work trips because of the regularity and fixed nature of these trips, as opposed to other types of trips (e.g., shopping) that are more variable both temporally and spatially.

The 1980 UTPP data file for Detroit contained work trip data during the peak 2 hours by specific areal units termed "Traffic Analysis Zones" (TAZs). SEMCOG, as a part of its continuing planning activities, has created a work-trip data base for minor civil divisions (MCDs), by aggregating the TAZs. Further, the three-county study area contained a total of 251 MCDs and a larger number of TAZs. The object of this study being to examine the suburban transit market, a decision was made to exclude from the study the city of Detroit, because the study was not concerned with trips originating at or destined for Detroit.

A total of 41 new areal units, termed as P-zones (abbreviated from privatization zones) were specifically created by combining MCDs. Factors considered in combining MCDs to P-zones included similarity in land uses, geographic proximity, and the general stipulation that the size of a P-zone will not exceed a 6-mi^2 block.

1980 Work Trip Data

A sample of the UTPP file for Troy MCD (P-zone 12), presented in Table 1, indicates that in 1980, a total of 51,526 workers commuted to Troy (a major suburban community in the study area) on an average weekday for work purpose from various MCDs within the study area during the a.m. peak hours. Table 1 presents a number of MCDs that contributed significantly to the work trip destinations in Troy. Similar data for all MCDs in the study area are available in the SEMCOG file. Software was developed as part of this project to convert the UTPP work trip data from the MCD level to the P-zone level on the basis of the following principles:

1. Trips interchanging between MCDs that made up a given P-zone were designated as intrazonal trips.
2. All other trips either originating at or destined to the MCDs comprising a given P-zone were assigned to that P-zone for the purpose of constructing interzonal trips.

TABLE 1 DISTRIBUTION OF DAILY WORK DESTINATIONS TO TROY FROM SEVEN COUNTY COMMUNITIES BASED ON 1980 UTPP PART IV DATA

Home MCD	Daily Workers to Troy	Home MCD	Daily Workers to Troy
Allen Park	109	New Baltimore	25
Avon Twp.	1811	Northville	6
Berkley	660	Northville Twp.	85
Beverley Hills	255	Novi	207
Bingham Farms	9	Oak Park	734
Birmingham	1000	Orchard Lake	36
Bloomfield Twp.	1705	Pleasant Ridge	77
Canton Twp.	153	Plymouth	13
Centerline	138	Plymouth Twp.	25
Chesterfield Twp.	99	Pontiac	615
Clawson	1484	Pontiac Twp.	369
Clinton Twp.	1088	Redford Twp.	292
Commerce Twp.	90	River Rouge	11
Dearborn	278	Riverview	54
Dearborn Hts.	190	Rochester	408
Detroit	4256	Rockwood	29
East Detroit	290	Romulus	12
Farmington	74	Roseville	472
Farmington Hills	691	Royal Oak	4273
Ferndale	998	Royal Oak Twp.	49
Franklin	103	Shelby Twp.	851
Fraser	234	Southfield	1074
Garden City	75	Southgate	45
Grosse Pointe	26	St. Clair	7
Grosse Pointe Farms	164	St. Clair Shores	797
Grosse Pointe Park	152	Sterling Hts.	4627
Grosse Pointe Woods	164	Sylvan Lake	28
Hamtramck	125	Taylor	102
Harper Woods	94	Trenton	25
Harrison Twp.	261	Troy	8944
Hazel Park	690	Utica	167
Highland Park	94	Walled Lake	16
Huntington Woods	107	Warren	3875
Inkster	28	Waterford Twp.	796
Keego Harbor	72	Wayne	10
Lake Angelus	22	West Bloomfield	907
Lathrup Village	109	Westland	143
Lincoln Park	63	White Lake Twp.	131
Livonia	497	Wixom	20
Madison Hts.	2405	Wolverine Lake	37
Marysville	21	Woodhaven	36
Melvindale	37	Wyandotte	64
Mt. Clemens	96	York Twp.	15
		Total	51,526

Source: SEMCOG and UTPP files

1990 Projected Work-Trip Data

The Fratar technique of growth factor analysis was used to update the 1980 UTPP data base to reflect 1990 conditions using the MINUTP software developed by FHWA. Although more sophisticated techniques for travel demand modeling are currently available, the growth factor technique was used for its simplicity, ease of application, and data availability.

Factors Influencing Potential Markets

The most important factors contributing to the viability of markets were considered to be travel demand, travel time, congestion levels, and land use densities. The relevance of these factors is discussed in the following paragraphs.

Travel Demand

The output of the Fratar model indicated the peak 2-hr travel demand (TD) expressed as number of workers that varied from a low of 0 to a high of 28,500 distributed among the 1,681 cells (P-zone pairs) of the travel demand matrix. The identification of transit markets for privatization is based on the premise that for a market to be viable there must be sufficient travel demand between the two zones. Further, even though much of this demand is met through the use of the private automobile, by adopting proper marketing techniques it is possible to capture fractions of this demand for the transit mode.

In an effort to narrow down the choice of markets from 1,681 zone pairs to a more manageable size, the number of workers commuting between these zones was recast in the form of a frequency distribution in increments of 250. It was found that for 95 percent of the P-zone pairs, travel demand (expressed in the number of workers commuting during the a.m. peak period) was less than 2,500. The remaining 5 percent had their daily a.m. peak demand ranging from 2,500 to 28,500 (Table 2). Because the object of this analysis was to identify high travel demand corridors, the 95 percentile value of the frequency distribution of 2,500 commuters was selected as the cutoff point. Thus, a total of 81 P-zone pairs (5 percent of 1,681 original pairs), being the high travel demand corridors in this area, were identified as the candidate markets.

