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**The Knoxville Tennessee Transportation
Brokerage Demonstration:
An Evaluation**

**Final Report
August 1979**

Service and Methods Demonstration Program



**U.S. DEPARTMENT OF TRANSPORTATION
Urban Mass Transportation Administration and
Research and Special Programs Administration
Transportation Systems Center**

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16. Abstract <p>The Knoxville Tennessee Transportation Brokerage Demonstration was conducted from October 1975 through December 1978. In this first metropolitan, multi-modal implementation of the brokerage concept, an organization known as the Knoxville Commuter Pool (KCP) attempted to identify and match transportation demand and supply across a variety of users and providers, and to effect legal and regulatory reforms conducive to the improvement of transportation services. Primary emphasis during the course of the demonstration was on serving two market segments: commuters and social service agencies.</p> <p>A major aspect of KCP's commuter-oriented activities was the large scale surveying of employees at their worksites and their subsequent computer matching with buses and/or with other commuters having similar travel patterns. KCP also purchased fifty-one vans and leased them to individual commuters as part of an operational vanpool program designed to demonstrate the viability of this mode and thereby to encourage the growth of a large private vanpool fleet. Implementation of the vanpool program required significant changes in state regulatory law and in the availability and cost of insurance for vanpools; however, KCP's active role as an advocate for all forms of ridesharing resulted in a variety of important changes in Tennessee's laws affecting other public transportation modes as well.</p> <p>KCP's activities regarding social service agencies began with a survey to identify agencies which offered or were interested in offering transportation services to clients; interested agencies were then dealt with individually, eventually resulting in the establishment of three new services.</p> <p>While this experiment in brokerage had great success in its efforts for institutional change, its overall impact on travel behavior in the Knoxville area was quite limited. Nevertheless, the brokerage concept, through the creation of a mechanism for testing new types of coordinated activities, appears to offer the flexibility to search for better solutions to our transportation problems.</p>					
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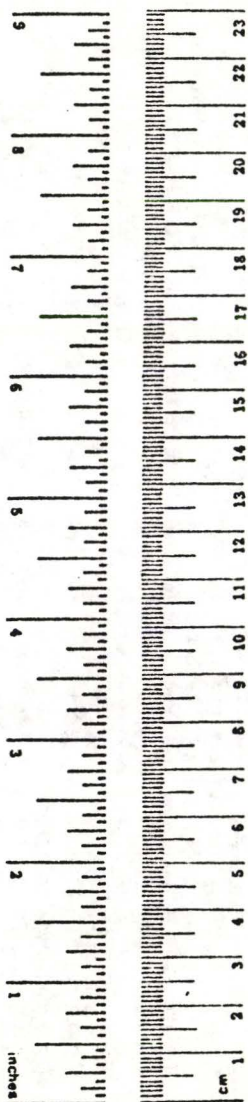
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METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

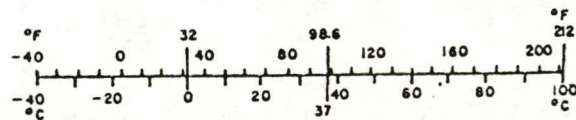
Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
in	inches	2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
AREA				
in ²	square inches	6.5	square centimeters	cm ²
ft ²	square feet	0.09	square meters	m ²
yd ²	square yards	0.8	square meters	m ²
mi ²	square miles	2.6	square kilometers	km ²
	acres	0.4	hectares	ha
MASS (weight)				
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
VOLUME				
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft ³	cubic feet	0.03	cubic meters	m ³
yd ³	cubic yards	0.76	cubic meters	m ³
TEMPERATURE (exact)				
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price \$2.25, SD Catalog No. C13.10-286.



Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
AREA				
cm ²	square centimeters	0.16	square inches	in ²
m ²	square meters	1.2	square yards	yd ²
km ²	square kilometers	0.4	square miles	mi ²
ha	hectares (10,000 m ²)	2.6	acres	
MASS (weight)				
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
VOLUME				
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m ³	cubic meters	35	cubic feet	ft ³
m ³	cubic meters	1.3	cubic yards	yd ³
TEMPERATURE (exact)				
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



PREFACE

The Knoxville Transportation Brokerage Demonstration was funded by the U.S. Department of Transportation under the UMTA Service and Methods Demonstration Program. As part of that program, Multisystems, Inc., under contract to the U.S. DOT's Transportation Systems Center, has prepared this Final Evaluation Report.

The report is based on analyses of data from many sources, including the Knoxville Commuter Pool, the Knoxville Department of Public Transportation Services, the University of Tennessee, the Metropolitan Planning Commission, and the East Tennessee Development District. The authors wish to express particular thanks to the following individuals for their assistance to the project:

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LIST OF ACRONYMNS

AJCC	Arnstein Jewish Community Center
ATU	Amalgamated Transit Union
CBD	Central Business District
CETA	Comprehensive Education and Training Act
CPI	Consumer Price Index
DPTS	Department of Public Transportation Services
DOT	Department of Transportation
ETDD	East Tennessee Development District
FAUS	Federal Aid to Urban Systems
FHWA	Federal Highway Administration
ISO	Insurance Services Office
KACRC	Knoxville Area Comprehensive Rehabilitation Center
KASH	Knoxville Area Short Hop
KAVA	Knox Area Vanpoolers' Association
KCP	Knoxville Commuter Pool
KECDC	Knoxville Early Childhood Development Center
KT	Knoxville Transit
KTA	Knoxville Transportation Authority
MPC	Metropolitan Planning Commission
MPO	Metropolitan Planning Organization
PSC	Public Service Commission
RTA	Regional Transportation Authority
SMD	Service and Methods Demonstration
SMSA	Standard Metropolitan Statistical Area
SSA	Social Service Agency
TDOT	Tennessee Department of Transportation
TSC	Transportation Systems Center
TVA	Tennessee Valley Authority
UC	Union Carbide
UMT	Urban Mass Transportation
UMTA	Urban Mass Transportation Administration
USDOT	United States Department of Transportation
UT	University of Tennessee
VIS	Volunteers Insurance Service
VMT	Vehicle Miles Traveled
YMCA	Young Men's Christian Association
YWCA	Young Women's Christian Association

1. EXECUTIVE SUMMARY

1.1 INTRODUCTION

From October 1975 to December 1978, Knoxville, Tennessee was the site of an UMTA Service and Methods Demonstration of the nation's first metropolitan transportation brokerage service.¹ A transportation broker identifies and matches individual traveler needs with a range of existing and/or new urban transit services to provide a more efficient and effective transportation system. The broker often acts as an advocate for shared-ride modes,² and in this capacity may work for whatever institutional or regulatory changes are required to facilitate the expansion of their use.

In the Knoxville demonstration, the brokerage (known publicly as the Knoxville Commuter Pool - KCP) was initially operated by the Transportation Center of the University of Tennessee (UT), under contract to the City of Knoxville. After twenty months, operations were moved to the newly formed Department of Public Transportation Services within the city government. Although the city itself was the demonstration grantee, KCP's service area nominally included the sixteen counties of the East Tennessee Development District; however, brokerage activities were primarily focused on the Knoxville Standard Metropolitan Statistical Area (SMSA) (also referred to as the "core area"), which had a 1975 population of 435,400.

Project expenditures during the thirty-eight months of the demonstration totaled approximately \$844,000. Of this amount, about \$780,000 came from the UMTA Service and Methods Program

1 This report covers the first thirty-two months of the demonstration (i.e., the "evaluation period") in detail, from the project's inception until June 30, 1978. However, where available, data has also been included for the period from July 1, 1978 to the actual end of the demonstration on December 31, 1978.

2 E.g., carpooling, vanpooling, and conventional mass transit.

(Section 6) and the remainder was received from a variety of local, state, and federal agencies.

1.2 PROJECT BACKGROUND AND SCOPE

The history of express bus and commuter ridesharing programs in Knoxville dates back to 1973, when the first of a series of successful express bus routes serving the downtown was implemented. From the outset, employees of the Tennessee Valley Authority (TVA), the downtown's largest employer, formed the nucleus of the service's ridership. In 1975, TVA introduced its Commuter Pool Demonstration Program, which provided its employees with monetary incentives for pooling, assistance with carpool formation, and a Vanpool Demonstration Project. This program further spurred the growth of express bus services, and by the spring of 1978, sixteen routes were in operation. TVA's program also provided an example of how effective a comprehensive ridesharing program could be.¹ From November 1973 to January 1977 the percentage of TVA's downtown employees driving alone dropped dramatically from 65% to 18%.

Concurrent with the growth of express bus services, UT's Transportation Center was engaged in a comprehensive program of study for the U.S. Department of Transportation in the area of employer-based rideshare matching. A major conclusion of this effort was that an areawide "brokerage system," involving a broad range of transit and paratransit modes, seemed the most promising approach to solving many traditional transportation problems. To implement and test this recommendation, the City of Knoxville (with help from UT) applied to UMTA for demonstration funding in April 1975.

The brokerage project's original scope (as detailed in the grant application) encompassed twelve specific tasks. These can be summarized as follows:

¹ Albeit under the best of circumstances (i.e., strong management commitment by a single employer, financial incentives, and a shortage of parking in the area).

- Identify (primarily through surveys and a telephone switchboard) potential demand of commuters, social service agency clients, and the jobless, as well as the potential demand for goods movement (prearranged travel only).
- Identify the following types of existing and potential suppliers: Knoxville Transit (KT) (fixed route/subscription express bus), charter bus operators, taxi or limousine operators, individuals with cars or vans available for ridesharing, and small entrepreneurs with a fleet of available vehicles.
- Acquire a fleet of fifty-one "seed vans" and make these available to private individuals on a lease basis (\$332,624 of the UMTA grant was for this purpose); establish and operate maintenance, accounting, and control procedures for these vans.
- Match potential users and suppliers using a computer program and foster, either formally or informally, agreements between riders and providers for prearranged service in areas currently not served by transit.
- Act as ombudsman, providing information on available transportation services, costs, insurance, etc.
- Maintain liaison with Knoxville Transit and various public agencies involved in the provision of transportation services and facilities.
- Actively promote institutional/regulatory changes which will facilitate the operation of the brokerage system and/or the broker-managed services.

Even before the grant application was submitted, UT staff met with representatives of the Amalgamated Transit Union (which represented KT employees) and the U.S. Department of Labor in discussions over labor protections required by the use of federal funds. A major issue was the potential for competition between the paratransit services to be fostered by the demonstration and existing (unionized) transit services. Negotiations proceeded slowly, and the actual 13(c) agreement was not signed until October 25, 1975 (delaying the planned start of the demonstration by almost four months).

The 13(c) agreement, together with two supporting agreements, stipulated that:

- All major maintenance (except warranty and emergency work or work performed by the regular operator/driver) required on seed vans either garaged or serving within Knoxville would be performed by KT's (unionized) employees.
- The size of the bargaining unit would be guaranteed for a period of four years or until the seed vans were "removed from service" (whichever occurred first).
- Seed vans would be targeted for areas not served by conventional transit.
- Any buspools formed by KCP would be operated by KT.

Although from the outset it was never KCP's intention to retain its van fleet indefinitely, the question of how (or when) the brokerage would terminate its role as a lessor had never been directly addressed and the subject was not a part of the original 13(c) negotiations. However, when the duration of the demonstration was later extended by eighteen months and a decision was reached to sell the fleet to existing driver/operators (under the stipulation that they continue to operate a pool), an amendment to the existing agreement became a necessity. Following three months of discussions, an amendment was signed in September 1977 which contained the following provisions:

- 1) extension of the duration of the protections from 4 to 5 1/2 years;
- 2) the elimination for vans sold by the city of the requirement that van maintenance be performed by KT personnel; and
- 3) the requirement that the sale or transfer of any van to a third party operator contain an agreement that he or she not actively solicit nor carry riders in the van when both the residence of the rider and his or her work are within a quarter mile of an active bus line operated by KT or any other common carrier under contract to or franchise from the city.

In addition, the city agreed to promptly investigate any claim of violation under the agreement and to take any action necessary to remedy the situation.

1.3 LEGISLATIVE AND REGULATORY ACTIVITIES

Shortly after the demonstration officially began (immediately following the 13(c) sign-off in October 1975), it became apparent that the initial scope was too broad to be accomplished in the twenty remaining months, and that a paring of activities would be required. A key factor in this regard was that the elimination of institutional barriers, some of which had not been recognized prior to implementation, had quickly become a major area of activity for the broker. These institutional efforts were undoubtedly to become the most successful and far reaching aspect of the demonstration, but they were extremely time consuming and siphoned the limited staff away from other (planned) brokerage activities. Although the work eventually spread to other areas, initial efforts were directed at eliminating all barriers to the implementation of KCP's seed vanpool program and the growth of privately owned vanpools.

Even before the grant application was submitted, UT staff contacted Tennessee's Public Service Commission to determine how existing statutes would be applied to vanpooling. The Commission ruled that vanpools were public carriers under the law, and thus subject to the common carrier certification process. Since the continuation of this policy would have been virtually fatal to the vanpooling program, KCP set out to free the mode from such regulation. After a great deal of work, success came on March 28, 1976, with the signing of a bill permanently exempting commuting vehicles carrying fifteen or fewer passengers from any government regulation, except as deemed necessary for safety purposes and to ensure adequate insurance coverage.

One of the motivations behind KCP's drive to eliminate the need for any kind of certification of vanpools was the implica-

tions such a requirement would have had on the cost and availability of liability insurance. When KCP first sought insurance for its own fleet (just before the start of the demonstration), it was turned down by approximately a dozen carriers or agents before a broker was found who was able to convince an underwriter to provide coverage. Even then, the premium was 86% higher than for comparable coverage on a private automobile. Since the cost of insurance is a major component of vanpool operating cost (and consequently of passenger fares), the higher the insurance premium, the less competitive vanpooling becomes. KCP therefore set as a goal the availability of reasonably priced vanpool insurance for both fleet and privately owned vehicles.

Again (after considerable effort), KCP's work proved successful. In early 1977, the Insurance Services Office (ISO), an industry supported organization which collects and analyzes data and publishes classification and rating guides, announced a new nationwide policy which rated all privately owned vanpools the same as passenger vehicles and created a new classification for leased and employer-owned vans. Although the existence of these new national rating schedules did not guarantee the availability of insurance on a local basis, by the end of the demonstration five companies in the Knoxville area were offering insurance to private vanpoolers at ISO rates.

While KCP's institutional activities in support of vanpooling were the earliest of the demonstration and the most important in terms of permitting the implementation of planned demonstration elements, they were by no means the only area of effort and of success. In 1977, KCP's leadership proposed and helped draft extensive state legislation supportive of general brokerage goals and objectives. Among the changes resulting from these efforts were:

- elimination of the remaining vestiges of state regulation of vanpooling (i.e., the safety and insurance provisions retained in the 1976 bill)

- authorization for the Public Service Commission to designate certain counties as "citizen transportation areas" (thus allowing the use of church and/or privately owned vehicles for passenger service) and to allow motor carriers to drop unprofitable routes (under certain circumstances).
- legislation allowing motor carrier experimentation with new routes for up to six months without the need to obtain specific certification.
- extension of state insurance statutes regarding "underinsured motorist" coverage, resulting in better protection for those in high occupancy vehicles.

KCP also developed a new taxi ordinance for Knoxville which modernized the allowable fare structure and range of services, making the business more financially viable. For example, the ordinance legalized and endorsed shared riding, opening the door to a wide range of specialized new services such as feeders to conventional transit. Clearly, the broker's institutional successes were impressive in both number and scope.

However, the demonstration was not without its political problems. In 1977, the city's Department of Public Transportation Services (which had responsibility for the brokerage and several months later would become its home) became embroiled in a series of controversies, including a particularly heated six week long transit strike and emotional disputes over transit service cutbacks aimed at controlling the city's sharply escalating transit deficit. Although KCP was not directly involved in either of these issues, at least a vocal minority of the public and of the local transit union membership perceived the broker's efforts to be either detrimental to or competitive with the provision of traditional fixed route transit services, which these groups sought to protect. Consequently, they fought to limit the influence and control of brokerage proponents. This opposition proved to be a major thorn in the broker's side. As a public relations problem, it sapped valuable staff time away from other brokerage functions; it also stymied the implementation of governmental changes in organization which might have increased the broker's flexibility.

1.4 COMMUTER-ORIENTED ACTIVITIES

The thrust of KCP's approach to commuter travel was to promote and facilitate the use of ridesharing modes (including, but not necessarily limited to, carpooling, vanpooling, and bus transit). The primary tool in this effort was an areawide employer-based surveying program designed to identify interested commuters. Eight hundred twenty-nine (829) employers were contacted, and three hundred ninety-one (391) participated in this process. (Any interested commuters at non-participating companies could submit the necessary information by telephoning KCP.) By June 1978, a total of 23,815 employees (about 12% of the market population) had completed surveys, and pertinent data concerning their travel patterns had been entered into a master data file.

Computer matching techniques (including modified FHWA software and later KCP-designed systems) were used to develop and print "matchlists" for each individual; these matchlists contained a list of other commuters with similar travel times, origins, and destinations with whom the matchlist recipient might pool. For those employed in downtown Knoxville, information about potentially suitable scheduled services (i.e., operating vanpools and/or local or express buses) was also provided. The average matchlist contained ten names of potential pool mates; of those eligible for scheduled service information, approximately 45% were matched with one or more bus routes or vans.

Actual utilization of the matchlists, however, was not as widespread as had been hoped. Although about 22% of all matchlist recipients contacted others and/or were contacted about forming or joining a pool, by June 1978 the percentage of all list recipients influenced into making or modifying ridesharing arrangements was less than 7%. Estimates are that 0.8%¹ of core area commuters were influenced in some way into new ride-

¹ Range is $\pm 0.7\%$; see Survey G2.

sharing arrangements by KCP (regardless of whether a matchlist was involved).¹ These statistics include those individuals who shifted among ridesharing modes and those who began ridesharing and later stopped. Thus, the overall impact of the project in terms of mode shares, roadway congestion, energy savings, etc. was quite limited.