On further analysis of the candidate markets, it was found that of the 81 P-zone pairs, 28 are intrazonal in nature and 53 are interzonal. A decision was made to concentrate on the 53 interzonal P-zone pairs as more likely candidates for fixed-route transit markets. The 28 intrazonal pairs were eliminated from further considerations, primarily because these trips were not long enough (being intrazonal in nature) to warrant fixed-route services, although these could possibly be candidates for paratransit services. The question of paratransit markets was not explored in this study.

Travel Time Distribution

Next to travel demand, zonal travel time was considered a critical factor in determining potential transit market. It was hypothesized that given a similar travel demand between two zone pairs, a larger portion of the market is likely to be captured by transit from the zone pair with longer travel time. An implicit assumption is that a typical urban traveler is more likely to change his travel mode from the automobile to transit when travel time is excessive.

Congestion Levels

Congestion levels along the major travel corridors for each zonal interchange were also considered a factor contributing to transit market potential. The implicit assumption is that higher congestion levels experienced by the automobile driver would be more conducive to transit travel. SEMCOG, as part of its long-range planning effort, rated each major travel corridor in the Detroit area on congestion ratings of high (H),

TABLE 2 DISTRIBUTION OF TRAVEL DEMAND BY P-ZONE PAIRS

Demand Range	No. of P-Zones/Pairs	% Frequency	Cumulative Frequency
0 - 0	602	38.64	38.64
1 - 250	553	35.49	74.13
251 - 500	128	8.22	82.35
501 - 750	55	5.35	85.88
751 - 1000	35	2.25	88.13
1001 - 1250	22	1.41	89.54
1251 - 1500	21	1.35	90.89
1501 - 1750	24	1.54	92.43
1751 - 2000	9	0.58	93.00
2001 - 2250	11	0.71	93.71
2251 - 2500	17	1.09	94.80
2501 - 2750	8	0.51	95.31
2751 - 3000	4	0.26	95.57
3001 - 3250	5	0.32	95.89
3251 - 3500	8	0.51	96.41
|	|	|	|
|	|	|	|
|	|	|	|
27001 - 27250	0	0.00	99.94
27251 - 27500	0	0.00	99.94
27501 - 27750	0	0.00	99.94
27751 - 28000	0	0.00	99.94
28001 - 28250	0	0.00	99.94
28251 - 28500	1	0.06	100.00

medium (M), and low (L). This rating was based on the percentile distribution of the vehicle miles of travel (VMT) the corridor carried during the peak hours on a given day as a function of a total of 83 major travel corridors in the region (7). This information was used to assign congestion levels to the major travel corridors of the candidate transit markets.

Revised Travel Time

Next, travel time and congestion levels were compiled into one composite factor entitled "revised travel time" (RTT). Congestion level, as determined on a qualitative scale of high, medium, and low from the SEMCOG data base, did not directly lend itself to the same level of quantitative analysis as the other two factors, travel time and travel demand. Further, travel time and congestion level essentially depict the same phenomenon, travel impedance. Last, the off-peak travel time as computed from the SEMCOG network data base, did not accurately reflect the relative effect of congestion, because off-peak travel time is computed for free flow traffic conditions. On the basis of these factors, it was decided to increase the travel time on highly congested corridors (rated H) by 50 percent and that on the medium congested (M) corridors by 25 percent. The travel time on corridors with low levels of congestion (L) were considered unaffected by congestion factors. The revised travel times were considered to be depictive of travel congestions during peak hours of congestion.

Land Use Density

It was postulated that zones where activities are clustered together would make better candidates for transit services as opposed to zones where activities are more dispersed. The rationale for this hypothesis was that zones with clustered activities (activities concentrated around one or a few focal points) would lend themselves to a more efficient pickup and drop-off of passengers to minimize walking distance between the bus stop and the trip origin or destination point. By contrast, a zone with dispersed activity patterns would either require many pickup or drop-off points or would result in longer walking distances.

A review of the available land activity data did not result in any indicator variable that could satisfactorily reflect the effect of clustering versus dispersal. As such a decision was made to use density of land activities as a surrogate to clustering with the presumption that higher densities are indicative of greater clustering and vice versa. For each zonal travel interchange, population density (PD) of the origin zone (Zone i) and the employment density (ED) of the destination zone (Zone j) were taken as the surrogate variables.

Priority Ranking of Markets

The 53 candidate markets identified in decreasing order of travel demand in Table 3 were rank ordered using the following variables as discussed earlier: travel demand, revised travel time, population density, and employment density.

Two types of priority ranking techniques were used: The scoring method and the scaling method.

Rank Ordering by the Scoring Method

In this method, a score ranging from 1 to 53 was assigned to each of the four variables, representing the 53 P-zone pairs, a score of 1 being the highest and 53 being the lowest. the algorithm used was as follows:

$$S_i = \sum_{j=1}^{4} W_j X_{ij} \qquad (i = 1 \text{ through } 53;\ j = 1 \text{ through } 4)$$

where

S_i = score of the ith P-zone pair,
X_{ij} = score assigned to the jth variable of the ith P-zone pair, and
W_j = weight assigned to the jth variable.

The software used for developing the final rankings is capable of utilizing any user-specified weights for any variable. Two weighting schemes are reported here. In the first scheme, travel demand being considered the most important variable was assigned the highest weight ($W_1 = 4$) followed by revised travel time ($W_2 = 2$). The two density variables were assigned equal weights of unity. the P-zone pair with the lowest score is to be considered the best by this method. The resulting data of the 53 P-zone pairs are presented in decreasing order of their ranging in Table 4 (Rank 1 considered better than Rank 2).

In Scheme 2, an unweighted ranking was followed (i.e., all variables having equal weights). It was found that there was reasonable correspondence between overall ranking obtained by weighted versus unweighted scheme. This was borne out by the fact that as many as 17 of the first 20 P-zone pairs were common in both the tables. This indicates that overall, the weighting scheme did not significantly affect final ranking.

Rank Ordering by the Scaling Method

By this method, each of the four variables was rated on a scale of 1 to 20, depending on the specific numeric value of the variable. For the purpose of scaling, the range of values for a given variable was divided into 20 equal intervals, so that each interval could be assigned a value ranging between 1 to 20. Thus, each variable for a P-zone pair was assigned a value of 1 to 20; the values were not mutually exclusive because the same value could be assigned for a given variable to more than one P-zone pair. By the same token, a specific value or set of values within the range of 1 to 20 could be missing for a particular variable, depending on its distribution. The algorithm used is as follows:

$$V_i = \sum_{i=1}^{4} W_j S_{ij}$$

where

V_i = scaled value of the ith P-zone pair,

TABLE 3 CANDIDATE MARKETS FOR PRIVATIZATION LISTED BY P-ZONE PAIRS IN DECREASING ORDER OF DEMAND

P-Zone Pairs	Name	Demand (No. of Commuters)	Travel Time in Minutes (and Routes)	Congestion Level	Revised Travel Time (min.)
2 - 3	Waterford-Pontiac	14501-14750 (14581)	10.5 (M59)	H	15.75
13 - 21	Sterling Hts.-Centerline/Warren	10501-10750 (10620)	14.25 (M53, Ford Rd.)	H	21.40
32 - 33	Dearborn Hts. - Dearborn Garden City	9751 - 10000 (9889)	12.88 (M153)	H	19.30
22 - 21	East Det. - Warren	9001-9250 (9080)	10.26 (I-94, 12 Mile)	H	15.40
18 - 12	Royal Oak-Troy	8501 - 8750 (8565)	13.46 (I-75, 16 Mile)	M	16.8
14 - 21	Mt. Clemens - Warren	8001-8250 (8222)	18.92 (I-96, 12 Mile)	H	28.4
36 - 33	Southgate-Dearborn	7001-7250 (7217)	13.55 (I-94, Southfield)	M	16.9
31 - 25	Westland - Livonia	7001 - 7250 (7158)	12.22 (I-274 or Newburgh)	M	15.3
13 - 12	Sterling Hts.-Troy	7001-7250 (7126)	15.10 (16 Mile)	H	22.7
36 - 37	Southgate-River Rouge	6251-6500 (6402)	12.79 (I-75)	M	16.0
18 - 17	Royal Oak-Southfield	6251-6500 (6336)	14.14 (12 Mile, Telegraph Rd.)	M	17.7
19 - 17	Ferndale-Southfield	5501-5750 (5534)	13.85 (8 Mile, Telegraph Rd.)	H	20.8
14 - 22	Mt. Clemens-East Det.	5501-5750 (5691)	13.30 (M3, U.S. 25)	M	16.6
21 - 12	Warren-Troy	5251-5500 (5361)	20.55 (12 Mile, I-75)	M	25.7
16 - 17	Farmington-Southfield	5251-5500 (5465)	11.09 (8 Mile, Middlebelt)	H	16.6
38 - 37	Grosse Ile-River Rouge	5001-5250 (5052)	18.87 (I-75)	M	23.6
37 - 36	River Rouge-Southgate	5001-5250 (5033)	12.79 (I-75)	M	16.0
25 - 16	Livonia-Farmington	5001-5250 (5221)	13.72 (Framington or Merriman)	L	13.72
38 - 36	Grosse Ile-Southgate	4501-4750 (4659)	15.76 (Outer Drive)	L	15.76
37 - 33	River Rouge-Dearborn	4251-4250 (4097)	13.81 (Outher Drive, Southfield)	M	17.3
32 - 25	Dearborn Hts.-Livonia	4251-4500 (4362)	14.86 (M153, Inkster)	M	18.6
25 - 17	Livonia-Southfield	4001-4250 (4053)	20.92 (Middlebelt, 8 Mile	M	26.2
23 - 22	St. Clair Shores-East Det.	4001-4250 (4090)	8.26 (Gratiot)	M	10.3
23 - 21	St. Clair Shores-Warren	4001 - 4250 (4053)	14.92 (I-696, M53)	M	18.7
25 - 33	Livonia-Dearborn	3751-4000 (3781)	19,69 (Middlebelt, Ford Rd. on M153)	M	24.6
21 - 22	Warren-East Det.	3571-4000 (3819)	10.26 (8 Mile, M 53)	H	15.4
21 - 13	Warren-Sterling Hts.	3751-4000 (3943)	14.25 (M53)	H	21.4
14 - 13	Mt. Clemens-Sterling Hts.	3501-3750 (3597)	10.18 (Livernois)	M	12.7
5 - 12	Rochester-Troy	3501-3750 (3597)	10.18 (Livernois)	M	12.7
37 - 38	River Rouge-Grosse Ile	3251-3500 (3312)	18.87 (M85)	M	23.6
36 - 38	Southgate-Grosse Ile	3251-2500	15.76	M	19.7
32 - 31	Dearborn Hts-Westland	3251-3500 (3406)	9.34 (Ford Rd.)	M	11.7
31 - 33	Westland-Dearborn	3251-2500 (3461)	16.29 (Ford Rd.)	M	20.4
19 - 18	Ferndale-Royal Oak	3251-3500 (3325)	7.59 (9 Mile)	M	9.5
18 - 21	Royal Oak-Warren	3251-3500 (3474)	15.67 (8 Mile, M53)	H	23.5
10 - 17	Bloomfield Hills-Southfield	3251- 3500 (3396)	16.36 (Telegraph Rd.)	H	24.5
26 - 25	Redford-Livonia	3001-3250 (3210)	11.13 (I-96)	M	13.9
24 - 25	Northville-Livonia	3001-3250 (3223)	16,65 (I-96)	l	16.65
20 - 12	Madison Hts.-Troy	3001-3250 (3144)	11.60 (John R.)	M	14.5
8 - 16	Walled Lake-Farmington	3001-3250 (3198)	23.24 (Pontiac Trail, Haggerty, I-696)	M	29.1
30 - 25	Canton-Livonia	2751-3000 (2889)	16.68 (I-275, I96)	M	20.9
26 - 17	Redford-Southfield	2571-3000 (2969)	15.84 (Telegraph)	H	23.8
12 - 21	Troy-Warren	2751-3000 (2953)	20.55 (I-75, 12 Mile)	M	25.7