In the later stages of the demonstration, KCP implemented a personalized telephone follow-up procedure designed to increase new ridesharing arrangements among matchlist recipients. Indications (based on limited data) are that this approach may have been as much as 130% more effective than simple distribution of matchlists, in terms of the percentage of people actually shifting modes.

Although the project's impact on the area's travel patterns was indeed limited, the foundation of the brokerage concept is its attention to individual (rather than aggregate) needs, and from the perspective of those helped by KCP, its impact was substantial. Over two thousand people who telephoned the brokerage were provided transportation assistance or information during the demonstration. While many of the calls related to services provided by organizations other than KCP, and were therefore referred elsewhere, the brokerage obviously served a much needed community function as a central point for transportation inquiries. In two instances when underutilized bus routes were terminated, KCP worked with the affected riders to arrange car and vanpools to meet their needs. Perhaps as many as a thousand individuals (including over one hundred drivers) were introduced to vanpooling for the first time.

KCP's purchase of fifty-one vans for lease to individual driver/operators (as part of its commuter vanpooling program) was a unique aspect of the demonstration. The intent was to use these "seed" vans to demonstrate the viability of vanpooling and thereby spur the growth of a large privately owned fleet of vanpools. Throughout the demonstration, KCP was quite

¹ KCP's impact outside the core area is believed to have been negligible.

successful in leasing its van fleet (except for a few vehicles deliberately retained for backup and promotional purposes), and in keeping it leased; unfortunately there is no way to determine how many vans could have been leased if there had been no supply constraint.

Van driver turnover averaged about seven percent of the operating fleet each month during the final year of the evaluation period. Average daily commuting distance was sixty-one (61) miles. Average occupancy over the course of the evaluation period was 10.5, including the driver; since KCP's suggested riders' fares were calculated to allow break-even operation with eight paying passengers (and the driver riding free),¹ the average occupancy indicates that many drivers either made a "profit" or reduced rider fares (this choice was at the driver's discretion). Interest in driving a van was expressed by about 9% of the individuals in KCP's master file, and when KCP decided to sell off its vehicles to existing driver/operators, it had relatively little difficulty.

However, KCP's anticipated development of a large fleet of private vanpools apparently did not materialize, at least as of the end of the demonstration. Aside from the "seed" vans sold by the city, only six additional vanpools were known to be operating at the end of the demonstration. Their operators, as well as the individuals who purchased seed vans, belonged to the KCP-established Knox Area Vanpoolers Association, which was formed to help vanpool operators manage their businesses and to provide for discounts on automotive parts and service for its members. Other efforts to help spur private van ownership included work with the Tennessee Department of Transportation resulting in a state-funded vanpool abort program to protect operators from capital loss and provide for 100% financing on vehicle purchases. However, most of these inducements became operational rather late in the demonstration, and there was only

¹ This was the case for twelve-passenger vehicles, which constituted the vast majority of KCP's fleet. For the few fifteen-passenger vans, nine paying passengers were required to break even.

limited opportunity for direct promotion of private ownership before the conclusion of the project.

KCP's success in keeping a high percentage of its van fleet leased resulted in a total profit (i.e., net revenue) of \$2,333 for vanpool operations over the evaluation period (before administrative expenses of \$60,466). However, during the final twelve months of the period, after warranty service for much of the fleet had expired, maintenance costs rose very sharply, and the operation sustained a loss of \$5,474. (Allowances for maintenance were significantly lower than actual expenses during this period, partly because of expenditures made in readying the vans for sale.)

1.5 SOCIAL SERVICE AGENCY TRANSPORTATION

Through a survey distributed to nearly 200 social service agencies in the Knoxville area, KCP identified twenty-two possibly interested in having an outside organization provide transportation services to clients--either to and from the agencies themselves or for use in specific agency activities (e.g., field trips). In four cases, KCP performed "transportation audits" to determine the agency's needs and possible service solutions; in two of these instances, KCP contracted with both a local van operator and the agency to implement the recommended service; in another instance, KCP provided information to an agency which enabled it to make its own arrangements (at considerably lower cost than had been available before the agency contacted KCP). While these activities were helpful to a small number of agencies, it did not have the wide ranging acceptance and impact for which KCP's leaders had hoped; one reason for this may have been the somewhat limited attention this area received during the demonstration.

1.6 CONCLUSIONS AND RECOMMENDATIONS

As the first implementation of the transportation brokerage concept on a metropolitan basis, the Knoxville demonstration has provided a wealth of information for prospective brokerage

operators. Over its thirty-eight months of operation it was a test bed for a variety of approaches to specific brokerage functions, helping to determine which of these hold promise and which apparently do not.

Since social service agency activities were a primary victim of the project's persistent shortage of staff, the demonstration's limited achievements in this area seem an inappropriate measure of the value of KCP's approach to meeting agency needs. The project demonstrated the feasibility of having a brokerage simultaneously contract with both the supplier and the agency, but KCP's role as coordinator and monitor was time consuming, and the intended benefit of "optimal" matching of supply and demand was unachievable on so small a scale. It remains to be seen whether the approach would be cost-effective given sufficient time to develop.

KCP's basic approach to encouraging commuter ridesharing (i.e., employee surveying, matching, and mass media promotion) and its overall impact on mode choice and related measures were reasonably similar to that of the majority of the carpool demonstration projects of the mid-1970's. In light of these experiences, it seems reasonable to conclude that, at least under existing economic conditions and incentives, the tactic of matchlist distribution without active follow-up was destined to have a limited effect. The hypothesis that a lack of knowledge about possible pool-mates was the main barrier to increased pooling simply is not supported by the data. Apparently most of those people who wished to pool found a way to do so on their own, and those who did not already have a desire to pool were not swayed enough to act by simply receiving a matchlist or literature extolling the economic and/or societal benefits of shared riding.

While the evidence is quite limited, it appears that the more personalized approach embodied in KCP's relatively new telephone follow-up marketing campaign holds considerably more promise than matchlist distribution alone in its ability to achieve modal diversion. Interestingly, KCP's initial marketing

of the vanpool concept also relied on personal contact (i.e., KCP actually telephoned all potential vanpoolers to try to sell them on the program and to help "break the ice"); it too was felt to be very effective. Further research into this kind of promotion appears to be warranted.

The implementation and operation of KCP's unique vanpool program clearly demonstrated the feasibility of such an undertaking, and a great deal of detailed knowledge was gained about how such a program should be organized, operated, and managed. However, the effort apparently failed to achieve its ultimate objective--the widespread individual ownership and operation of vanpools.¹ To some extent, this probably reflected the fact that while KCP had been very successful in eliminating or overcoming the institutional barriers to its own seed program by mid-1976, it was still actively engaged in trying to ease the way for privately owned operations two years later. Furthermore, staffing limitations precluded using a "personalized approach" to promote private vans. Lastly, by making its own van fares as low as possible (to attract ridership), KCP essentially undermined the incentive for private ownership. It is clear that if a private owner had tried to match KCP's fares, he or she would have been less profitable than a lessee, if profitable at all. Given this fact, plus the risk associated with buying rather than leasing, KCP's fare structure may have kept demand for seed vans high at the expense of private fleet growth. With the sale of KCP's fleet by the end of the demonstration, this conflict was removed.

It is important to recognize that the seed vanpool program would never have been viable without the institutional changes which were achieved in the early stages of the demonstration, and that the most important long range impacts of the Knoxville broker's existence are likely to stem from its legislative and regulatory accomplishments. However, the benefits of many of

¹ At least as of the end of the demonstration.

these efforts are geographically localized, and many of the same barriers may face future brokers. Consequently, institutional reform is likely to remain a major and highly critical component of brokerage operation for some time to come.

Perhaps the most valuable lesson of the Knoxville experience is that brokerage is an extremely complex undertaking, demanding exceptional planning to be carried out effectively. Where institutional changes are required to allow the implementation of brokered services, the need for careful planning is probably at its greatest. KCP was extraordinarily successful in its pursuit of legislative and regulatory reform, but there is little question that these accomplishments were achieved at least partially at the expense of other brokerage functions, which were consequently understaffed. In fact, staff shortages were pervasive throughout the demonstration, largely as a result of the ambitious goals KCP had set for itself. While KCP's extremely broad scope may or may not have been appropriate for an experimental demonstration, it seems clear that future brokers would be wise to carefully match their goals, staffing, and funding, based on a critical appraisal of what can realistically be accomplished and in what period of time.

Regardless of its origins, Knoxville's persistent shortage of staff serves to underscore the need for further research not only about which techniques are most effective, but about how basic brokerage functions might be more efficiently accomplished. The most pressing need appears to be in the area of employer-based surveying and master file updating, on which KCP spent a substantial percentage of its resources. While an attempt was made to gain the participation of as many employers as possible, concentration on the area's largest employers and on those most likely both to cooperate and to employ the best ridesharing prospects (based on criteria yet to be identified) would have reduced the effort required and increased the value of this activity considerably (albeit at some loss of coverage). Master file updating (which proved to be extremely demanding in terms of staff time, and which fell progressively behind the

planned twelve to fifteen-month schedule as the demonstration proceeded) is undoubtedly one of the most critical areas for future research. Without reasonably up-to-date data, the value of the entire rideshare matching process is questionable.

In evaluating the brokerage concept, one must recognize that in the absence of a broker, people can and do manage to ride-share, and institutional reforms do occur (although often quite slowly). A basic question is which applications of the brokerage concept (if any) provide sufficient additional public benefits to justify their costs. While the benefits of the Knoxville demonstration were more limited than had been hoped, it was clearly a pioneering effort, involving experimentation with a small fraction of the possible range of brokerage functions, techniques, organizational interrelationships, etc. Research in these areas is continuing, and to some extent the environment in which future brokers will operate (at least in terms of energy costs and availability) may be significantly different than that faced by KCP. The result could be that future brokers will have considerably more impact on their communities than did this initial experiment. At the very least, the brokerage concept, through the creation of a mechanism for testing new types of coordinated activities in a multitude of areas, offers the flexibility to keep searching for better solutions to our transportation problems, rather than simply accepting the status quo.



2. INTRODUCTION

2.1 DEMONSTRATION OVERVIEW

2.1.1 Description of the Demonstration

Knoxville, Tennessee was recently the site of an experimental Service and Methods Demonstration (SMD) of a public transportation brokerage service in which a clearinghouse organization, the Knoxville Commuter Pool (KCP), sought to identify and coordinate transportation needs and services across a broad range of users, providers, and modes.

A transportation broker determines transportation needs principally on an individual traveler basis rather than the aggregate basis typically used in planning transit services. Needs are identified through general public marketing techniques and by working through employers, social service agencies, and other organizations to survey individuals within those organizations to determine peak and/or off-peak travel requirements. The broker also seeks to identify specific transportation service suppliers to fill these needs. Suppliers may be either existing public or private providers, such as the Knoxville Transit Division of the American Transit Corporation (KT), charter bus companies, or new suppliers, particularly individual entrepreneurs with vans or cars. The broker then matches these specific transportation needs and services to provide a more efficient and effective transportation system. The goal of the broker's efforts is to make better use of existing transportation resources, including buses, autos, vans and taxis, regardless of ownership, to increase both supplier productivity and individual mobility.

In pursuing this goal, KCP promoted and achieved significant institutional/regulatory changes which removed existing barriers and thus facilitated the operation of the brokerage system and

broker-related services, primarily with regard to publicly and privately owned vanpools. (As part of the demonstration, KCP purchased fifty-one "seed vans" for lease to private individuals as a promotion of the vanpooling concept.) Lastly, KCP served as an ombudsman, providing information on available transportation services, costs, insurance and regulatory requirements, and a range of other topics.

2.1.2 Demonstration Objectives

The Knoxville Transportation Brokerage Demonstration was designed as one approach toward achieving a variety of local objectives:¹

- reduction in vehicle-miles traveled (VMT), with attendant improvements in environmental and traffic conditions
- reduction in energy consumption
- provision of balanced transportation facilities for rural areas
- improved employment opportunity, especially for the rural poor
- improved goods movement, coordinated with passenger transportation services
- improved economic opportunities for small and minority businesses, primarily through provision of transportation services
- improved coordination among planning agencies

From the perspective of the SMD program, the brokerage system was expected to serve three of the program's five objectives:²

- increased transit coverage

¹ A full discussion of the background leading to development of the demonstration is contained in Evolution of the Knoxville Transportation Brokerage System (62).

² The other two program objectives are decreased transit travel time and increased transit service reliability.

- increased transit productivity
- improved service for the transit dependent

2.1.3 Demonstration Issues

As the first demonstration of an areawide transportation brokerage service, Knoxville provided a unique testing ground for experimenting with and assessing how to design, implement and operate such a system. While there was often little opportunity within the structure of the demonstration to try, and later compare, alternative brokerage approaches, there is much to be learned from Knoxville by prospective brokerage designers and operators through a review of the problems addressed, the approaches taken, and the results observed.

There is a very wide range of issues related to brokerage operation in general and to specific aspects of the Knoxville demonstration. This evaluation addresses the following major issues:

- What were the institutional, legal, and/or regulatory barriers to brokerage implementation and operation? To what extent were they overcome and how?
- How broad a range of brokerage functions was feasible and useful to implement? What were the costs associated with performing these functions? How effectively were they implemented?
- What was the public's response to the services offered by KCP? To what extent did these services lead to a shift to ridesharing modes?
- How effective was the "seed vanpool" approach in fostering the development of a privately owned vanpool fleet? To what extent did brokerage activities spur the introduction of new services by private providers in general?
- What was the market for the provision and coordination of transportation services for social service agencies?

2.2 ORGANIZATIONAL ROLES

The demonstration was conducted as part of the Urban Mass Transportation Administration's (UMTA) Service and Methods

Demonstration (SMD) Program, under the sponsorship of the City of Knoxville. The city, which contracted with the University of Tennessee (UT) Transportation Center in July 1975 for the performance of initial planning, operational, and managerial activities, assumed responsibility for all brokerage operations in July 1977. Initial funding for the project was \$1,116,539, consisting of \$997,959 in UMTA SMD grants (of which \$332,624 was for the purchase of the van fleet) and \$118,580 in local in-kind services. Although the demonstration period was later lengthened, which might have presented financial problems, the eventual sale of the seed vans and the influx of revenue from other unanticipated sources more than compensated for the extension. By the end of the demonstration, project expenditures totaled approximately \$844,000, with \$218,000 of the original SMD grant unspent and returned to UMTA.

2.3 EVALUATION OVERVIEW

This evaluation was performed by Multisystems, Inc. under contract to the Transportation Systems Center (TSC) of the U.S. Department of Transportation (USDOT), which has overall responsibility for the evaluation of all SMD projects. The evaluation principally covers the period from project inception to June 30, 1978; however, where available, data has been included up to the official end of the demonstration on December 31, 1978. Prior to Multisystems' involvement in the demonstration (which began in April 1976), evaluation activities were conducted by CACI, Inc.

2.3.1 Scope of The Evaluation

Demonstration projects implemented under the SMD Program are meant to serve as learning tools and/or as models for other locales across the country. In order to have maximum effectiveness in their respective demonstration capacities, it is essential that technically sound and objective evaluations be performed. In general, the focus of these evaluations is twofold: 1) to describe and assess the implementation/operation

process and the feasibility and impacts of the demonstration project at the particular demonstration site, and 2) to provide guidance for further applications of the demonstration concept in other locations. This report, which aims at both these objectives, constitutes a relatively comprehensive documentation and assessment of the Knoxville demonstration's planning, implementation, operation, and impacts.

The key questions surrounding the generalized brokerage concept fall into two major areas:

- viability of the transportation brokerage concept (and, if viable, under what conditions, with what methodologies, etc.)
- likely effects of a brokerage operation on transportation services and usage in the area

While the demonstration in Knoxville provides useful information with respect to certain particular types of brokerage approaches and services, it is necessarily limited in its ability to address these key issues. The brokerage concept is a very broad one which can be applied in a wide variety of ways. The Knoxville project dealt with a small number of transportation problems and solution options over a period of time. When later brokerage experiences provide additional information on the effects of other approaches, there should be sufficient data to help answer many of the basic questions associated with this concept.

2.3.2 Evaluation Data and Analysis Issues

This evaluation differed from other SMD evaluations for several reasons. The most significant factors were 1) the early and intensive involvement of the University of Tennessee in the evaluation process; and 2) the unique nature of the demonstration itself.

The Knoxville grant was unusual in its inclusion of an extensive set of evaluation activities to be performed by the grantee (or, in actuality, its contractor). Since UT had already planned and partially implemented these activities prior

to initiation of the formal SMD evaluation effort, and in consideration of funding limitations, every effort was made to integrate SMD and UT data needs. While this was generally successful, the delay in initiating the SMD effort had some lasting implications. For example, while an SMD-oriented survey of vanpool operators might have proved interesting, KCP was concerned that another survey of these individuals (after the sociologically-oriented one which had already been conducted by UT) might have negative effects on their decisions to vanpool.¹

The very nature of the project, involving assaults on major institutional barriers and dynamic changes in scope as new approaches became feasible, had great bearing on the course of the evaluation. The breadth of the project's scope--especially at the outset--made the collection of pre-implementation data impractical. As each new brokerage activity was introduced, evaluation plans were reviewed and modified (if needed) to ensure that critical aspects of the implementation would be captured and impacts would be measured. In general, this approach worked quite well, but on occasion shifts in demonstration plans resulted in unexpected difficulties. For example, plans to perform evaluative surveys of matchlist recipients in conjunction with KCP's planned comprehensive "resurveying" of the entire set of participating employers between mid-1977 and mid-1978 were precluded by KCP's decision to delay this activity.

The descriptions, analyses, and conclusions presented in this evaluation report are based on a variety of objective and subjective data sources including: KCP's operating records, surveys of both matchlist recipients and the general public, and interviews with public officials, union leaders, KT management, and a variety of participating and non-participating employers. Since the absence of pre-implementation data made

¹ Similar motivations precluded any attempts to obtain actual revenue data or fare schedules from operators or riders.

classic "before/after" comparisons infeasible, the analyses of changes in travel behavior, etc. are based on the use of post-facto survey questions (i.e., those which ask the respondent what he/she was doing at an earlier time) and on questions which addressed the respondent's current travel characteristics and specifically asked whether KCP was responsible for any changes in behavior.

2.4 READER'S GUIDE

The remainder of this evaluation is organized into eight chapters and three appendices. Chapter 3 describes the environment in which the demonstration occurred, including geographic and demographic characteristics, travel patterns, and exogenous factors. Chapter 4 presents the demonstration scope and implementation process, and describes each of the activities undertaken by KCP. Chapter 5 addresses the modal options available to Knoxville area commuters, as well as KCP's effectiveness in supplying individual clients with these options. Commuter response to KCP's services is examined in Chapter 6 and case studies of KCP's activities involving social service agencies are presented in Chapter 7. Chapter 8 presents the economics of KCP's operation, with particular attention given to the seed van program. Chapter 9 focusses on the impact on and attitudes of various groups affected by the demonstration. Finally, Chapter 10 summarizes major conclusions about the effectiveness of KCP's organization and activities, and examines the implication of these findings for future brokerage implementations.

Appendix A is a glossary of terms used in this report. Copies of each of the six surveys referenced in this report, as well as descriptions of their purposes, the populations surveyed, the sample selection procedures, the methods of administration, and a tabulation of responses are contained in Appendix B. Appendix C is a numbered list of all references directly mentioned or used in the preparation of this report.

3. DEMONSTRATION SETTING

This chapter, which describes the environment in which the demonstration occurred, serves two purposes: it facilitates the analysis of project impacts by providing a firm understanding of the geography, people and politics involved, and it serves as a foundation for considering the transferability of the demonstration's results to other regions. The chapter is divided into three main sections: geographic and demographic characteristics; transportation characteristics; and exogenous factors.

3.1 GEOGRAPHIC AND DEMOGRAPHIC CHARACTERISTICS

3.1.1 General Description of Knoxville, its SMSA and the East Tennessee Development District

Although the City of Knoxville and the Knoxville SMSA received the major share of KCP's services, the demonstration project area officially encompassed the sixteen-county East Tennessee Development District (ETDD). (See Figure 3-1.) The 6,590 square miles within ETDD are located in the Central and Southern Appalachian areas, primarily in the Great Valley of the Tennessee River. The Cumberland Mountains and Plateau rise above the Valley to the northwest, while the Great Smoky Mountains form the southeast boundary.

The City of Knoxville and the Knoxville SMSA¹ (with 1975 populations of 183,400 (40) and 435,400 (74), respectively) lie in the middle of the Great Valley and are surrounded by five of the "Great Lakes of the South." Numerous steep slopes, together with the lakes, rivers and streams, are particularly significant to land use patterns in the Knoxville area; 40% of city land is undeveloped, due partially to restrictions of hilly terrain and partially to land speculation.

¹ The Knoxville SMSA includes Knox, Anderson, Blount and Union Counties; Union County was added in 1974.

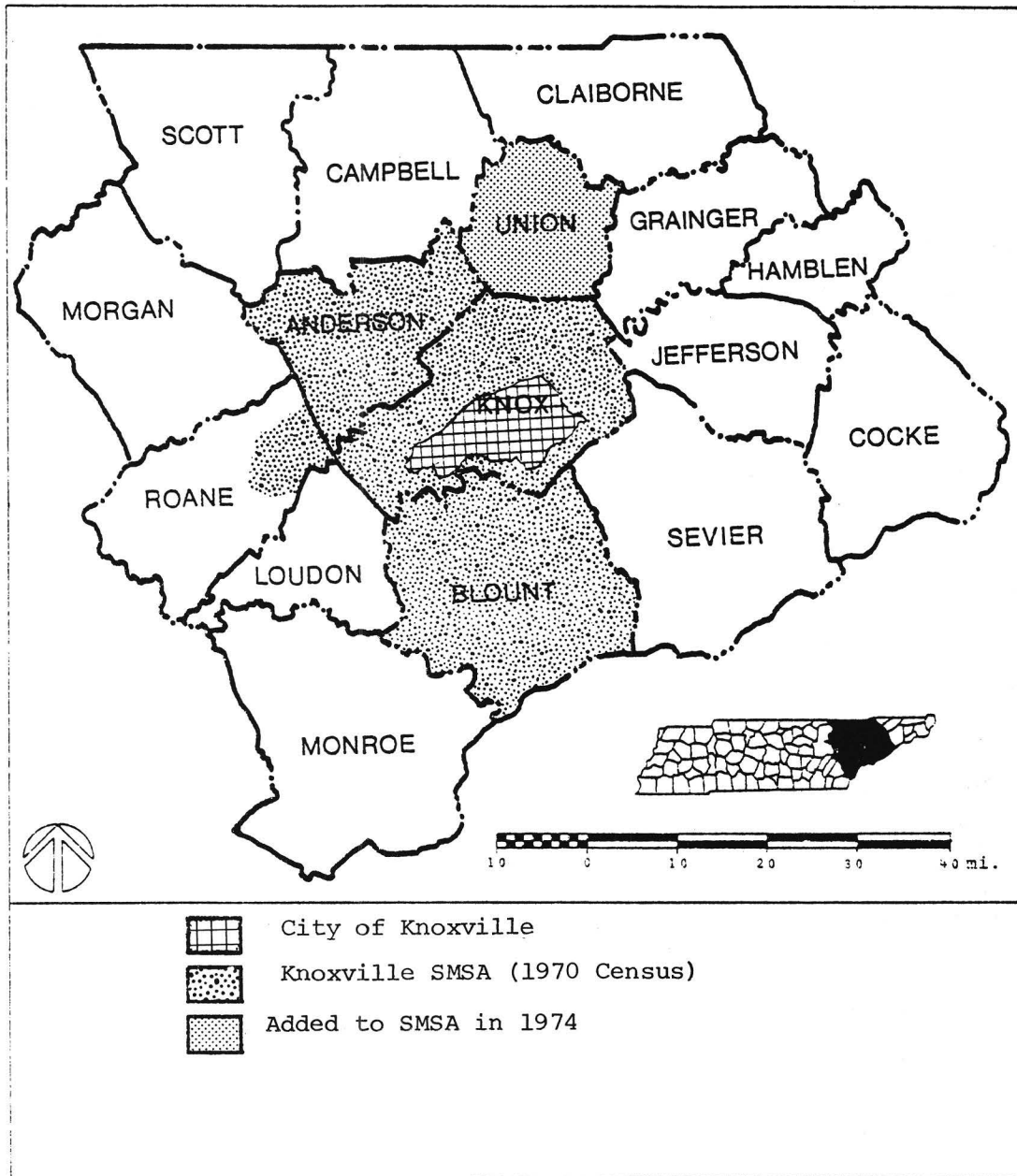


FIGURE 3-1. EAST TENNESSEE DEVELOPMENT DISTRICT

Since its official founding in 1791, the City of Knoxville has periodically expanded its boundaries through annexation to include surrounding territory such as satellite towns and suburbs. City limits have remained stable since 1963 at a land area of approximately seventy-seven square miles. In 1954 Knoxville became a "home rule" city, thus permitting Knoxville's Mayor-Council government responsibility for its own charter without deference to special state legislation.

Although the topographical variety of the area creates isolating natural boundaries and large portions of undevelopable land, the waters and mountains have fostered a thriving tourist/recreational area with Knoxville as the metropolitan center. The city also attracts traffic for business purposes from the surrounding small towns. While manufacturing is the area's strongest industry, retail trade and educational and other service industries are becoming more prominent in the local economy. Employment by county is shown in Figure 3-2. Knox County has the largest number of employees, and a high concentration of industry, service, and retail organizations including several of Knoxville's major employers: the Tennessee Valley Authority, Knoxville and Knox County Governments and the University of Tennessee. The University, in addition to its status as employer of a work force numbering almost 4000, has a day enrollment of over 26,000--a figure approximately equal to fourteen percent of Knoxville's total population. Such a sizeable population segment necessarily impacts Knoxville's cultural and economic climate.

In recent years employment has increased dramatically beyond city limits in clusters of commercial firms along highway routes and in industrial parks to the north and west. Two of the area's largest employers are located outside Knoxville: the Atomic Energy Commission/Union Carbide at Oak Ridge, and the Aluminum Company of America in Blount County. Knoxville is, and will likely remain, the core of the area's commercial, cultural and higher educational activity, with several current CBD projects adding to its vitality. However, due to planned public

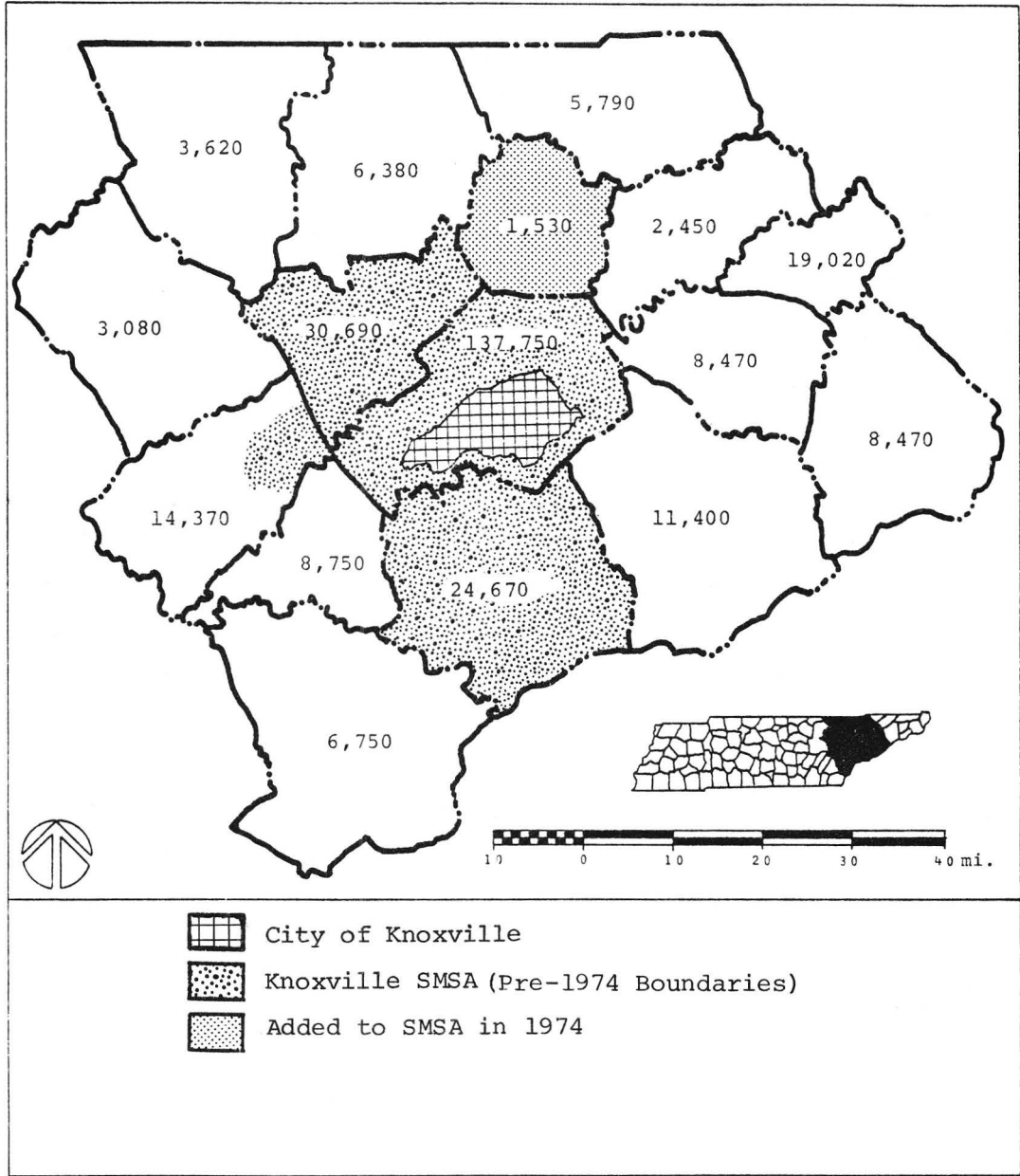


FIGURE 3-2. ESTIMATED 1976 ETDD EMPLOYMENT
BY WORK LOCATION

facilities improvements and the abundance of vacant land, development trends suggest that most future growth will occur outside Knoxville, especially in western Knox County.

3.1.2 Demographic Profile

The KCP service area consisted of three distinctly different regions: 1) the City of Knoxville; 2) the Knoxville SMSA counties--Knox, Anderson and Blount;¹ and 3) the remaining, decidedly rural, sparsely populated counties of the ETDD. The service area contained only four incorporated municipalities with populations over 10,000 (three of which are situated within the Knoxville SMSA):²

- 1) Knoxville, Knox County (183,400)
- 2) Oak Ridge, Anderson County (26,900)
- 3) Alcoa Maryville, Blount County (25,600)
- 4) Morristown, Hamblen County (20,700)

The remainder of the service area was significantly less densely populated, consisting of isolated, small communities. (See Table 3-1 and Figure 3-3.) Significant demographic data for the three region types contained in the service area appear in Tables 3-2 through 3-4.³

Knoxville's population density is almost ten times that of the SMSA and twenty times that of the KCP service area as a whole. (See Table 3-2.) Predictably, the highest concentrations of non-white and elderly residents occur within the city.

1 The 1974 expansion of the Knoxville SMSA to include Union County is not reflected in the following demographic profile since the census data upon which it is based were collected prior to 1974.

2 1975 populations; Source: 74

3 These tables are generally derived from 1970 census data. Although significant changes may have occurred in population characteristics since 1970, this was the most comprehensive data source available, and it was therefore utilized in this discussion. More recent data is used whenever available.

TABLE 3-1. ETDD COUNTIES: POPULATION AND DENSITY (1975)¹

<u>County</u>	<u>1975 Population</u>	<u>Area² (Sq.Mi.)</u>	<u>Density (Pop/Sq.Mi.)</u>
Anderson ³	61,900	340	180
Blount ³	69,800	580	120
Campbell	30,600	450	70
Claiborne	22,400	450	50
Cocke	27,900	430	60
Grainger	15,600	310	50
Hamblen	43,400	170	260
Jefferson	27,200	320	90
Knox ³	293,400	510	580
Loudon	26,400	240	110
Monroe	25,400	660	40
Morgan	14,500	540	30
Roane	41,000	350	120
Scott	16,600	550	30
Sevier	32,400	600	50
Union ³	10,300	210	50
Total ⁴	758,800	6720	110
Knoxville SMSA	435,500	1420	300
Knoxville (City)	183,400	80	2290

¹ Sources: 22, 68, 74

² "Area" includes water.

³ SMSA counties.

⁴ The county populations and densities do not always sum to the total due to rounding.

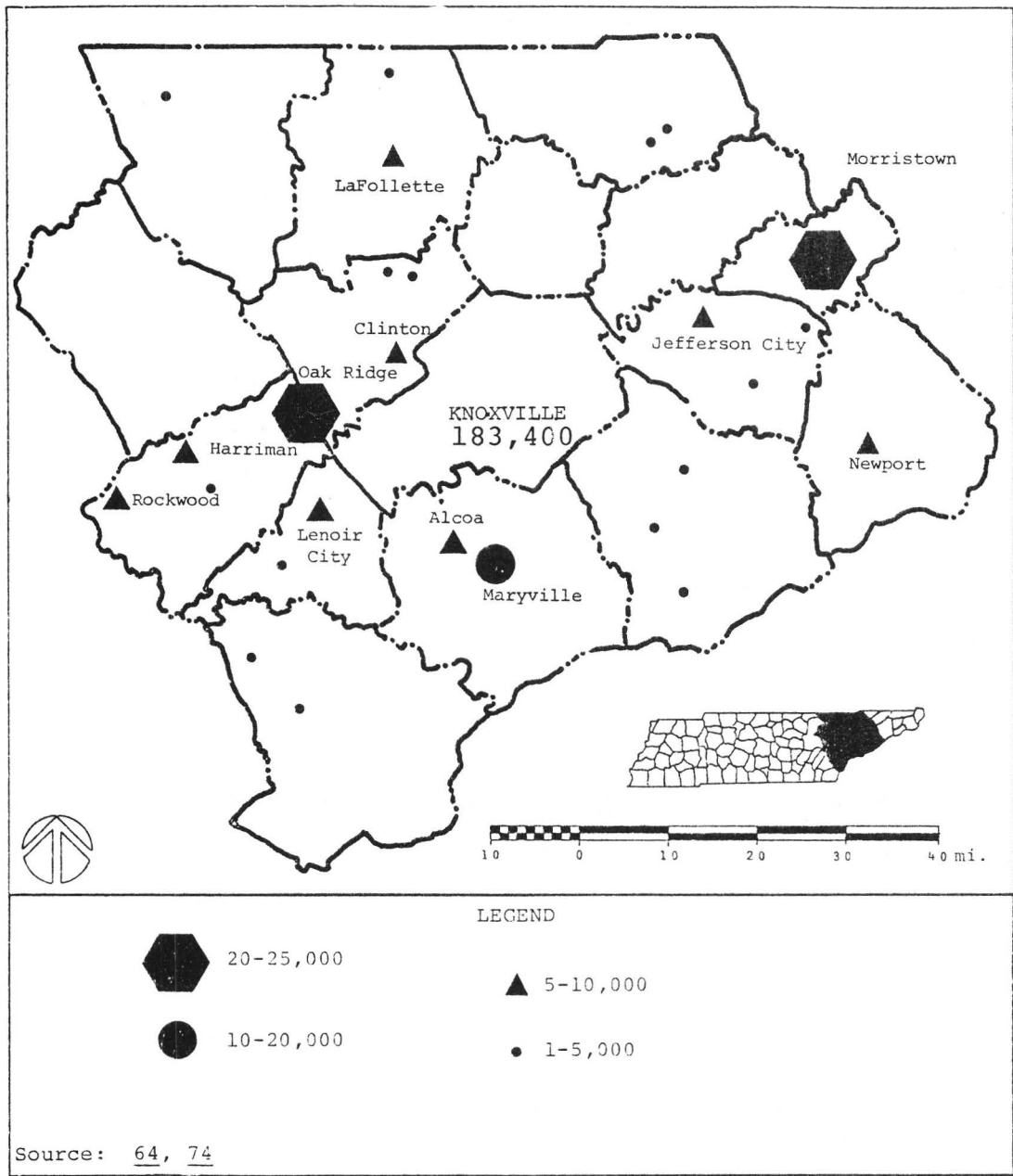


FIGURE 3-3. POPULATION CENTERS IN THE ETDD

TABLE 3-2. KEY DEMOGRAPHIC STATISTICS¹
(1970)

	<u>Knoxville</u>	<u>Knoxville SMSA</u>	<u>ETDD</u>
Population (1970)	174,600	400,300	701,000
Density (per Sq. Mi.)	2,250	300	100
<u>Sex (%)</u>			
Male	47	48	48
Female	53	52	52
<u>Race (%)</u>			
White	87	93	96
Non-White	13	7	4
<u>Age (%)</u>			
Under 20	34	36	37
21-44	33	33	32
45-64	22	22	21
65 and over	11	9	10

¹ Source: 1970 Census (71)

In Table 3-3, statistics concerning ETDD households (one fourth of which are located in Knoxville) are presented. Family incomes are higher in and around Knoxville than in the project area as a whole. However, household auto availability is lower in Knoxville than in the SMSA or the overall project area; over 21% of all 1970 Knoxville households reported no automobile available for use.