TABLE 3 *(continued on next page)*

TABLE 3 *(Continued)*

P-Zone Pairs	Name	Demand (No. of Commuters)	Travel Time in Minutes (and Routes)	Conges-tion Level	Revised Travel Time (min.)
32 - 17	Dearborn Hts.-Southfield	2501-3000 (2737)	25.27 (Telegraph Rd.)	H	37.9
22 - 14	East Det.-Mt. Clemens	2501-2750 (2669)	13.37 (Gratiot)	M	16.7
19 - 21	Ferndale-Warren	2501-2750 (2706)	16.21 (8 Mile, M53)	H	24.3
15 - 16	Novi-Farmington	2501-2750 (2671)	15.73 (I696)	M	19.7
12 - 17	Troy-Southfield	2501-2750 (2647)	23.70 (I-75, 12-Mile)	H	35.6
5 - 3	Rochester-Pontiac	2501-2750 (2643)	12.38 (Rochester Rd., M59)	M	15.5

TABLE 4 PRIORITY RANKING OF 53 CANDIDATE MARKETS BY SCORING METHOD (WEIGHTED)

Rank	P-Zone Pair	Name	Score for each variable TD	RTT	PD	ED	Composite Score (4TD+2RT +PD+ED)
1	14-21	Mt. Clemens-Warren	6	5	16	4	54
2	13-21	Sterling Hts.-Warren	2	19	13	4	63
3	32-33	Dearborn Hts.-Dearborn	3	27	6	1	73
4	21-12	Warren-Troy	15	7	9	6	89
5	13-12	Sterling Hts.-Troy	9	18	13	6	91
6	18-12	Royal Oak-Troy	5	33	3	6	95
7	19-17	Ferndale-Southfield	13	23	1	3	102
8	36-33	Southgate-Dearborn	7	32	11	1	104
9	2-3	Waterford-Pontiac	1	41	21	2	109
10	18-17	Royal Oak-Southfield	11	30	3	3	110
11	22-21	East Detroit-Warren	4	43	5	4	111
12	25-17	Livonia-Southfield	22	6	15	3	118
13	38-37	Grosse Ile-River Rouge	17	15	19	9	126
14	36-37	Southgate-River Rouge	10	38	11	9	136
15	14-22	Mt. Clemens-East Detroit	12	36	16	10	146
16	25-33	Livonia-Dearborn	28	10	15	1	148
17	37-33	River Rouge-Dearborn	21	31	2	1	149
18	31-25	Westland-Livonia	8	45	17	11	150
19	9-17	W. Bloomfield-Southfield	25	13	23	3	152
20	38-33	GrosseIle-Dearborn	31	4	19	1	152
21	16-17	Farmington-Southfield	14	37	20	3	152
22	32-35	Dearborn Hts.-Livonia	20	29	6	11	155
23	23-21	St. Clair Shores-Warren	24	28	4	4	160
24	14-13	Mt. Clemens-Sterling Hts.	29	9	16	14	164
25	37-36	River Rouge-Southgate	18	39	2	13	165
26	21-13	Warren-Sterling Hts.	26	19	9	14	165
27	18-21	Royal Oak-Warren	33	17	3	4	173
28	19-12	Ferndale-Troy	34	21	1	6	185
29	38-36	Grosse Ile-Southgate	19	40	19	13	188
30	25-16	Livonia-Farmington	16	48	15	16	191
31	10-17	Bloomfield H.-Southfield	38	11	26	3	203
32	32-17	Dearborn Hts.-Southfield	48	1	6	3	203
33	23-22	St. Clair Shores-East Det.	23	51	4	10	208
34	31-33	Westland-Dearborn	36	24	17	1	210
35	37-38	River Rouge-Grosse Ile	40	15	2	20	212
36	21-22	Warren-East Detroit	27	44	9	10	215
37	26-17	Redford-Southfield	45	14	7	3	218
38	36-38	Southgate-Grosse Ile	35	25	11	20	221
39	8-16	Walled Lake-Farmington	43	3	27	16	221
40	12-21	Troy-Warren	46	8	18	4	222
41	18-21	Ferndale-Warren	49	12	1	4	225
42	12-17	Troy-Southfield	52	2	18	3	233
43	18-19	Royal Oak-Ferndale	32	52	3	7	242
44	5-12	Rochester-Troy	30	49	25	6	249
45	30-25	Canton-Livonia	47	22	22	11	265
46	24-25	Northville-Livonia	41	25	24	11	269
47	19-18	Ferndale-Royal Oak	39	53	1	8	271
48	32-31	Dearborn Hts.-Westland	37	50	6	21	275
49	26-25	Redford-Livonia	42	27	7	11	280
50	20-12	Madison Hts.-Troy	44	46	8	6	282
51	22-14	East Det.-Mt.Clemens	51	34	5	18	295
52	15-16	Novi-Farmington	50	26	28	16	296
53	5-3	Rochester-Pontiac	53	42	25	2	323