Educational and occupational statistics appear in Table 3-4. Residents of Knoxville and the SMSA counties are similar in both educational attainment and occupational categories, but the populations of Knoxville and surrounding communities are more highly educated than the ETDD as a whole, due in large part to the attraction and influence of the University of Tennessee.

Professionals and service and office workers are more highly concentrated in and around the city. While most farm workers reside outside the Knoxville area, only 2.8% of the entire district work force is engaged in farm work. This low figure for such a predominantly rural area probably reflects difficulties with poor soil composition and rugged terrain.

3.2 TRANSPORTATION CHARACTERISTICS

3.2.1 Supply of Transportation

Three interstate highways traverse the East Tennessee Development District: Interstate 40 runs west and southeast; Interstate 75, intersecting I-40 just west of downtown Knoxville, serves a north-south corridor; and Interstate 81 runs west and northeast, connecting with I-40 about thirty-five miles east of Knoxville. However, the state and local highway systems beyond the immediate vicinity of Knoxville suffer from a lack of adequate connectors. As of 1970 about 18% of the state highways and 62% of the country roads in the region were considered low grade (22).

The City of Knoxville lies at the intersection of Interstates 40 and 75 and a number of state highways connecting it to neighboring communities including Oak Ridge, Clinton, Morristown, Sevierville, and Alcoa-Maryville. During peak

TABLE 3-3. HOUSEHOLD STATISTICS¹

(1970)

	<u>Knoxville</u>	<u>Knoxville SMSA</u>	<u>ETDD</u>
<u>Households</u>			
Total Number	57,100	126,800	236,100
Mean Size	2.85	3.05	2.97
<u>Family Incomes (%)</u>			
Under \$5,000	28	26	33
\$5,000 - \$9,999	37	37	38
\$10,000 - \$14,999	21	23	19
\$15,000 - \$24,999	10	11	10
\$25,000 and over	4	3	
Mean	\$9,370	\$9,330	NA
Median	\$7,890	\$8,200	\$7,250
<u>Auto Availability (%)</u>			
None	21	15	14
One	45	45	43
Two	29	34	38
Three or More	5	6	5

¹ Source: 1970 Census (71)

TABLE 3-4. EDUCATIONAL AND OCCUPATIONAL STATISTICS

	<u>Knoxville</u>	<u>Knoxville SMSA</u>	<u>ETDD</u>
<u>Education Attainment (%)</u> ¹ (persons 25 and over)			
None	1	1	-
Some Elementary School	18	18	42
Elementary School	11	13	-
Some High School	18	17	42
High School Degree	28	29	-
Some College	12	11	17
College Degree or More	12	12	-
Median Years	12.1	12.0	10.5
<u>Total Labor Force (1976)</u> ²	83,100	182,700	310,800
<u>Occupation (%)</u> ¹			
Professional	18	17	14
Managerial	9	8	8
Sales	9	8	6
Clerical	18	16	14
Craftwork	12	15	16
Operative	11	13	18
Transport Operative	4	4	5
Laborers	4	4	5
Farm Work	-	1	3
Service	14	12	12
Private Household Work	2	2	-

¹ Source: 1970 Census (71)

² Source: 65

traffic hours, access to and from the highway system is generally inadequate, resulting in significant congestion. Problems are worse on roadways serving the rapidly growing western suburbs. The lack of convenient parking facilities also contributes to downtown Knoxville's traffic problems.

Public Bus Service - Knoxville Local Routes

Knoxville's first public transit service, a streetcar system, began in the late nineteenth century and continued to serve the city until 1947 when the streetcars were retired and buses were introduced. In 1950 bus ridership was estimated at twenty-four million, but by 1968 it had declined to just over five million (76). Confronted with insurmountable financial problems, the bus system, Knoxville Transit Lines, was sold to the city in April 1967 and renamed Knoxville Transit Corporation. At the same time, the city-appointed Knoxville Transit Authority (KTA) was established to govern public transit policies for routes, fare structure, and equipment procurement. In 1978, the company was renamed, becoming simply Knoxville Transit (KT).

The City of Knoxville owns all KT capital assets and must approve the corporation's budget; KTA contracts with a private management firm to operate KT, which has an exclusive contract with the city to provide local bus service within an area extending seven miles beyond the city limits. Although almost all regular KT services operate entirely within the city's boundary, express bus service is provided between selected suburban areas and locations in or near the Knoxville Central Business District (CBD).

At the start of the demonstration, KT operated eighty buses on a variety of routes, including eight intra-city routes serving approximately 76% of Knoxville's population and 59% of the city's land area.¹ The eight routes extended from the downtown to cover the surrounding areas with a total of twenty

¹ Figures are based on the assumption of coverage extending one-quarter mile on each side of a transit route.

radial legs, all ending in one-way loops as they approached the city limits. Both downtown and suburban access was generally "walk;" there were no official park-and-ride lots in operation at the start of the demonstration.¹

The 1975 adult bus fare for these local routes was 30¢ with a 5¢ zone charge. Transfer tickets could be purchased for 5¢ (upon boarding), with transfers provided free to senior citizens. In addition, elderly and handicapped individuals were charged only half-fare (15¢) while students paid 20¢. (Changes in services and fare structure which occurred during the demonstration are discussed in Section 3.3.1.)

When the Knoxville demonstration began in 1975, all KT regular routes operated weekdays between 6:00 am and 6:00 pm and Saturdays between 6:00 am and 12:00 midnight; fewer routes ran on weekday evenings (6:00 pm to 12:00 midnight) and on Sundays. Peak-hour headways ranged from 15 minutes to one hour; most route legs had peak-hour headways of 30 minutes or more. During off-peak hours, most headways were 40 minutes or more.

KT local route ridership peaked between 6:00 am and 9:00 am (accounting for 27% of daily ridership) and between 3:00 pm and 6:00 pm (accounting for 31% of daily ridership); approximately 1,553 passengers per hour were carried during these two peak periods. Daytime off-peak ridership averaged 917 passengers per hour, and weeknight ridership fell to an average of 169 per hour. Average ridership figures were even lower on weekends (76). (See Table 3-5.)

Transit service was utilized for less than 3% of all intra-city trips, and total transit ridership in Knoxville decreased a significant 22.4% between 1969 and 1975. (However, later ridership figures indicated a leveling off of this trend; this is

¹ However there are estimates of as many as 80 church and other lots in the Knoxville area were used on an "unofficial" basis for park and ride activities. Organizations hesitate to officially sanction use of the lots because it may affect their tax status and/or expose them to liability.

partly attributable to a half-fare (15¢) and free-transfer program for senior citizens instituted in February 1975.) In 1975, the regular route system operating deficit was \$1.12 million or approximately 31¢ per revenue passenger (76). (See Figure 3-4.)

Public Bus Service - Express Routes

KT offered express bus service at a fare of 50¢ (in 1975) on fourteen routes connecting Knoxville's suburbs with downtown work locations and carrying 290,000 passenger-trips per year (approximately 7.8% of total system ridership). Express bus patrons, as profiled in 1974 and 1975 surveys (76), differed significantly from regular route transit riders in terms of income, occupation, and automobile availability. While 84% of regular route riders were transit dependent, most express bus patrons chose to ride the bus instead of driving cars available to them for their work trip.

While express bus service expansion had induced many commuters out of the single-occupant auto for the work trip, these services became less profitable over time. When KT first offered express bus service (in 1963) drivers and vehicles were utilized for both express and regular route operations. When express buses began to serve only express routes at peak commuter hours, and express bus drivers (although guaranteed eight work hours per day) could be effectively utilized only during peak periods, express bus operations could no longer break even. With each vehicle making only two runs per day, revenues from the 50¢ one-way fare covered less than 85% of fixed operating cost and less than 70% of combined fixed and variable operating costs (63). Consequently, KT express route expansion has been limited and will, at best, continue operation at a deficit, unless more efficient use of off-peak labor and vehicle hours can be achieved.

Private Bus Service

Three private bus companies provided coverage supplementing KT service when the Knoxville SMD project began; their operating

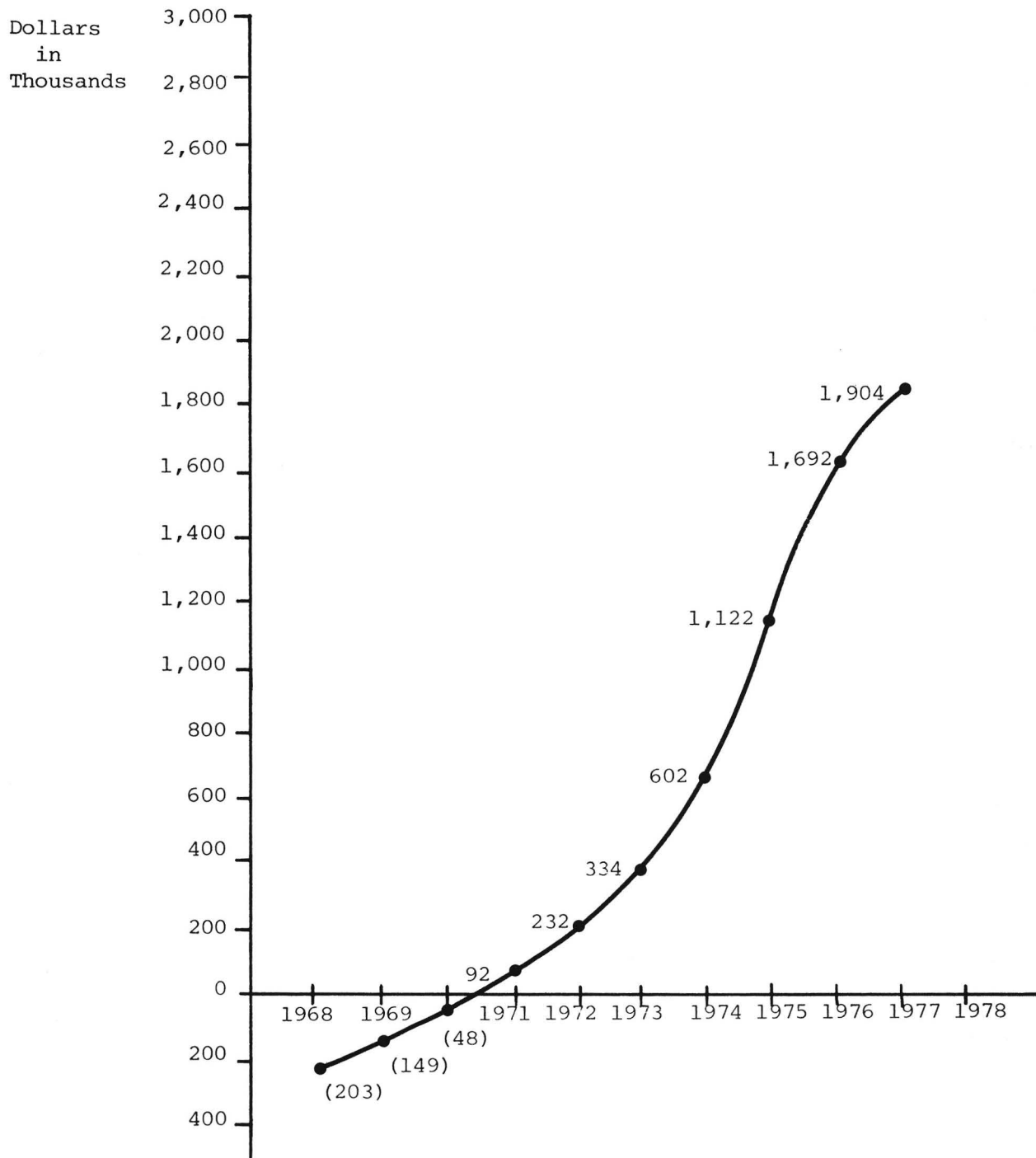


FIGURE 3-4. KT OPERATING DEFICIT 1968 TO 1977

Source: 16

TABLE 3-5. AVERAGE DAILY KT LOCAL RIDERSHIP (1975)^{1,2}
BY TIME-OF-DAY

<u>Time Period</u>	<u>Weekday</u>	<u>Saturday</u>
AM Peak (before 9 am)	4,396 (28%)	1,125 (14%)
Mid-Day (9 am - 3 pm)	5,499 (35%)	3,875 (49%)
PM Peak (3 pm - 6 pm)	5,004 (31%)	2,125 (27%)
Night (6 pm - 12 am)	1,014 (6%)	750 (10%)
Total	15,913 (100%)	7,875 (100%)

¹ Source: 76

² Ridership is defined as the number of passenger trips.

rights specifically prohibited service of passenger trips where both the origin and destination occurred within city limits (to preclude competition with KT).¹ The companies and their services are described below:

1) Autrey Bus Lines maintained a fleet of nine buses which were fifteen or more years old. Regular service included the following routes:²

- one early morning round trip connecting Knoxville and Sevierville (one-way fare: \$1.60)
- three daily round trips between Knoxville and Gatlinburg via Sevierville (one-way fare: \$2.95)
- seven daily express round trips serving Tennessee Valley Authority commuters (one-way fare: \$.50; TVA guarantees a minimum payment of \$355/week)

Average route ridership was approximately fifty passengers per trip.

2) B & C Bus Lines provided daytime service along the following routes:²

- four non-stop trips between Knoxville and Alcoa daily Monday through Friday (full one-way fare: \$1.00)
- twelve local bus trips per day between Knoxville and Alcoa during the week and four trips each Saturday (full one-way fare: \$1.00)
- one morning express route serving the University of Tennessee (one-way fare: \$1.00)
- three TVA commuter express routes between southern and western Knox County and the Knoxville CBD (full one-way fare: \$1.25; between the CBD and Maryville, one-way fare: \$.75)

The company's fleet consisted of eleven buses, all fifteen or more years old; eight were used during peak hours. Total ridership was estimated at 400 passengers per day, a significant number of whom were affiliated with the University of Tennessee.

¹ In addition, several bus companies (primarily Seymour, Loy and Cobble) served charter and school trips only.

² For both Autrey and B&C, fare increases of approximately 20% occurred over the course of the demonstration, apparently without significant impacts on ridership. Fares indicated are those at the beginning of the demonstration.

- 3) The Corryton Bus Service operated one route between downtown Knoxville and Corryton at a fare of 75¢ per one-way trip. The twenty-mile route passed both the Standard Knitting Mills and a Levi Strauss manufacturing facility, two major Knox area employers. Daily ridership ranged from sixty to one-hundred passenger-trips. Service was provided with one twenty-eight-passenger bus. (During the demonstration, Corryton terminated its operations.)
- 4) Trailways used four buses to provide one trip each morning and one each afternoon from Knoxville to Maryville, Alcoa and vicinity, and two trips to Rockwood and vicinity. This service was provided six days a week, excluding Sunday.
- 5) Greyhound served the surrounding Knoxville area as a part of their long distance travel schedule. Approximately 34 buses operated daily on six routes serving nearby communities such as Oak Ridge, and the towns surrounding Highway 33 and Highway 70. Service was available seven days a week.

No regular Sunday or evening service was provided by any of the private companies except Greyhound, and Saturday service was quite limited. The express service provided by these operators benefitted from the utilization of part-time drivers and thus avoided the labor work rules which characterize and add to the cost of KTC express bus operations (76).

Employer-Sponsored Transportation

The Knoxville-based Tennessee Valley Authority (TVA) has been an innovator in employer coordinated transportation. In addition to providing matching assistance for all employees, at the start of the demonstration TVA offered the following incentives for ridesharing (63):

- a one-third discount on commuter bus tickets
- a \$5 per month parking subsidy for carpools with three or more members (at least two of whom were employed by TVA)
- a \$3 per month credit for each employee participating in the TVA-Credit Union Vanpool Demonstration Project

The Authority had appointed an employee transportation coordinator who negotiated for transit services, helped administer the vanpool program, and performed other functions aimed at encouraging ridesharing.

The program was (and continues to be) extraordinarily successful, resulting in a reduction in the "drive alone" mode from 65% to 19% of the Authority's Knoxville CBD-based workforce. As of January 1976, a total of seven express bus runs and six vanpools were serving the downtown worksite. By June 1978, the number of express buses and vanpools serving TVA's downtown offices had risen to twenty-six and thirty-five respectively.¹

Taxi Service

At the start of the demonstration, the Knoxville metropolitan area was served by fifteen taxi companies. An inventory of thirteen of these indicated that they served more than five thousand passenger trips per day using eighty-five vehicles. There was a wide distribution of fleet sizes: while two maintained fleets of twenty-five or more, the other eleven companies inventoried operated fleets of ten or fewer vehicles, with two operating only one taxicab. The average weekday distribution of taxi trips in Knoxville indicated that demand for this service remained relatively constant throughout the day. This is a sharp contrast to the highly peaked distribution of transit demand by time of day.

At the demonstration's outset, the authority to administer taxi insurance and rate structure ordinances in Knoxville was vested in the city's Taxi Coordinator, but historically the municipal code had not been strictly enforced. Pre-demonstration fares were based on a standard rate of 50¢ per mile within city limits; trips outside the limits were charged according to a predetermined company-specific rate schedule. Some of the smaller taxi firms offered subscription service, but no special rates were offered to encourage pre-scheduled or shared-ride

¹ It should be noted that some of these vehicles served non-TVA employees as well.

taxi.² The only identified exception in the region was the Oak Ridge taxi fare subsidization program for senior citizens, which provided for a \$.75 subsidy (\$.65 city subsidy plus \$.10 provided by the two Oak Ridge taxi operators) for each taxi trip by qualified riders.

As a result of a new Knoxville ordinance introduced during the demonstration,¹ the prohibition on shared-riding was eliminated and the following maximum rate structure was introduced (16):

meter rates = \$.75 for the first 1/3 mile plus \$.20 for each additional 1/3 mile

zone rates = \$1.50 plus \$.75 for each additional zone

group rates = \$.25 for each additional rider

exclusive use rate = \$1.00 extra per trip

Contract, package, hourly and out-of-town rates were exempt from the regulation. Nine dollars per hour was a typical rate for charter service at the end of the demonstration.

Airport Limousine Service

Airport Limousine Services, Inc., holds exclusive transportation operating rights between the McGhee Tyson Airport and the Knoxville and Oak Ridge areas. During the demonstration, twenty-five radio-equipped vehicles provided sixty scheduled trips between 6:00 am and 6:00 pm to Knoxville hotels and motels. Approximately twenty more demand responsive trips per day were made up to 2:00 am. During the demonstration period, the fare changed from \$4.00 each way to \$5.25 for the trip between the airport and the City and \$2.75 for the reverse trip (to the airport). Trips to Oak Ridge averaged fifteen per day, at a one-way fare of \$9. The limousine service has experienced decreased ridership in recent years.

¹ Knoxville's new ordinance prohibited shared-riding without the riders' consent.

² See Section 4.3.2.

Social Service Agency Transportation

Of the 200 principal social service agencies in the area, twenty-two indicated in a recent survey that they provided client transportation (51); most of these operated only within Knox County. The survey also indicated that while these agencies owned or leased a total of forty-two vehicles, fifteen of the twenty-two agencies felt they did not fulfill their clients' transportation needs. Most clients of these agencies have low incomes, and many are unemployed, handicapped, and/or unable to pay for other transportation.

Insufficient numbers of vehicles (often inadequately equipped) and drivers, the geographic distribution of clients, and limited funding (with restrictive requirements) have combined to frustrate attempts at efficient provision of transportation services. Almost half of the twenty-two agencies endeavored to coordinate at least some of their transportation services with others, and all but one agency claimed that they would abandon their own transportation systems in favor of outside provision of equal services.

3.2.2 Travel Patterns

With a 1970 work force of approximately 104,020 (about 13,500 in the CBD) (74), Knox County was the largest travel generator in KCP's service area.¹ (See Figure 3-5 and Table 3-6). Census data indicates that in 1970, 59% of all workers residing in the Knoxville SMSA were employed in the City of Knoxville; an additional 7300 commuted to the city from ETDD counties outside the SMSA (22). While most Knox County residents worked within the county, there was significant worktrip travel to neighboring Anderson and Blount Counties (4000 and 1200, respectively, in 1970).

¹ By 1976, Knox County's work force had risen to approximately 137,750. (See Table 3-6.) (Estimated from sources 22, 40, 67, 71.)

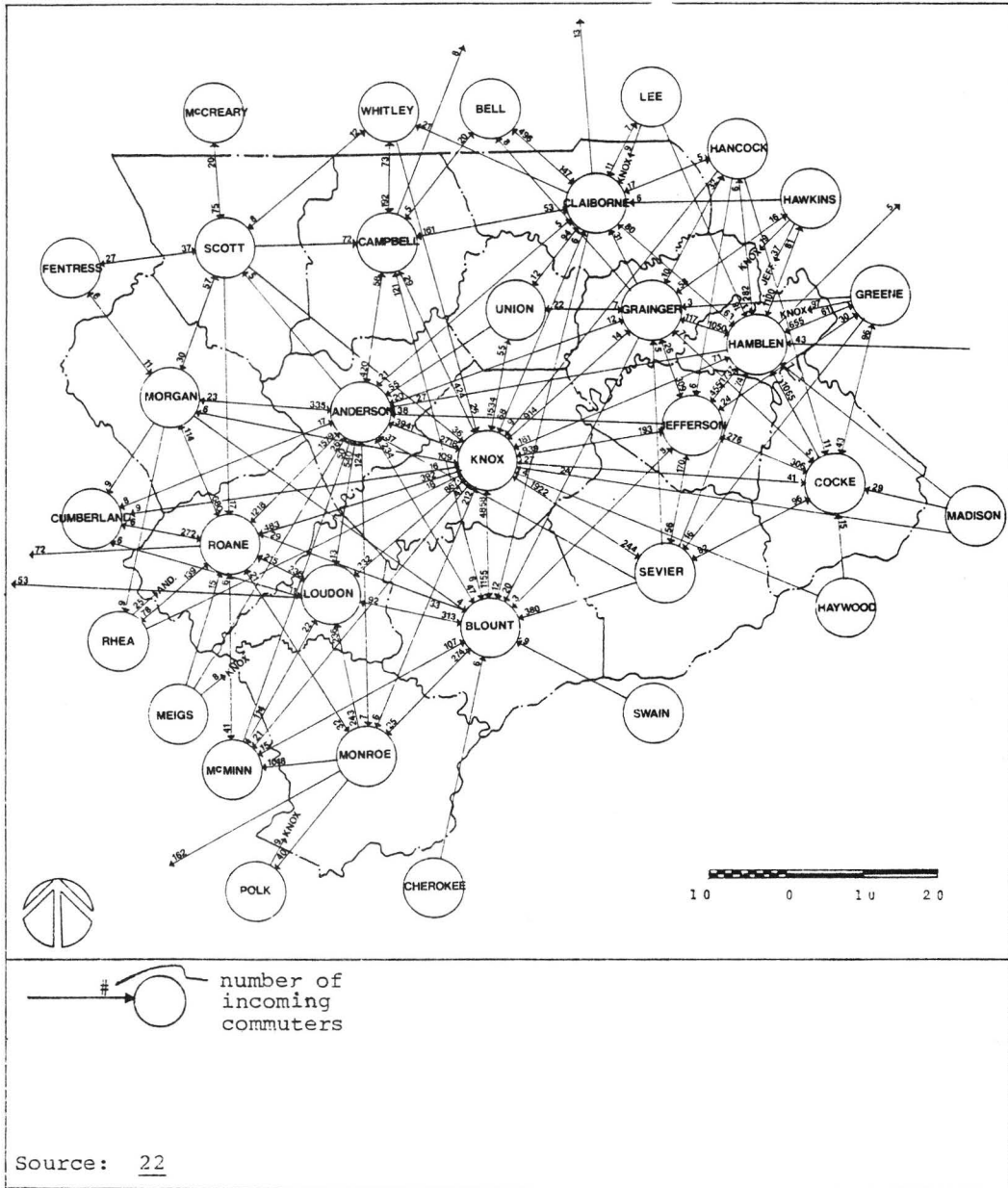


FIGURE 3-5. ETDD COMMUTING PATTERNS (1970 Census)

TABLE 3-6. 1976 ETDD WORK FORCE DISTRIBUTION¹

(BY WORK LOCATION)

<u>County</u>	<u>1976 Work Force</u>	<u>% of ETDD Work Force</u>
Knox ²	137,750	47%
Anderson ²	30,690	10
Blount ²	24,670	8
Hamblen	19,020	6
Roane	14,370	5
Sevier	11,400	4
Loudon	8,750	3
Cocke	8,470	3
Jefferson	8,470	3
Monroe	6,750	2
Campbell	6,380	2
Claiborne	5,790	2
Scott	3,620	1
Morgan	3,080	1
Grainger	2,450	1
Union ²	1,530	1
Total	293,190	100%
SMSA	194,640	66%

¹ Estimated from sources 22, 40, 67, 71.

² SMSA counties.

Transit modal split (in 1970) was estimated at 2% of all trips in Knoxville, 3 to 4% of all trips destined for the CBD, and 7% of all work trips in Knoxville (see Table 3-7).¹ According to a May 1975 KT on-board survey, work trips were by far the most commonly reported bus trip purpose (41% of all trips), while school and shopping together accounted for an additional 34% of all trips. As one might expect from the existing route structure, the large majority (70%) of transit trips originated and/or ended in the Knoxville CBD (76). However, strong east-northwest crosstown flows and intra-neighborhood travel patterns (in communities just east and northwest of the CBD) were also identified.

Accurate average vehicle occupancy figures for the Knoxville area are not available. The State of Tennessee presently uses data collected for Nashville as the standard for all similar Tennessee cities; these statistics indicate peak and off-peak occupancy levels of approximately 1.33 and 1.42, respectively

TABLE 3-7. 1970 WORK TRIP TRANSPORTATION MODE²

	<u>Knoxville</u>	<u>Knox County</u>	<u>SMSA</u>	<u>ETDD</u>
Total Workers	64,794	102,711	146,113	243,659
Auto Drivers (% of Total Workers)	45,000 (69%)	75,341 (73%)	109,027 (75%)	176,796 (73%)
Auto Passenger (% of Total Workers)	9,114 (14%)	13,602 (13%)	19,410 (13%)	36,544 (15%)
Transit (% of Total Workers)	4,308 (7%)	4,645 (5%)	5,313 (4%)	5,963 (2%)
Other (% of Total Workers)	6,372 (10%)	9,123 (9%)	12,363 (8%)	24,357 (10%)

¹ Conversation with Keith Thelan, Knoxville/Knox County Metropolitan Planning Commission, May 4, 1977.

² Sources: 22, 71

(68). However, Knoxville's average vehicle occupancy during peak periods is thought to be significantly higher than the standard due to the high percentage of CBD commuters (especially among TVA employees) known to be ridesharers (76).

In recent years, traffic growth has been greatest to the west of the city, where significant residential and commercial construction has occurred. This growth manifests itself in congestion on Interstate 40, whose four lanes presently carry approximately 100,000 vehicles daily near the CBD;¹ plans are underway to widen this facility to eight lanes. Other principal four- and five-lane highways serving Knoxville operate within their capacities and accommodate between 15,000 and 67,000 vehicles per day.

3.2.3 Institutional Environment²

In Tennessee, responsibility for transportation policy lies with either incorporated cities, special authorities, or (by default) the state. Under state law, control extends beyond an incorporated city's limits a distance proportional to its population (for Knoxville, it is seven miles). With the concurrence of local agencies, special authorities can be created by any jurisdictional entity in Tennessee. The Knoxville Transit Authority (KTA), which was responsible solely to the city, was the principal transportation authority operating within the service area during the evaluation period;³ its jurisdiction was identical to Knoxville's, extending seven miles beyond the city limits. KTA's responsibility was limited to supervision of city-owned transit vehicles and facilities. Its legal authority was vested in a five-member citizen board appointed by the Mayor and approved by the City Council.

1 Conversation with Keith Thelan, Knoxville/Knox County Metropolitan Planning Commission, May 4, 1977.

2 This section is based on Skorneck, A.J. (62), except as noted.

3 A second operated in Anderson County but it had no involvement in the demonstration.

At the outset of the demonstration, there was no central transportation policy-making body in the Knoxville area. KTA (without a planning staff) supervised the transit system, which was operated by a private contractor; the city's Traffic Engineer was responsible for the flow of traffic; the Knoxville Parking Authority controlled off-street parking facility construction and operation; the Knoxville Utilities Commission (actually the City Council) had the power to regulate all for-hire transportation in the city; the Metropolitan Planning Commission (MPC) was responsible for the local comprehensive planning effort but had little substantive interaction with the operating agencies (63). The state itself (i.e., Tennessee DOT) legally acted as the region's Metropolitan Planning Organization (MPO) until March 1977, when a new local MPO was established.¹

The state legal and regulatory environment impacting ride-sharing programs can be divided into three general categories:

- Public Service Commission (PSC) regulation
- liability and insurance requirements
- taxation and subsidy policies

PSC regulation seeks to help establish and maintain transportation services for the "public convenience and necessity." It is typically based on the assumption that public transportation is a natural monopoly, essential to the public welfare, with substantial economies of scale; competition is perceived as detrimental to the efficient provision of service. The PSC uses its licensing, franchising, and rate-setting powers to limit entry and exit from the market and to provide for a fair (regulated) rate of return for all authorized carriers. In return for their operating rights, these carriers are required to provide service in a non-prejudicial and non-discriminatory manner for the public good, and are generally required to maintain service availability on a continuing basis to meet "the public's convenience and necessity."

¹ The State acted as the legal MPO for all of Tennessee's incorporated cities until March 1977.

Prior to the demonstration, the entry/exit regulations and rate-setting powers had significant implications for all forms of public transportation innovation, particularly private ride-sharing arrangements. New carriers were required to prove: 1) their willingness and ability to serve the public; 2) the public's need for the service; and 3) that existing operators were unable to meet that need.¹ Even established carriers had to fully justify any additions to and deletions from their authorized routes and services. These regulations greatly discouraged experimentation among the major ridesharing entrepreneurs (including vanpool operators²) who could typically not afford the significant effort required to obtain the appropriate licenses, franchises, certificates, etc. needed to become authorized carriers.

Liability and insurance requirements seek to protect the public's ability to collect for damages in the event that a transportation provider is at fault in an accident. The "degree of care"³ used to determine fault is much stricter for "common carriers" than for "private" operators, so the way a particular service is classified by the state can have a major impact on the liability risks associated with that service and, thus, on insurance availability and cost. At the outset of the demonstration, individuals operating vanpools were to be classified as either "common" or "contract carriers."

¹ Not only did a provider have to undertake the lengthy and expensive process of obtaining a certificate to offer a new service, he had to go through a similar process to terminate service.

² Although the PSC had the authority to regulate conventional carpools, its policy was not to exercise that power.

³ The term "degree of care" is used in discussions of insurance liability to denote the level of caution or care which must be exercised by a driver to meet his legal obligations to avoid accidents and/or damage to persons and/or property transported. Failure to meet the applicable "degree of care" implies potential legal liability of the driver for negligence.

Taxation and subsidy policies in Tennessee developed at a time when public transportation was a profitable business. Generally, however, major private companies have long since lost profitability and have been taken over by public bodies. Legislation has exempted the publicly-owned transportation companies from normal common carrier taxation (and provided subsidies to cover net losses), but private companies are still subject to the old policies. Tennessee's policy is to tax public utility property (which includes that of common carriers and contract haulers) at higher rates than either private or business property. Thus, residences are assessed at 25% of value, businesses at 40% of value, and public utilities at 55% of market value (75). Prior to the demonstration, an individual who licensed a van with the PSC for hauling commuters (as required by law) would have been subjected to more than double the existing tax on his vehicle and possibly his home (if it were determined that he used it as an office).

KCP's activities and accomplishments in each of the areas discussed above are detailed in Section 4.3.

3.3 EXOGENOUS FACTORS

3.3.1 The Politics of Public Transportation in Knoxville

Any evaluation of the Knoxville Transportation Brokerage Demonstration must be prefaced by a discussion of the unusual political environment in which the demonstration took place. Although the events which occurred during the project (including a six week transit strike) probably had little effect on the public's overall response to the broker's services, their effects on the course, scope and flexibility of the demonstration were truly significant. From the standpoint of this SMD evaluation, these events are considered exogenous factors because they arose among organizations external to the brokerage itself. (Others might argue that as a major element of the city's Department of Public Transportation Services and as a target in some of the controversies the brokerage was central to the events.)

By early 1977 a series of events had occurred which were to have major impacts on the politics of public transportation in Knoxville for the remainder of the demonstration:

- 1) In 1976, to comply with UMTA requirements, the Metropolitan Planning Commission contracted for a detailed study of KT operations. The resulting report, which was made public in January 1977, and was later adopted formally as the area's Transit Development Plan, set forth specific recommendations for service cuts (both in hours and in route miles) aimed at reducing the system's rapidly escalating deficit (see Figure 3-4).

While the proposed cuts were justifiable from a technical standpoint, they became an explosive emotional issue which was to dominate transportation politics for the remainder of the demonstration. The initial (and stormiest) controversy surrounded the Chapman Highway route serving South Knoxville, which was a candidate for a reduction in service.¹ Although the city had located a private carrier willing to operate a portion of the service, citizen pressure proved overwhelming and KTA rejected the cutback. Further attempts by the Authority to modify other specific routes in the spring of 1977 also met with very emotional opposition and were similarly dropped.