TD = Travel Demand, RTT = Revised Travel Time
PD = Population Density, ED=Employment Density

S_{ij} = scale value assigned to the jth variable of the ith P-zone pair, and
W_j = weight assigned to the jth variable.

The P-zone pair with the lowest scale value is to be considered the best, and vice versa. As in the scoring method, the software used for the scaling method can incorporate any weighting factor as specified by the user. Table 5 presents the result of the application of the scaling method by the weighted scheme (using the same set of weights). As in the previous case, it was found that although for a given P-zone pair, the rankings obtained are different between the weighted and unweighted scheme, overall there was a remarkable correspondence between the weighted and unweighted scores.

Significance Test

The Spearman rank correlation test was used to determine if there is a significant difference between the relative rankings obtained by (a) the scoring versus the scaling method, and (b) the weighted versus the unweighted method. It is a standard statistical technique frequently used for testing the degree of association between two sets of rankings assigned on a number of test objects. The Spearman rank correlation coefficient, r_s, is calculated as follows:

$$r_s = 1 - \frac{6\left(\sum_{i=1}^{n} D_i^2\right)}{n(n^2 - 1)}$$

TABLE 5 PRIORITY RANKING OF 53 CANDIDATE MARKETS BY SCALING METHOD (WEIGHTED)

Rank	P-Zone Pair	Name	Score for each variable TD	RTT	PD	ED	Composite Score (4TD+2RT +PD+ED)
1	2-3	Waterford-Pontiac	1	16	15	1	52
2	32-33	Dearborn Hts.-Dearborn	8	14	5	1	66
3	13-21	Sterling Hts.-Warren	7	14	12	6	74
4	14-21	Mt. Clemens-Warren	11	7	14	6	78
5	18-12	Royal Oak-Troy	11	15	1	6	81
6	22-21	East Detroit-Warren	10	16	4	6	82
7	18-17	Royal Oak-Southfield	14	15	1	2	89
8	32-17	Dearborn Hts.-Southfield	20	1	5	2	89
9	36-33	Southgate-Dearborn	13	15	10	1	93
10	19-17	Ferndale-Southfield	16	13	1	3	94
11	21-12	Warren-Troy	16	9	8	6	96
12	12-17	Troy-Southfield	20	2	15	2	101
13	13-12	Sterling Hts.-Troy	13	16	12	6	102
14	37-33	River Rouge-Dearborn	18	15	1	1	104
15	25-17	Livonia-Southfield	18	9	13	2	105
16	18-21	Royal Oak-Warren	19	11	1	6	105
17	38-33	Grosse Ile-Dearborn	19	7	15	1	106
18	19-21	Ferndale-Warren	20	10	1	5	106
19	19-12	Ferndale-Troy	19	12	1	6	107
20	26-17	Redford-Southfield	20	10	5	3	107
21	23-21	St. Clair Shores-Warren	18	14	2	6	108
22	31-25	Westleand-Livonia	13	16	14	11	109
23	36-37	Southgate-River Rouge	14	16	10	11	109
24	25-33	Livonia-Dearborn	19	10	13	1	110
25	16-17	Farmington-Southfield	16	15	15	2	111
26	9-17	W.Bloomfield-Southfield	18	10	17	2	111
27	28-27	Grosse Ile-River Rouge	16	11	15	11	112
28	37-36	River Rough-Southgate	16	16	1	16	113
29	14-22	Mt. Clemens-East Detroit	15	15	14	11	115
30	10-17	Bloomfield H.-Southfield	19	10	17	2	115
31	32-25	Dearborn Hts.-Livonia	18	14	5	12	117
32	37-38	River Rouge-Grosse Ile	19	11	1	18	117
33	31-33	Westland-Dearborn	19	13	14	1	117
34	12-21	Troy-Warren	20	9	15	6	119
35	21-13	Warren-Sterling Hts.	18	12	8	16	120
36	23-22	St. Clair Shores-East Det.	18	20	2	11	125
37	18-19	Royal Oak-Ferndale	19	20	1	9	126
38	14-13	Mr. Clemens-Sterling Hts.	19	10	14	16	126
39	20-12	Madison Hts.-Troy	20	17	6	6	126
40	21-22	Warren-East Detroit	19	16	8	11	127
41	19-18	Ferndale-Royal Oak	19	20	1	11	128
42	25-16	Livonia-Farmington	16	18	13	16	129
43	36-38	Southgate-Grosse Ile	19	13	10	18	130
44	8-16	Walled Lake-Farmington	20	7	20	16	130
45	5-3	Rochester-Pontiac	20	16	17	1	130
46	38-36	Grosse Ile-Southgate	17	16	15	16	131
47	26-25	Redford-Livonia	20	17	5	12	131
48	22-14	East Detroit-Mt. Clemens	20	15	4	18	132
49	30-25	Canton-Livonia	20	12	17	12	133
50	5-12	Rochester-Troy	19	18	17	6	135
51	32-31	Dearborn Hts.-Westland	19	19	5	18	137
52	24-25	Northville-Livonia	20	15	17	12	139
53	15-16	Novi-Farmington	20	13	20	16	142

TD = Travel Demand, RTT = Revised Travel Time
PD = Population Density, ED=Employment Density

in which D_i = difference between ranks associated with the object i; and n = number of objects (zone pairs).

The criterion for establishing a degree of association was selected as 0.80 to interpret the results. If the value of r_s was above 0.80, it was concluded that there was a high degree of association between the two separate rankings. The correlation test indicated that (a) there is no significant difference between the relative rankings of the stations by the scoring method and the scaling method, and (b) there is no significant difference between the relative rankings obtained by the unweighted versus the weighted schemes.

Provider Survey

The purpose of the survey was to assess the interest among providers of transportation in privatization projects. The population under study included any for-profit providers in transportation in the seven counties in southeast Michigan. The study included two separate surveys that were administered as Phase I and Phase II.

Phase I Survey Method and Results

The objective in Phase I survey was to describe the project to the transportation providers and determine their level of interest in private contracting to provide public transportation services between suburbs. A total of 292 companies were identified and up to five attempts were made to conduct the interview. A business would be included if it was a for-profit main office of a transportation provider in southeast Michigan.

Of the initial 292 companies, 78 did not fit this criteria (being branch offices, nonprofit firms, and out of business since the directory was published). Telephone interviews were conducted with 113 of the 214 firms, for a cooperation rate of 53 percent. Of the remaining 101 firms, 56 refused to participate, and 45 were unavailable after five attempts (passive refusal).

Of the 113 companies that were interviewed in this phase, 86 (76 percent) were interested in providing public transportation services under contract with a public agency. The interested firms provide a variety of services, with charters and demand-response service the most common. The majority of these firms also provide airport and other scheduled services as well as vacation and travel tours.

A variety of options was presented to determine what might make the bidding process even more attractive to all of the firms, including those who initially expressed disinterest. Not surprisingly, most firms would be more interested if they were guaranteed a minimum payment and if outside revenue was provided. More than half of the companies indicated that priority bus lanes would also make bidding more attractive. In order to summarize the results in the Phase I survey, it was found that private operators are generally interested in working with public agencies on contractual transit services; that these operators have at their disposal underutilized vehicular fleet and that with proper incentives, the private enterprise can be attracted to the field of public transportation.

Phase II Survey Method and Results

The objective for Phase II was to target specific markets for the specific suppliers. Twenty companies from Phase I were identified that had the resources and interest in contractual services with the public transportation agency. These companies were provided with 10 potentially high travel demand routes on the basis of initial results of market analysis to determine interest in providing services on them.

The Phase II survey was designed to provide more specific information to those that had expressed an interest in proposed routes. The 20 companies that were interviewed in Phase II were provided with a list of potential routes and asked if they would be interested in providing service along them. Overall, the majority of the firms were interested in providing services along most of the proposed routes.

Not surprisingly, companies are willing to accept a smaller dollar per hour rate if the agency provides the vehicle. Almost all of the firms liked the idea of an incentive clause that would encourage providers to provider better service and generate additional ridership. A majority of firms also agree that a penalty clause that attaches fines and penalties to correct and discipline substandard services would be effective. Almost all of the companies agreed that penalty clauses would be effective in ensuring prompt service, as well as in maintaining a standard in vehicle maintenance.

The Phase II survey confirmed the findings of the earlier survey, with the additional stipulation that given route-specific information, private operators are more likely to provide definitive answers on their role in public transportation. Further, as the following section indicates, the preference and interest expressed by the private sector can be used to develop transit operating plans.

Establishing Potential Markets

Because there was no major difference in the results obtained by weighted versus unweighted schemes, a decision was made to use the results of the weighted scheme for establishing potential transit markets. A review of the top 20 P-zone pairs in Table 4 (scoring method) and in Table 5 (scaling method) revealed that as many as 14 out of these 20 were common in both tables. These common P-zone pairs were then identified as potential markets for privatization.

Operating Plans

The 14 markets were then merged in various combinations on the basis of contiguity of routes to provide a total of nine sectors for privatization. Complete operating plans were developed for five of the nine sectors (including fleet size, headway, speed, fare-box revenue, and operating cost).

The demand data compiled from UTPP files indicated the expected number of workers commuting between P-zones during the a.m. peak two hours. It was also assumed the same number of workers would travel between the same P-zones during the p.m. peak period. The premise of this study is that by providing high-quality transit services, it may be possible to capture fractions of the travel demand market for transit.

On the basis of discussions with local transit agencies and experience in other areas, it was felt that a range of 3 to 15 percent of market capture by transit of the current demand would represent a realistic scenario. Further, it is generally agreed by transit experts that actual market capture by a new transit service is likely to start at a low end; however, service quality becomes the ultimate determining factor of transit ridership over the long run.