- 2) On January 31, 1977, the three year old contract between the International Amalgamated Transit Union (ATU) and KT expired. In the negotiations over a new contract, the union (Local 1164) requested a 10% wage increase, improved fringe benefits, and a cost of living escalator clause; the package was estimated (by KT) to cost about \$451,500.
- 3) Also in early 1977, the city was in the process of developing an 18-month budget (as part of the transition from a calendar year to fiscal year budgeting system). In an effort to avoid new taxes while maintaining the city's credit rating, the Mayor instructed each department to limit its budget to 150% of the previous (twelve month) year's amount; the obvious implication, in view of

¹ This route had one of the lowest productivities in the system with an average deficit of 84¢/ride on weekdays and \$1.60 on Saturdays. (Source: Knoxville Journal, February 19, 1977).

the existing inflation rate and the pressure for salary increases, was service cuts in virtually all departments, including public transportation. Under this pressure KTA developed and the City Council subsequently approved a budget for the transit operating deficit based on implementing some of the service reductions recommended by the KT study and providing the union with an estimated \$137,000 in additional wages and benefits over eighteen months (amounting to a 5.5% increase). The establishment of this budget prior to the initiation of collective bargaining was particularly upsetting to union officials, since it appeared to represent an inflexibility on the part of the city.

Initial negotiations proved futile and the strike began on February 14, 1977, idling 132 drivers, garage workers, and office employees. Between 7000 and 8000 people who regularly rode transit (84% of whom were estimated to have been transit dependent) and about 600 express bus riders (only 5% of whom were transit dependent) per day were affected, as well as a large number of downtown merchants who depended upon transit riders for a share of their business.

The strike lasted six weeks, and ended with a settlement which included wage increases, benefit improvements and a cost of living clause, collectively costing the city an estimated \$200,000. Service resumed on March 28, 1977, but with reduced hours (as had been anticipated even before the strike):

- evening service terminated at 9 PM instead of midnight
- Sunday service began at 9 AM instead of 7 AM
- holiday service was reduced from 17 to 8 hours/day.

Two weeks later, local bus fares were increased from 30¢ to 40¢ (with senior citizen fares increasing by half that amount); express bus fares rose from 50¢ to 60¢; and student fares increased by 5¢ to 25¢. Again, these increases were responses to pre-strike economic factors rather than to the size of the settlement.

Five months after the strike, transit ridership had declined between nine and twelve percent overall, representing a loss of between 6400 and

8500 passenger trips per week. Presumably the majority of this decrease occurred among choice riders; for example, express bus ridership dropped 13.3%.

The combination of citizen resentment over the proposed and attempted cuts in selected routes, coupled with the antagonism generated within the ATU over the city's perceived hard line in collective bargaining, has proven to be an important factor in Knoxville politics since early 1977. The ill feeling has been directed primarily towards the Department of Public Transportation, which: 1) nominally controls KT's budget (deficit); and 2) has housed the brokerage service. At least a vocal minority of the public and of the ATU local perceived many of the broker's efforts as either detrimental to or competitive with the provision of traditional fixed route transit services, which they sought to protect. Consequently they fought strongly to limit the influence and control of brokerage proponents in policy decisions affecting Knoxville Transit. This opposition, based at least partly on the mistaken impression that the broker's funding could somehow be used to retain or expand conventional transit services threatened by the city's budget squeeze, was a major thorn in the broker's side. As a public relations problem, it sapped valuable staff time away from other brokerage functions; it also stymied the implementation of governmental changes in organization which would have increased the broker's flexibility.

3.3.2 Economic Conditions

Over the course of the demonstration, economic conditions in the Knoxville area were generally very good, in some ways better than the national averages. The service area was in a state of growth in both the number of people employed and the economic health of the region. Although the Knoxville SMSA's unemployment rate rose from 3.1% in 1973 to 4.2% in 1978, it remained well below the total U.S. rates of 4.9% in 1973 and 5.8% in 1978 (66).

3.3.3 Gasoline Availability and Price

Throughout the course of the demonstration, gasoline was in plentiful supply in the Knoxville area, although prices did rise significantly (13-17%) over the thirty months, as shown in Table 3-8.¹ During this period, the region's consumer price index (CPI) rose 18.0%; thus the increase in gasoline prices during the demonstration was less than that of the price of goods and services in general. Even though the observed rise in gasoline prices occurred over a short period of time (and thus faster than the CPI), recently developed disaggregate demand models suggest that it could not have been enough to significantly impact worktrip mode split.²

3.3.4 Weather (19)

Situated between two mountain ranges, Knoxville is protected from extremes of cold winter winds and can attribute its high relative humidity to warm moist air directed from the Gulf of Mexico. Abrupt temperature changes are rare; nighttime temperature seldom varies from daytime temperature by more or less than twenty degrees.

A relatively constant annual distribution of rainfall contributes to Knoxville's temperate climate. Annual precipitation is about forty-three inches, with the heaviest rainfall (i.e., usually just over five inches) typically occurring in March. Annual snowfall in Knoxville averages twelve inches, with accumulation from a single snowfall rarely exceeding four inches.

¹ Although specific data is unavailable, it is believed that prices were relatively stable over the first two years of the demonstration before experiencing a sharp rise.

² A study by Ben-Akiva and Atherton (2) examining the impact of carpool incentives on travel demand suggests that a 200% increase in fuel prices would result in only a 5.6% decrease in drive-alone work trips, a 4.2% increase in shared-ride work trips, and a 6.4% increase in transit work trips. Although it is not possible to simply factor down these estimates to yield elasticities with respect to a 13% or 17% increase in prices, it is clear that such an increase would not be sufficient to significantly alter work-travel mode split.

TABLE 3-8. SELF-SERVICE GASOLINE PRICES (PER GALLON)¹

<u>DATE</u>	<u>REGULAR</u>	<u>PREMIUM</u>
January 1976	52.9¢	57.9¢
January 1978	59.9¢	67.9¢
% Increase	13.2	17.3

¹ Add approximately 5¢/gal. for full-service.
Source: Knoxville Commuter Pool.

4. DEMONSTRATION SCOPE AND IMPLEMENTATION

4.1 INTRODUCTION

4.1.1 Background of the Demonstration

The impetus for express bus and commuter ridesharing programs in Knoxville originated with the expression of concerns about commuting first voiced in early 1973 by West Knox County resident associations and the Knoxville Regional Cooperative Conference (a representative body for downtown Knoxville TVA employees).¹ A survey conducted by these groups identified a potential market for express bus commuter service between Knoxville's western suburbs and the Central Business District.

In response to a joint citizen-employee petition for commuter express bus service, KTA proposed a subscription service, which was rejected by the petitioners. According to the survey results, such a service structure would not have suited many commuters' schedules. Instead, a two-week demonstration non-subscription service was instituted by KT with a Levi Strauss and Co. Community Affairs Program guarantee insuring break-even operation. Community awareness of the demonstration program was heightened through journalistic efforts and a large-scale appeal for participation by west suburban resident associations and TVA employee groups. This activity occurred at the end of 1973, when the energy shortage had begun to have personal implications for commuters. The first express bus, which began operation in December 1973, was soon overcrowded; by the following spring, seven KT express buses were offered, and, as of spring 1978, sixteen routes were in operation.

TVA employees formed the nucleus of the ridership for a variety of reasons:

¹ This process and the development and results of the TVA Com-muter Pool Demonstration Program are described in Stokey, et al, 1977 (63).

- TVA is a large downtown employer and many of its employees live in West Knox County; furthermore, potential riders were identified through the company's employee address lists.
- Bus schedules were structured to coincide with TVA shifts.
- TVA management allowed the use of agency resources for express bus promotion, including circulation of service announcements through the internal mail system.
- TVA guaranteed the economic viability of buses to accomodate their workers' overtime schedules.

In the spring of 1974, TVA publicized its intention to construct a new downtown office complex as part of the planned CBD redevelopment program. This would have simultaneously eliminated about 1,300 existing parking spaces and created demand for expanded employee parking facilities. However, rather than a parking construction solution (which would have fostered low-occupancy vehicle usage), TVA management and employee unions (with the benefit of input from KTA) agreed upon appointment of a transportation coordinator to develop ridesharing incentives and administer a Commuter Pool Demonstration Program (63). The TVA program began on January 2, 1975, and included the following components:

- monetary incentives for express bus, carpool, and vanpool commuters
- carpool formation assistance
- TVA-Credit Union Vanpool Demonstration Project (providing subsidizd van leasing)¹

As the ridesharing program gained popularity, TVA even chose to contract with private bus companies to supplement KT-operated express bus routes (62). Thus the TVA coordinator was performing many "brokerage functions" (although only for the company's employees) as early as 1975.

¹ A "gentleman's agreement" between KT and TVA forbade direct competition of vans with existing bus routes.

During the period when commuter express bus service was receiving serious consideration, the University of Tennessee Transportation Center received funding approval from the U.S. Department of Transportation's Office of the Secretary for research and development of a computer package to match work-trip patterns. Since the \$176,000 grant was to fund research activities only, the UT Transportation Center teamed with the City of Knoxville to request UMTA supplementary funding for an eighteen-month ridesharing implementation program. In June 1974, \$93,000 was granted.

The program, which focussed on large employment facilities, involved surveying of employee origins and preparation and distribution of match lists to facilitate employee carpooling. The analysis and recommendations of the overall study are presented in the report Ridesharing and the Knoxville Commuter, published by the University of Tennessee Transportation Center in August 1975 (14). In essence, the study concluded that a brokerage system was the most promising solution to many traditional transportation problems. To implement these recommendations, the City of Knoxville (with the help of UT's Transportation Center) applied to UMTA for SMD funding in April 1975.

4.1.2 Overview of Demonstration Scope

From its outset, the scope of the demonstration was extremely broad. The approved grant application (41) listed twelve specific tasks to be accomplished over the twenty-four-month duration of the project; these can be summarized as follows:

- Identify (primarily through surveys and a telephone switchboard) potential demand of commuters, social service agency clients, and the jobless, as well as the potential demand for goods movement (pre-arranged travel only).
- Identify the following types of existing and potential suppliers: Knoxville Transit (fixed route/subscription express bus), charter bus operators, taxi or limousine operators, individuals with cars or vans available for ridesharing, and small entrepreneurs with a fleet of available vehicles.

- Acquire a fleet of fifty-one "seed vans" and make these available to private individuals on a lease basis (\$332,624 of the \$997,959 UMTA grant was for this purpose); establish and operate maintenance, accounting, and control procedures for these vans.
- Match potential users and suppliers using a computer program and foster, either formally or informally, agreements between riders and providers for pre-arranged service in areas currently not served by transit.
- Act as ombudsman, providing information on available transportation services, costs, insurance, etc.
- Maintain liaison with Knoxville Transit, and various public agencies involved in the provision of transportation services and facilities.
- Actively promote institutional/regulatory changes which will facilitate the operation of the brokerage system and/or the broker-managed services.

The original schedule for performing the twelve tasks is presented in Figure 4-1.

In hindsight this was clearly too ambitious an undertaking for so short a period, and the problem was compounded by two unforeseen factors:

- 1) While the demonstration had been planned to begin on July 1, 1975, negotiations over a 13(c) agreement¹ between KT and the Amalgamated Transit Union delayed start-up until October 23, 1975 while the project's planned completion date of June 30, 1977 was retained;²
- 2) The institutional/regulatory barriers to implementation of vanpool operations proved considerably more complex and difficult to overcome than anyone had envisioned when the project was initially proposed.³

This second factor proved to have major impacts on both the direction and the accomplishments of the demonstration. Figure 4-1 indicates that tasks associated with the promotion of com-

¹ See Section 4.3.1.

² This was subsequently extended to December 31, 1977 and finally December 31, 1978 without any increase in funding.

³ See Section 4.3.2.

TASKS	Fiscal Year 1976				Fiscal Year 1977			
	Starting:							
	July 1	Oct. 1	Jan. 1	Apr. 1	July 1	Oct. 1	Jan. 1	Apr. 1
	I QUARTER	II QUARTER	III QUARTER	IV QUARTER	I QUARTER	II QUARTER	III QUARTER	IV QUARTER
Task 1 - Identify Methods to Increase Traditional Transit Supply		■	■	■	■			
Task 2 - Implement Employer Surveying and Matching	■	■	■	■	■	■	■	■
Task 3 - Identify Social Service Agency Transportation Needs and Potential Suppliers		■	■	■	■	■		
Task 4 - Identify Transportation Needs of the Transit Dependent Jobless			■	■	■	■	■	
Task 5 - Determine Feasibility of Implementing Combined Passenger and Goods Movement Services				■	■	■	■	
Task 6 - Develop an Operational Vanpool Program	■	■	■	■	■	■	■	■
Task 7 - Develop an Operational Express Bus Program	■	■	■	■	■	■	■	■
Task 8 - Examine Potential for Private Sector and Minority Business Involvement in Transportation			■	■	■			
Task 9 - Develop Accounting and Operational Record Keeping Systems	■	■	■	■	■	■	■	■
Task 10 - Achieve a Regulatory Structure Supportive of Ridership	■	■	■	■	■	■	■	■
Task 11 - Evaluate the Ridesharing Program	■	■	■	■	■	■	■	■
Task 12 - Coordinate with Governmental and other Groups		■	■	■	■	■	■	■

FIGURE 4-1. PRELIMINARY SCHEDULE OF PROJECT TASKS

muter ridesharing modes were intended to dominate the early months of the demonstration; this was initially expected to be a relatively balanced effort, addressing all pertinent modes. However, from the beginning of the project (in October 1975) until the end of March 1976, the project's leadership was forced to devote the vast majority of their time to their most immediate and troublesome problem: the deregulation of commuter vanpools and the establishment of an operational vanpool program. Given the available staffing, such concentration on vanpooling implied a reduced effort in other areas; while the vanpooling efforts eventually proved fruitful, the direction of the project (and both public and governmental perceptions of its purpose) were by then firmly established. Later efforts to change the perception of the project from strictly vanpooling to the full range of brokerage functions were only partially successful, although the actual breadth of activities was considerably broader than was commonly recognized.¹

During its first twenty months of operation, when the brokerage was located at and managed by the Transportation Center at the University of Tennessee, effort was concentrated in the following areas:

- implementation of employer-based surveying and ride-share promotion efforts
- generation and distribution of materials to potential poolers
- institutional and regulatory efforts in support of vanpooling and other ridesharing arrangements
- implementation of an operational vanpooling program
- development of a promotional campaign involving a variety of marketing techniques
- inventorying of potential sources of transportation supply (including school and church bus fleets)
- identification of existing social service agency transportation services and perceived needs

¹ See Sections 9.5 and 9.7.

- development of plans for a second Service and Methods Demonstration aimed primarily at travel to and from the Knoxville CBD
- arrangements for the continuation of brokerage activities within the city's newly formed Department of Public Transportation Services

The majority of this effort was directed at commuter needs, with other activities being subordinated primarily due to staffing constraints and/or unresolved institutional barriers. However specific decisions were also made during this period to abandon (at least for the duration of the demonstration) proposed plans regarding the brokering of goods movement services and the implementation of new express bus routes.

After the physical and institutional relocation of KCP within the city government, the primary thrust of brokerage operations (i.e., commuter rideshare matching and promotion) remained essentially the same. However in the year that followed, activities in the area of social service agency transportation were intensified and led to implementation of several service arrangements. Furthermore, the broker planned and began implementation of its proposed new CBD-directed demonstration.¹

The remainder of this chapter deals in detail with the organization, operation and activities of the Knoxville Transportation Brokerage Service, both at the University and later in the city's Department of Public Transportation Services.

4.2 BROKERAGE ORGANIZATION AND IMPLEMENTATION

4.2.1 University of Tennessee Management Period

Under the terms of its \$665,335 contract with the City of Knoxville, the Transportation Center of the University of Tennessee (UT) planned, implemented, managed and evaluated the first twenty months of the transportation brokerage service.

¹ Albeit in advance of grant approval.

At the beginning of the period, UT had essentially a free hand in this endeavor, since no one in the city government took direct responsibility for these matters; the city's primary functions during this period were the approval of contracts administered by UT and the purchase of vans and insurance.

It was apparent to UT's project leaders, however, that the long term viability of brokerage in Knoxville would be dependent on the establishment of a permanent home for the operation once the demonstration period ended. Their discussions with the Mayor soon led to the hiring of a transportation professional and the establishment of a new city department--the Department of Public Transportation Services (DPTS)--in November 1976. The new department was charged with the responsibility to manage and coordinate all public and private transportation activities, including the development and administration of the brokerage. As part of its coordinating role, its director would serve as executive secretary of the Knoxville Transit Authority and the Parking Authority. Soon after the establishment of the department, its director worked with UT project leaders to move the city into a much more significant role in the demonstration, albeit primarily in terms of policy-making rather than operations.

While residence of the brokerage at UT provided extraordinary access to individuals with specialized transportation and other expertise, it was not without its disadvantages. The perception of the brokerage as a "university" project seemed to identify it as a temporary experiment and to link it with previous projects carried on by University staff--including the ridesharing program of 1974, from which it could not be distinguished by some individuals. Furthermore, the business community had provided so much data and/or filled out so many surveys for previous UT projects that the new (rideshare information) surveys were occasionally not well received.

The choice of "Knoxville Commuter Pool" as the only publicly promoted name for the brokerage also had its disadvantages. While it was well suited to many of the broker's commuter

pooling activities, the name was probably not well associated with bus, social service, or other non-carpool or vanpool transportation. This was reinforced by KCP's early emphasis on private "pooling" modes.