The business plan represented in this report is based on a modest market capture of 5 percent of the travel demand for express bus service with no intermittent stop between the P-zones. Table 6 presents data on expected ridership (based on a 5 percent market capture), individual segment lengths for each sector. A review of Table 6 indicates that ridership on Sectors 1, 2, 3, 5, and 7 is reasonably balanced between different segments (P-zone pairs) of these sectors. In Sectors 4, 8, and 9, on the other hand, there is a much greater lack of balance in ridership between different segments. Sector 6 is the only sector that is based on a singular market in one direction with negligible ridership in the reverse direction.

In developing business plans, the computation of size of bus fleet is based on the ridership at the maximum loading section (MLS). A lack of balance in ridership between different segments is likely to reduce the cost-effectiveness of the system, because of the large vacancy rate at the low-ridership segments. Thus, efforts to develop business plans for this project were limited to Sectors 1, 2, 3, 5, and 7 only.

Fleet Size, Headway, and Cycle Time

Using methodologies followed by transit agencies and suggested in textbooks, the fleet size, headway, and cycle times for each of the five sectors were computed (*8*). The following formulations were used in these computations:

$$\mathrm{Nv} \geq (\mathrm{Dp} \times Q)/(\mathrm{Vc} \times 60)$$

$$H = Q/\mathrm{Nv}$$

where

- Nv = number of buses required (fleet size),
- Dp = hourly passenger demand at the maximum loading section (MLS),
- Q = cycle time (min) = Td + Ts + Tc,
- Td = driving time (min),
- Ts = boarding and unboarding time (min),
- Tc = layover time (min),
- H = headway (min), and
- Vc = number of passengers by each bus.

As indicated earlier, the value oı Dp was taken as the demand at the MLS compiled from information presented in Table 6. The following set of assumed values was used in computing the headway and fleet size.

TABLE 6 EXPECTED RIDERSHIP DATA BY P-ZONE PAIRS FOR NINE SECTORS ON THE BASIS OF A 5 PERCENT MARKET CAPTURE RATE

Sector	P-Zone	Demand (Peak-Hour Ridership)	Distance (miles)	P-Zone	Demand (Peak-Hour Ridership)	Distance (miles)	P-Zone
* 1	14-Mt. Clemens	592	9.44	13-Sterling Hts.	531	7.03	21-Warren
	21-Warren	274	7.03	13-Sterling Hts.	104	9.44	14-Mt. Clemens
* 2	14-Mt. Clemens	696	8.25	22-East Detroit	454	5.38	21-Warren
	21-Warren	268	5.38	22-East Detroit	134	8.25	14-Mt. Clemens
* 3	13-Sterling Hts.	356	7.42	12-Troy	148	11.75	21-Warren
	21-Warren	197	7.03	13-Sterling Hts.			
4	20-Madison Hts.	69	3.69	18-Royal Oak	428	7.17	12-Troy
* 5	18-Royal Oak	176	3.44	19-Ferndale	277	6.28	17-Southfield
	17-Southfield	116	6.28	19-Ferndale	166	3.44	18-Royal Oak
6	25-Livonia	671	6.79	16-Farmington	274	6.92	17-Southfield
* 7	38-Grosse Ile	919	8.6	36-Southgate	320	6.44	37-River Rouge
	37-River Rouge	215	8.32	33-Dearborn			
	33-Dearborn	31	8.32	37-River Rouge	252	6.44	36-Southgate
	36-Southgate	174	8.6	38-Grosse Ile			
	36-Southgate	541	8.26	33-Dearborn			
8	33-Dearborn	495	7.88	32-Dearborn Hts.	70	7.88	33-Dearborn
9	2-Waterford	729	6.25	3-Pontiac	42	6.25	2-Waterford

* Selected for Developing Business Plans

Dp = Hourly demand at the MLS (based on a 5 percent market capture),
Vc = 50 passengers per bus (no standees),
Vm = 30 mph (maximum speed),
Tc = 2.5 to 5.5 min.

It was also assumed that during the off-peak hours the demand would be reduced by 50 percent. Thus, 50 percent of the fleet size of that computed for peak-hour operation would be required for off-peak operation at twice the headway. Last, the most important assumption was that express, nonstop service would be provided between the P-zone pairs with an effort to maintain an average speed between 20 and 25 mph. Local services may provide additional revenue, particularly because they allow a seat to be sold several times. However, the assumption of express, nonstop service is consistent with the presumed existence of markets for zone pairs with longer travel times as explained earlier. The basic operating data compiled for the five sectors are presented in Table 7.

Operating Cost and Revenue Data

Operating cost and revenue were compiled for privatized transit operation for the following scenario using the fleet and headway data presented in Table 7.

> Peak-hour services are to be provided during a.m. two hours (7:00 to 9:00 a.m.) and p.m. two hours (4:00 to 6:00 p.m.). Off-peak hour services are to be provided for seven hours (9:00 to 4:00 p.m.) at twice the peak-hour headway with 50 percent size of fleet. The private contractor will have the complete responsibility of providing buses (seating capacity 50), operating, and maintenance (including vehicle storage) services for a contractual rate of $70 per bus-hour. (Note: This contractual rate was purposely assumed to be higher than the hourly rate quoted by the providers during the survey, to offset unforeseen increases in energy, price, inflation, etc.) The transit agency will have the responsibility of monitoring the contract, collecting fare-box revenue, ensuring proper service level, and developing and enforcing quality standards for a 20 percent overhead. The effective hourly rate for providing services would thus amount to $84 per hour (including overhead). Although fleet size is computed using 100 percent vehicle occupancy at the MLS, a conservative estimate of 70 percent vehicle occupancy was used for computing fare-box revenue. A bus fare ranging from $0.75 to $1.50 per ride was assumed. Services are to be provided for 255 working days per year. Fare-box revenue was computed for four peak hours using the peak-hour ridership data. For seven hours of off-peak operation, fare-box revenue was estimated as 50 percent of peak-period revenue.