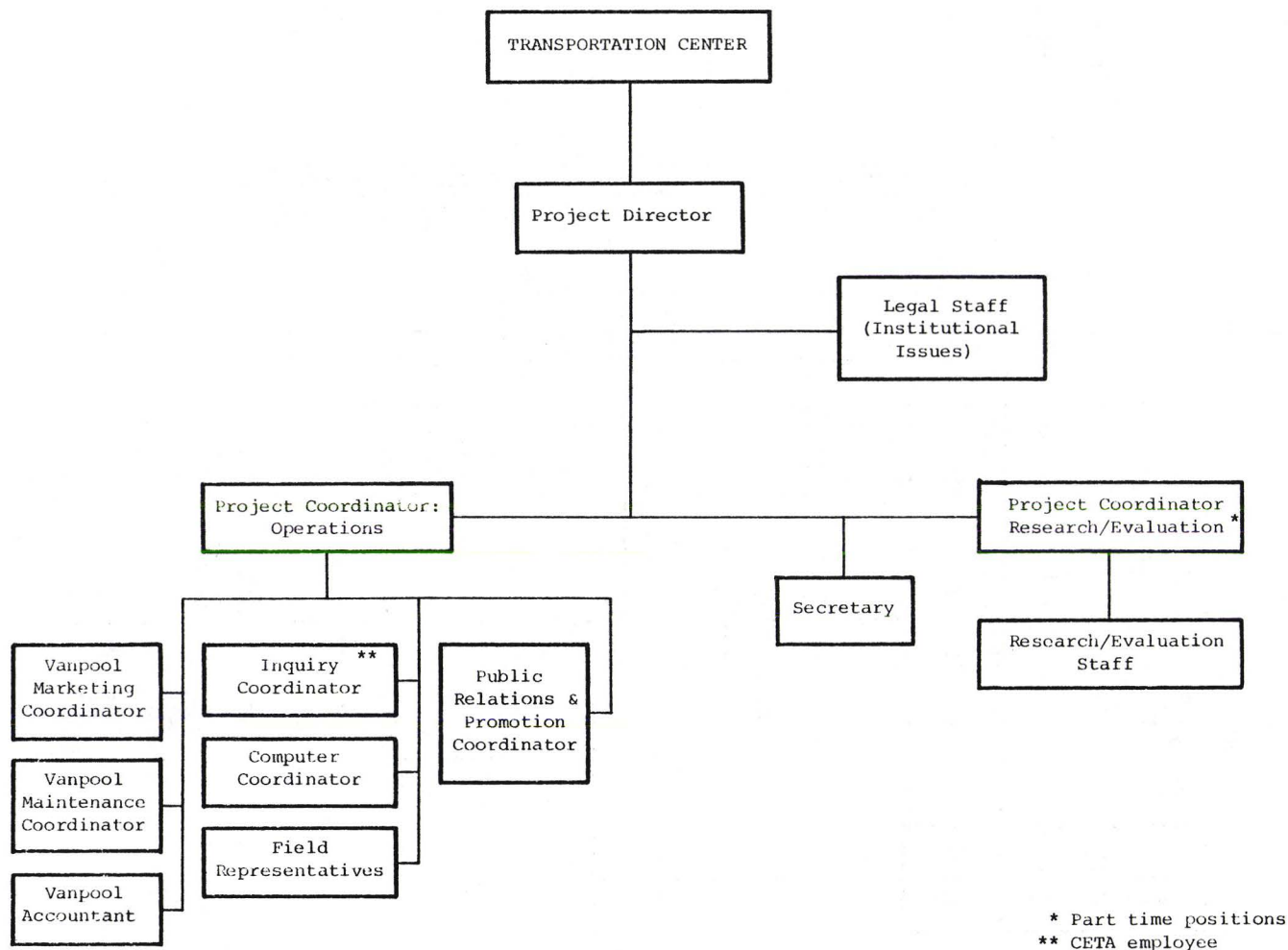
While KCP operated at UT, its director was a professor in the Department of Marketing and Transportation, but day-to-day management was the responsibility of two project coordinators both hired from outside the academic community. Their areas of responsibility were eventually divided into "operations" and "research/evaluation." In addition, a communications professional was hired to perform all public relation functions. While at the outset of the demonstration these three individuals were the only full-time staff, numerous professors and graduate students were part-time contributors to either the operational and/or research/evaluation efforts. As project responsibilities evolved and roles became better identified, three additional full-time positions were created.¹ (See Figure 4-2.)

4.2.2 City Management

The transition of operations from the University to the city took place in July 1977, when KCP moved into two rooms in Knoxville's City Hall. Since the key staff members at the University simply moved with the organization, what might have been a very difficult transition (if new people had had to be trained) was quickly and relatively smoothly accomplished.

Figure 4-3 indicates the new organizational structure implemented with the move. KCP now resided within the new Department of Public Transportation Services. The individual who had served as Project Coordinator for Operations at UT became its administrator, reporting to the Director of the Department. Each remaining member of the staff had also served with KCP at UT.

¹ A more detailed description of specific staff responsibilities is contained in Beeson (1).



* Part time positions
** CETA employee

FIGURE 4-2. ORGANIZATION OF THE KNOXVILLE COMMUTER POOL
AT THE UNIVERSITY OF TENNESSEE

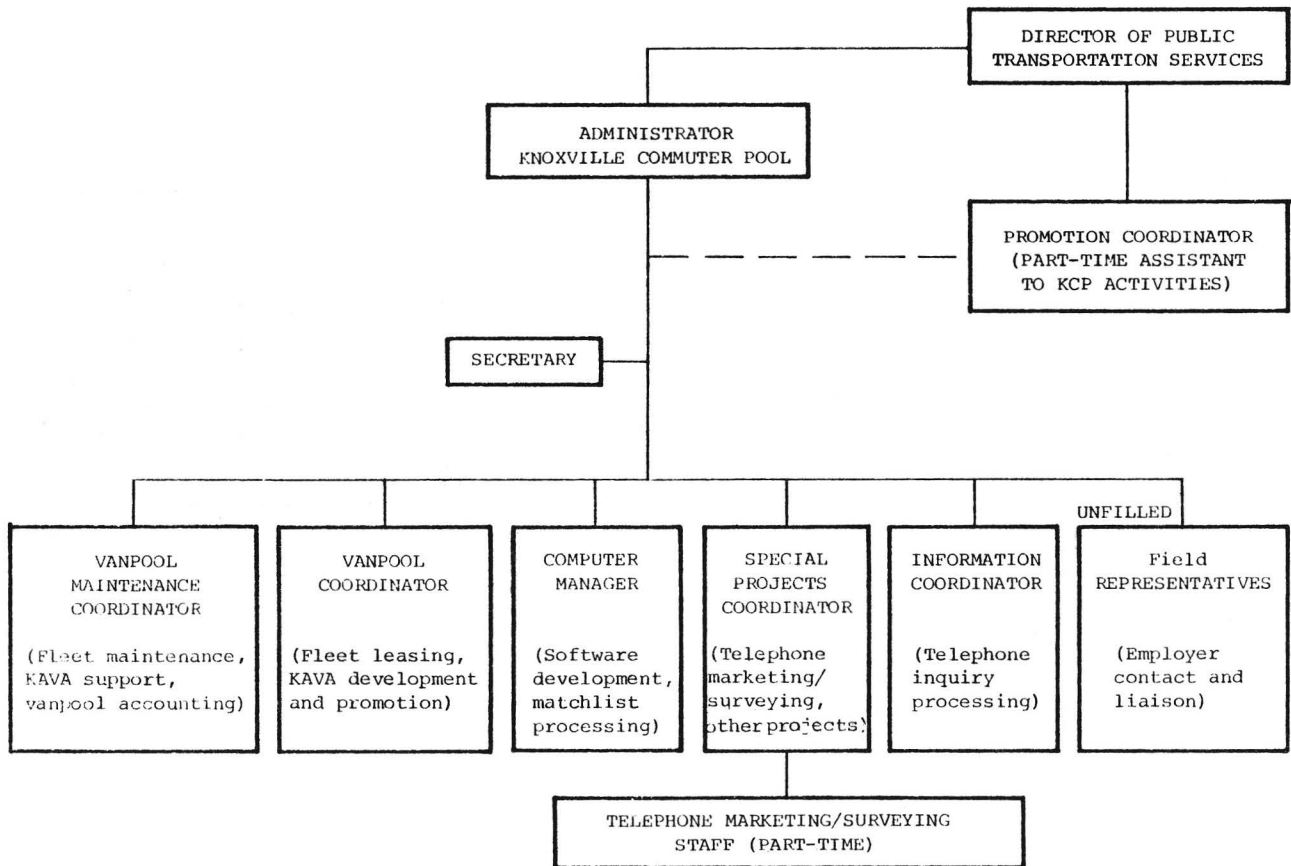


FIGURE 4-3. ORGANIZATION CHART OF THE KNOXVILLE
COMMUTER POOL AT THE CITY OF KNOXVILLE

The only significant staffing problem encountered in the City period involved the Field Representative positions, which remained unfilled throughout the evaluation period. These positions had not been specifically identified prior to the transition of KCP activities to the city, and when attempts were later made to add staff to perform this function, KCP found that it could not obtain approval to pay (for a part-time position) the salary necessary to attract qualified individuals. Consequently each existing staff member was assigned responsibility for employer contact and liason in a specific geographic area. Unfortunately, the requirements of their "regular" responsibilities were sufficiently time-consuming to adversely affect the brokerage's ability to maintain and expand employer involvement and to carry out effective resurveying on an areawide basis as had been intended.¹ It is also suspected that the youthfulness of KCP's staff (all of whom except the administrator were under thirty years of age) may have affected their credibility and rapport with employers. At the very least, KCP's original intention of hiring older "businessmen" to serve as Field Representatives would have freed other staff members to perform their assigned functions; it is also possible that it might have had a measurable effect on employer cooperation.

Financing of brokerage operations during the City period came from many sources:

- 1) a total of \$92,187 in SMD operating funds deliberately unspent during the UT period, (i.e., not expended under UT's contract)
- 2) the Comprehensive Education and Training Act (CETA), funds from which were used to fill two staff positions
- 3) the seed vanpool depreciation account and the proceeds of the sale of seed vans (toward the end of the demonstration)
- 4) staff support from non-KCP members of DPTS and the use of City Hall office space and utilities

¹ This is supported by the minimal growth in the number of participating employers and in the size of the master file during this period. See Figures 5-2 and 6-4.

- 5) computer services accounts provided by the U.S. and Tennessee Departments of Transportation and by the Tennessee Office of Energy

Thus federal funds remained the principal support for the brokerage even after its move to the city. (See Section 8.2 for a more detailed review of demonstration financing.)

An obvious concern, however, was how to finance continued operation after federal demonstration funds were exhausted. The location of a truly regional service organization like KCP in a city government--particularly one beset with controversial transit deficit problems--raised serious problems. Should the city pay for a service aiding those living and working outside its limits? From a political standpoint, the answer was a clear "no!." Thus the city began a search for a new organizational home for the brokerage.

The first approach was to propose the reorganization and renaming of the Knoxville Transit Authority to a Transportation Authority charged with the development and promotion of a comprehensive, multimodal transportation system. The administration-sponsored ordinance to effect this change called for the appointment of five KTA commissioners (nominated by the Mayor and approved by the City Council) and an eighteen-member Citizens Advisory Committee (appointed by the City Council). The staff of DPTS would serve as the staff of the new Authority. Although the Authority would have had overall responsibility for coordinating and controlling public and private fixed route, commuter and charter buses (except school and church buses or vans not-for-hire), vanpools, carpools, taxicabs and limousines, the City Council would have retained the right of approval over many of the Authority's powers; for instance, since the Authority was not given the power to raise its own funds, the City Council's funding authorizations would provide one means of exercising its control. However, KCP saw the new Authority as an important institutional step towards the integration of KCP's ridesharing and other paratransit activities and the conventional transit services then controlled by KTA.

The ordinance passed the City Council on first reading on February 7, 1978 but was subsequently defeated on second reading several weeks later after being amended to restrict the Authority's power to modify (or cut) fixed route bus services. The coalition which opposed the legislation in its original form and ultimately brought about its defeat consisted of KT bus drivers and local citizens (particularly from South Knoxville), who feared that a DPTS/KCP-dominated Authority would promote vanpools and carpools at the expense of conventional transit, leading eventually to reductions in fixed route services.¹

4.3 INSTITUTIONAL ACTIVITIES

Perhaps it is fitting that while institutional forces had major impacts on the course of the demonstration, the demonstration had major impacts on a variety of former and potential institutional barriers to ridesharing. The purpose of this section is to describe KCP's experience and activities regarding:

- mass transportation labor
- legislative and regulatory issues
- insurance

4.3.1 Mass Transportation Labor

Federal legislation, specifically Section 13(c) of the 1964 Urban Mass Transportation (UMT) Act, seeks to provide protection of labor rights in situations where federal (UMTA) assistance funds are used. In brief, Section 13(c) states that no employee shall have his/her conditions of employment worsened as a result of federal assistance provided under the UMT Act. If such "worsening of conditions" occurs, the affected employees are eligible for compensation under previously negotiated terms.

¹ After the evaluation period had ended, a similar ordinance to establish a Transportation Authority--with DPTS as its staff--was enacted. This compromise proposal vested the power to modify or eliminate fixed route services in the City Council.

The responsibility for administering Section 13(c) lies with the Secretary of the Department of Labor (DOL), not with the U.S. Department of Transportation. The actual process through which the section is administered has involved the development of "mutually satisfactory arrangements" which are "fair and equitable" to both parties in the process--management (i.e., the grant recipient) and labor. The Department of Labor has sought to base Section 13(c) determinations on the existence of actual documents which are the product of local bargaining and negotiation and which set down the terms of the protective arrangements,¹ including identification of affected employees, compensation levels for adverse impacts, and appeal or arbitration procedures for disputes. In practice, this has meant that unions representing "potentially affected employees" are afforded the opportunity to "sign off" on every federal grant using Urban Mass Transportation Act (Section 3, 5, or 6) funds.² The protections of Section 13(c) are (by definition) applicable to "employees affected" and not merely to "mass transportation employees". However, the Department of Labor has administratively interpreted this provision to apply only to employees falling within UMTA's definition of "mass transportation,"³ but this decision has never been adjudicated and is potentially subject to legal challenge.⁴

1 These documents are generally known as "13(c) agreements."

2 Section 16(b)2 funding has been excluded by administrative decision.

3 This generally excludes such modes as premium-ride taxis, limousines, private ambulances, auto rentals, etc. (i.e., "for hire" services in which the vehicle can remain exclusively under the direction and control of a single passenger).

4 This restrictive interpretation is based on a review of the committee hearings preceding passage of the statute and U.S. DOL's interpretation of legislative intent.

The potential for conflict between paratransit and conventional transit is great for two paratransit service concepts: vanpooling and special market demand-responsive services.¹ Vanpooling could clearly compete directly with conventional transit, causing diversion of existing transit patterns, although the possibility of competition can be minimized by the organization and administration of the program; vanpools can be explicitly restricted to trip patterns not served by conventional transit. Alternatively, the concept could be implemented in direct competition with conventional public transit, particularly in states which deregulate vanpools from common carrier status and cannot, therefore, legally prevent such competition from taking place.

In early 1975, even before the SMD grant application had been submitted, UT staff met with representatives of the U.S. Department of Labor and the International Amalgamated Transit Union to discuss the demonstration concept. At that time the union agreed not to press for unionization of vanpool drivers. However, local officials of the ATU initially took a negative view of the demonstration. They felt that public support for conventional transit in Knoxville was already weak and that the vanpool alternative embodied in the demonstration could further erode their position. During the course of negotiations over a 13(c) agreement, which lasted through the summer of 1975, the ATU sought protection of current employment levels for the local bargaining unit for a period of four years, at least to the extent that reductions could be traced to the demonstration.² With this protection, the union was willing to allow vanpool operation without any geographical restrictions.³

1 Particularly special services for the elderly and handicapped within areas receiving conventional transit coverage.

2 This clearly goes beyond protecting individual employees.

3 Local officials were persuaded by the national leadership of the union that such an agreement was advantageous. (Source: Notes of a conversation between Earle Putnam, General Counsel, Amalgamated Transit Union, and Alan Altshuler, August 21, 1974.)

However, the city was fearful of its liability under such an agreement and proposed the establishment of geographical limits for vanpool operation, but without guarantees on bargaining unit size.

The actual 13(c) agreement was reached after achievement of two other agreements between the city, the transit operator, and the union. The first was a contract between the city and the transit operator for the performance by the transit operator (i.e., unionized labor) of all major maintenance (except warranty or emergency work) not performed by the regular operator/driver of the seed van, except where the van was neither garaged in nor served within city limits. The second agreement was a verbal understanding between the city and the union that the seed vans would be targeted for areas which did not have conventional transit services and that subscription buspools, if formed, would be served by the present public (unionized) operator. Based on these two agreements, a 13(c) agreement was executed on October 25, 1975, which guaranteed the size of the existing bargaining unit for a period of four years or until the seed vans were "removed from service," whichever occurred first.¹

The actual impact of this agreement on KCP operations was less than might initially be anticipated. For example, rather than risk the enforcement of the agreement's protection if a reduction in transit service subsequently became necessary, the city (i.e., KCP) precluded any seed van from operating with both its origin and destination within city limits (the KT service area). However, KCP analyses suggested that "economical" vanpooling required a round trip of twenty miles or more; only a very small number of trips of this length could occur totally within the city's boundaries. Thus, the restriction on competi-

¹ Except to the extent brought about by things other than the project. However, if the project was in any way responsible for the reduction of employment, the agreement's full guarantees were to take effect; the burden of proof in such cases was on the city.

tive trips was practically moot. Furthermore, while "seed" vans could not be used to serve these trips, privately-owned vanpools, promoted by KCP, could. KCP's carpool promotion efforts, which were, in fact, much more likely to have a significant impact on transit ridership, were not prohibited in any way by either agreement.