Independent of the privatization approach, the costs of the operating services were also derived by the fully allocated cost (FAC) method, a technique increasingly applied by transit agencies when all the cost elements are apportioned into different variables (*8*). The FAC model developed for large buses for the regional transit agency SMART was used to compile operating cost data (*9*):

SMART Agency Model:

$$\text{FAC} = \$1.025X + \$21.03Y + \$80{,}516Z$$

where

FAC = annual fully allocated cost,
X = annual total vehicle-miles,
Y = annual total vehicle-hours, and
Z = number of hours required to provide peak service.

The data compiled on operating cost and revenue are presented in Table 8. The annual operating cost derived by the FAC method in all the five cases analyzed is somewhat higher than the cost of privatized operations as computed under the appropriations stated earlier. In all the cases analyzed, deficits are incurred because of a shortfall between operating cost and fare-box revenue. The data presented in Table 8 are based on two conservative assumptions: (a) an hourly rate of $84 of operating cost, and (b) 70 percent vehicle occupancy. Con-

TABLE 7 BASIC OPERATING DATA FOR FIVE PROPOSED SECTORS

Sector	Peak/Off-Peak	Dp (Passengers/ Hour)	MLS (i-j pair)	Headway (II) (minutes)	Cycle Time (Q) (minutes)	Fleet Size (# of buses)	Av. Speed (mph)
1	P	472	13-21	6	96-100	16	20.0
	O	236	13-21	12	84	7	23.5
2	P	433	22-21	6	66-70	11	23.5
	O	217	22-21	12	60	5	27.3
3	P	178	13-12	12	60-70	5	22.5
	O	89	13-12	30	60	3	26.2
5	P	139	19-17	15	60-70	4	16.5
	O	70	19-17	40	60	2	19.5
7	P	503	26-27	5	100	17	28.1
	O	252	36-37	10	80-85	8	33.0

TABLE 8 COMPARISON OF FARE BOX REVENUE AND OPERATING COST

Sector	Fleet Size Peak/Off-Peak	Annual Operating Cost: Hourly Rate Method $84/hour	Annual Operating Cost: Fully Allocated Cost Method	Annual Fare-box Revenue (70% occupancy)	% Profit (Deficit): Hourly Rate Method $84/hour)	% Profit (Deficit): Fully Allocated Cost Method
1	P-16 O-7	$2,420,460	$2,746,595.00	$934,715.25	(61.4%)	(66.0%)
2	P-11 O-5	$1,692,180	$1,872,206.90	$989,068.50	(41.6%)	(66.0%)
3	P-5 O-2	$728,280	$817,742.95	$275,285.50	(48.5%)	(54.1%)
5	P-4 O-2	$642,600	$635,377.40	$347,807.25	(45.9%)	(45.3%)
7	P-17 O-8	$2,656,080	$3,612,311.00	$1,255,212.00	(52.7%)	(65.3%)

siderable reduction in deficit can be attained by reducing the hourly rate for operating cost and increasing the vehicle occupancy. For example, in Sector 1, a reduction in hourly rate from $84 to $45 alone would bring about a reduction in deficit from 61.4 to 27.9 percent.

CONCLUSIONS

The widely diverse travel patterns in our metropolitan centers, along with continued increase in operating expenses, have posed serious financial problems to our public transportation agencies. Privatization is considered by many as a viable tool for improving suburban mobility; however, there are not many examples of successful implementation of such programs in the United States today.

A procedure for identifying markets for transit privatization and a case study application on a large metropolitan area are described. First, a demand-based approach was developed that identifies spatial groups in the study area in the form of zone pairs with high travel demand. A procedure for identifying potential markets from these high demand sectors was identified by considering other explanatory variables, e.g., travel time, congestion levels, and land use density. Third, a procedure for identifying interested private providers was developed through a two-phase survey. Last, operating plans were developed on the basis of an assumed market capture from all available modes by transit service to be provided by the private agency.

This methodology was applied to the Detroit suburban area, focusing primarily on the travel demands between suburban communities in the three-county Detroit metropolitan area. The analysis resulted in a total of 53 candidate markets that were narrowed down to 14 potential markets by two independent priority ranking procedures. These markets were then merged in various combinations to provide a total of five sectors in which privatization of transit service appears feasible. This is further attested by a positive provider response that was conducted as a part of this study.

The data requirements for the proposed procedure include information on zonal travel, network, land use, and congestion levels. Because most planning agencies are likely to have access to this type of information, the procedure appears to be transferable for application at most regional and local levels.

It can be argued that the proposed methodology of market identification does not specifically address the question of user choice between public versus private operation. Because any user preference survey was beyond the scope of the project, the privatization aspect, as used by the authors, is indeed a policy decision, serving as a starting point for the analysis presented. It is the basic premise of this research that high-quality transit services, whether private, public, or privately operated under public control, have a higher potential of penetrating the market that is currently dominated by the private automobile. The authors' justification of associating privatization with these markets is borne out by considerable suggestive evidence in the literature that privatization, because of is competitive environment, is likely to result in higher quality of service.

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