When the initial 13(c) agreement was signed, the demonstration was scheduled to end on June 30, 1977, and no one had yet addressed the disposition of the vans at that time. However, as the demonstration progressed, two unforeseen factors made necessary the negotiation of an amendment to the original agreement:

- 1) the duration of the demonstration was extended eighteen months, making the new termination date December 31, 1978; and
- 2) the city decided that the time had come to end its role as a van lessor and to sell the vans to current driver/coordinators.

Negotiations over the amendment began in June 1977. In addition to the extension of the original document's protections for one and a half more years, the union sought 1) assurances that no vanpool operator (whether a purchaser of a city seed van or not) compete with conventional services (backed by the city's promise to police this provision) and 2) a new dispute process involving the U.S. Department of Labor as arbiter. However, the city agreed only to ensure control of all of its fifty-one seed vans (through the sales contracts) and refused to accept controls on other vans or the proposed new dispute process.

An amendment was finally signed on September 9, 1977 and contained the following provisions:

- 1) extension of the duration of the protections from 4 to 5 1/2 years
- 2) the elimination for those vans sold by the city of the requirement that van maintenance be performed by KT personnel

- 3) the requirement that the sale or transfer of any van to a third party operator contain an agreement that he or she not "actively solicit nor carry riders in the van when both the residence of the rider and his or her work location are within one-fourth mile of an active bus line operated by the Company¹ or by any successor or other common carrier operating under contract or franchise from the city or by the city."

In addition, this third clause was backed by a letter of assurance written by the Mayor to the president of the (international) union stating that the city would promptly investigate any claim of a violation and take action necessary to remedy any problem. The letter also reiterated the existing dispute settlement process and promised to provide the union with copies of all progress and other reports pertaining to the project submitted to UMTA by the city.

4.3.2 Legislative and Regulatory Issues

Activity in the area of regulatory reform began when the demonstration concept was in its earliest stages, even before the SMD grant application had been prepared. The Tennessee Public Service Commission (PSC) had the authority to regulate carpooling, but, as a matter of policy, had chosen not to exercise it. It was uncertain what the PSC's position would be on vanpooling. To determine how existing statutes would be applied, UT staff contacted the PSC in November 1975, and explained the nature of the demonstration project and its vanpooling component. PSC responded that it considered vanpools to be public carriers and thus subject to the normal common carrier certification process.² In an effort to reverse the

¹ KT.

² The PSC indicated the same position to TVA and attempted to regulate its young vanpool program. However, TVA claimed that as a federal entity it was outside the PSC's jurisdiction. KCP's success in achieving deregulation precluded a showdown, but it is possible that without this change, TVA's highly successful vanpooling activities would never have developed.

ruling, KCP offered to restrict its vans to noncompetitive areas, thus precluding any impact on existing carriers, but this approach proved futile.

Since the PSC's policy would have drastically affected the viability of the vanpool program, KCP's founders sought ways to free the demonstration from such regulation. Two alternatives appeared feasible: 1) the establishment of a regional transportation authority (RTA); and 2) regulatory reform, through state-level legislation, to exempt vanpools from PSC control.

A regional transportation authority would have had the power to regulate within its boundaries, thus superceding the PSC's power; and, presumably, the new RTA would have chosen not to regulate vanpools. KCP's founders sought the participation of all cities and counties in the demonstration service area (i.e., the ETDD); if any jurisdictions chose not to join, the service area would have been modified accordingly. Participation would have required no financial involvement and could have been withdrawn at any time (62).

KCP's strategy for obtaining local participation was to contact the highest elected official in each county, point out the benefits of joining the RTA, and then enlist his/her help in presenting the proposal to the appropriate county legislative committees. By January 1976, both Knoxville and Oak Ridge had agreed to join the RTA and had taken the steps necessary to deregulate vanpools within their jurisdictions. However, there was concern in some counties that Knoxville might dominate the organization. There was also opposition from the Easter Seal Society, which feared competition with the broker over federal funding for social service agency transportation. The effort to establish the RTA might have eventually succeeded, but it was abandoned when progress on the legislative front made the organization unnecessary.

Simultaneously with its effort to establish the ill-fated RTA, KCP was laying the groundwork for state-wide legislative modifications to deregulate ridesharing. Deregulation could have been complete, as had recently been accomplished in Cali-

fornia and Connecticut, or an effort could have been launched to exempt only demonstration vans, either permanently or for a limited period of time. KCP chose to pursue both alternatives.

One effort centered on a non-binding resolution permitting and advocating that the PSC exempt transportation demonstration vehicles from normal regulation. This easily passed both houses of the legislature. KCP then petitioned the PSC for the exemption authorized by the resolution, but the Commission did not schedule a hearing or take other action.

KCP's other tack was to draft legislation aimed at eliminating PSC control over all vanpools and express buses oriented towards work trips. Since their power was to be significantly limited by the legislation, the Commission was expected to be a major foe. However, real opposition came only from PSC staff within the Motor Carrier Division, who sought to protect existing inter-city carriers (principally Greyhound and Trailways).¹ PSC leadership was primarily concerned about the exemption of express buses and retention of their power to regulate safety requirements. With the aid of the Tennessee DOT's Bureau of Mass Transit, KCP and PSC leadership worked together to develop a compromise package which omitted the exemption of express buses.²

With the help of several key members of the Knoxville delegation to the legislature, influential representatives were lined up to co-sponsor the bill. This, together with the officially neutral position of the PSC and the support of the Legislative Subcommittee on Mass Transit, allowed the legislation swift passage. Only two amendments were added to the basic legislation:

¹ PSC expected strong lobbying against the legislation by these carriers, but it never occurred. Competition with KT was not at issue, since the company is under the city's jurisdiction rather than the PSC's.

² Conversation with Mal Baird, Tennessee DOT, January 26, 1977.

- The PSC retained the right to inspect pooling vans annually for safety (including possession of a fire extinguisher and first aid kit) for a nominal \$5 fee.
- Davidson County (not part of ETDD) was exempted from the bill at its own request.¹

An amendment supported by PSC's Motor Carrier Division to limit the deregulation to those vans taking part in the demonstration was defeated.

The legislation, Tennessee House Bill No. 2184, was signed into law on March 28, 1976, permanently exempting "vehicles, except taxicabs or airport limousines, used primarily for hauling fifteen or fewer passengers to and from their regular places of employment" from any government regulation, except as necessary for safety purposes or to establish a minimum level of insurance coverage.

In the 1977 session of the Tennessee legislature, KCP leadership proposed and helped draft extensive legislation supportive of the goals and objectives of the brokerage concept. The scope of this package was truly enormous, consisting of a total of six separate bills, all but one of which were adopted. The successful legislation provided for the following changes and/or activities:

- 1) elimination of the vestigial PSC regulation of car and vanpools in the areas of safety and insurance retained by the 1976 bill. Compliance with the PSC's safety standards (which applied to carpools as well as vanpools) required the purchase of a \$35 kit (containing a fire extinguisher, first aid equipment, etc) which KCP leadership felt was overly expensive. Although the PSC never set special minimum insurance requirements for pooling vehicles, their special treatment under the law (i.e., the requirement of a certificate of insurance) raised the potential for the application of a higher "degree of care"² for these vehicles, thus

¹ Nashville, with a large transit operation, is located in this county and its Metropolitan Transit Authority wanted to control all vanpools operating in its service area.

² See the following section for a discussion of the insurance issues associated with PSC regulation.

influencing the availability and cost of insurance. (Furthermore, KCP was sensitive to this kind of issue because of a recent decision in New York State in which a carpooler who had neglected that state's regulatory requirements had been declared a "public nuisance on the highway" following an accident.)

- 2) authorization for the PSC to designate a county a "citizen transportation area," thereby allowing the use of church and/or privately owned vehicles to carry passengers for compensation within the county and to and from other "citizen transportation areas." The decision to designate a county as such an area is to be based on the availability and cost of existing services and the transportation needs of its citizens.
- 3) authorization for Public Service Commission flexibility in allowing motor carriers to drop unprofitable routes. The legislation allowed consideration of the profitability of a particular route, as well as alternative forms of service, when reviewing a motor carrier's request.
- 4) motor carrier experimentation with new routes for up to six months without obtaining a Certificate of Public Convenience and Necessity. The existing requirement necessitated a costly and risky process for a service provider, thereby hampering experimentation with new services.
- 5) authorization for vocational schools to offer voluntary emission control inspections and provide other diagnostic information.
- 6) amendment of the state's insurance statutes to extend "underinsured motorist" coverage. (See Section 4.3.3 for details.)

The sole bill supported by KCP which was not enacted was the "Transportation Act of 1977." Although it contained some controversial provisions, the legislation also called for the completion of several relatively expensive studies and was apparently more a victim of its cost and the partisan politics surrounding its sponsorship than its content. The bill would have resulted in several important changes since:

- 1) It authorized the use of state-owned vehicles for pooling where their use is effective and the commuters pay full costs; such use was prohibited by

existing statutes. (This became a controversial issue after a scandal erupted over the use of state-owned vehicles by high officials.)

- 2) It exempted employers from liability arising from their support of employee ridesharing activities. (KCP's concern was that employers might be reluctant to fully support ridesharing out of a fear of liability from an employee's accident or an increase in workman's compensation premiums.)
- 3) It directed the state DOT to locate and designate "park and ride" lots. Where churches or other groups offered the use of their lots without a fee, the state was authorized to use public funds to erect signs on the property. Also, the donating group was exempted from any liability or tax implications arising from the lot's use. (Around Knoxville, approximately eighty churches had volunteered the weekday use of their lots for this purpose; although the legislation was defeated, some churches proceeded to offer the use of their lots for ridesharing activities.)
- 4) It established the responsibility of the state DOT for the coordination of ridesharing demonstrations, authorized the study of ridesharing benefits (in terms of both cost and energy savings), and established a formal policy of encouraging ridesharing among state employees.

While the large majority of the demonstration's regulatory activities occurred at the state level, a potentially very significant accomplishment was the development (by DPTS) and passage of a new taxi ordinance for Knoxville. While the law set new strict standards for the licensing, inspection and operation of taxis (in a needed effort to improve the quality of service), it also modernized the allowable fare structure and range of services, making the business more financially viable (in an effort to increase the quantity of service). The most significant aspect of the ordinance was its legalization and endorsement of shared riding, which potentially opened the door to a wide range of specialized new services, including feeder services to conventional buses. Although such new services have not yet been implemented, from the perspective of brokerage operations, this ordinance constituted an

important step toward providing the quantity and range of services necessary to efficiently serve identified travel needs.

4.3.3 Insurance¹

The van insurance problem is primarily a financial one: since insurance is a significant component of vanpool costs, the price of insurance can greatly affect the mode's attractiveness as an alternative to private automobiles and carpools. Unfortunately, while the insurance industry had had great experience in insuring private automobiles, carpools, trucks, buses, and a variety of other vehicles when the demonstration began, it had not yet determined how to classify vanpools for rating purposes; operational experience had been too limited to provide sufficient actuarial data for this decision. Thus, individual underwriters were forced to judge vanpool risks by analogy to other (already rated) categories of vehicles, primarily private automobiles, carpools, and common carriers.

The cost of insuring a transit bus (a common carrier) is typically several times that of insuring a private automobile or carpool. This reflects the difference in risk to the insurer, not only from the higher liability limits carried, but also from the treatment of common carriers under the law, which makes the probability of higher settlements more likely. Liability insurance protects (to the limit provided for by the policy) a driver who was at fault from suit by passengers, occupants of other vehicles involved in an accident, and/or any other injured party. State laws typically specify that common carriers are held to a higher "degree of care" than private vehicle operators in assessing who is at fault in an accident.

¹ The insurance issues associated with operation of a vanpool by an organization or an individual are quite complex. A comprehensive study of the topic is documented in Vanpool Insurance Study, a report prepared for the Federal Energy Administration by Dr. Frank Davis, Bill Dotterweich, and David Burkhalter, 1976 (15).

Also, the "concentration of risk" on the driver of a transit vehicle is high, since he/she is likely to be sued by a greater number of people in the event of an accident than an automobile operator.

Although vanpooling and carpooling appear extremely similar from the user's point of view, there are significant differences from the insurance provider's perspective which affect his perception of the risk.¹ For example, the "concentration of risk" on a vanpool driver can be significantly greater than that of a carpooler, and the "degree of care" applicable to a vanpool driver has not yet been established in a court of law.² There are other legal questions as well (15) which may, in fact, alter the insurer's risks. Unfortunately, their application will vary from state to state, and precedents have not yet been established. Thus, the question of what constitutes a fair premium for vanpool insurance is basically unresolved.³ From the perspective of the vanpool operator, the availability of insurance at a rate more similar to that of private automobiles than of common carriers is essential to maintaining the mode's attractiveness for all but the longest commuting trips.⁴

¹ Some of these differences stem from a misconception on the part of the insurance companies as to how carpools actually operate. The companies' traditionally favorable treatment of carpools was founded on the assumption that two or more individuals were alternating driving and thus their automobiles were being used less often. However, KCP interviews of Knoxville carpoolers indicate that quite often one individual always drives and the others always ride.

² The legal classification of a vanpool (i.e., whether it is considered a common carrier) can prove the major determinant of the applicable "degree of care."

³ A potential solution to the insurance companies' dilemma would be finding a way to limit contractually the driver's liability to his/her passengers. However, no reliable method of achieving this (i.e., certain to stand up in a court of law) has yet been identified.

⁴ Several company-sponsored vanpool programs have circumvented the problem of obtaining conventional liability insurance by providing their own self-insurance or by including the vans in an existing general corporate liability policy.

Thus far, this discussion has centered on the problem of obtaining adequate and reasonably priced liability insurance to protect the van driver from suit; in fact, this is the traditional consideration in obtaining insurance. However, the passengers in a vanpool may also be exposed to unusual insurance risks. While there is no legal constraint on how much can be awarded to an injured party, in any accident in which the van driver is at fault, the limits of the driver's liability insurance will typically determine the maximum settlement a passenger can collect for an injury. If, for example, the driver is carrying a \$1,000,000 combined single limit policy¹ and eleven van passengers plus the driver of another vehicle sue, each could presumably receive up to \$83,000 (assuming equal settlements). However, this would actually be reduced substantially by attorney fees (typically 33% to 50%), court costs, etc. Clearly, in the event of a catastrophic accident, the passenger and anyone else injured would not be well protected by current standards.²

The problem is severely compounded if the van is hit by another driver who is determined to be "at fault." In Tennessee at the start of the demonstration, the maximum amount of insurance typically available to an individual was \$100,000/\$300,000 for bodily injury unless the insurance carrier granted special permission.³ This implied considerably smaller maximum settlements to each injured party. In fact, however, studies show that 60% of all cars in the United States carry \$25,000/\$50,000 bodily injury liability insurance or less and that 17.4% of all cars registered in Tennessee carry no insurance at all (15). A Tennessee van rider or driver severely injured in an accident

¹ In such a policy, there is no limitation on the settlement for each individual suit other than the policy limit for all suits arising from any accident.

² It should be noted that the prospects of obtaining an affordable van insurance policy with more than \$1,000,000 of coverage are virtually nil at this time.

³ This provides for settlements of up to \$100,000 to each individual, but total settlements cannot exceed \$300,000.

caused by another driver would have been very unlikely to be adequately protected under insurance provisions which existed when the demonstration began.

The complexity and seriousness of the insurance problems facing KCP were not fully recognized during the formative stages of the demonstration. While it was apparent that insurance would be required, the difficulties later experienced and the staff time expended in obtaining the desired coverages as well as the role that insurance was to play in shaping the services that KCP could provide were to prove surprising to the project's organizers. This is quite understandable in view of the virtual absence of precedents on which such judgments could be based.

KCP's earliest attempts to secure van insurance for its own fleet of "seed" vehicles began in August 1975. The initial effort involved telephone calls to approximately twelve insurance carriers, brokers, etc. aimed at determining the types of coverage that were available and their costs. However, these initial attempts were fruitless--none of those contacted were interested in providing coverage.

A breakthrough came months later when one of the independent brokers contacted by KCP convinced an insurance underwriter that the risks associated with "seed" vans would not be exceptionally great. The arguments supporting this contention were that:

- Van drivers would be carefully screened and thus would be statistically better than average risks.
- The vans would follow a rigorous maintenance schedule.
- Van drivers would be familiar with their routes.
- The vehicles would remain idle during midday hours.

Based on the coverage the underwriter was willing to offer, KCP developed specifications and made a public request for bids to provide coverage. Only the single (expected) bid was received.

The insurance, which went into effect on December 15, 1975, provided the following coverage for KCP seed vans only:

- combined single limit bodily injury and property damage liability insurance of \$1,000,000 per occurrence
- medical payment insurance of \$1,000 per person
- automobile physical damage insurance (fleet automatic)--including comprehensive with a \$100 deductible from actual cash value and collision with a \$250 deductible from actual cash value
- uninsured motorists insurance providing up to \$10,000 per person and \$20,000 per accident

The cost of this coverage was initially \$582 per van per year for the period ending December 15, 1976. The following year's costs were determined based on the location at which the vans were housed and ranged from \$539 to \$762 per van for identical coverage.

A comparison of the cost of van insurance with that of essentially identical coverage for an equally valuable private automobile provides a measure of the additional charge for the added risks assumed associated with vanpooling. In 1977, for example, when a van housed in Knoxville cost \$762 to insure, comparable automobile coverage cost approximately \$407; thus, the van insurance cost 86% more.¹

The earliest instance of KCP's implementation plans being altered by the unavailability of insurance occurred when the idea of making dual use of seed vans (i.e., making commuter seed vans available to social service agencies during the normally idle midday hours) was dropped. While there were other reasons as well for discarding the idea,² KCP's inability to obtain insurance for multiple use of the vehicles was a major factor in its decision.

While KCP was facing its own problems in obtaining reasonably priced seed van insurance, it was also acutely aware of the problem insurance presented to private vanpool entrepreneurs.

1 Conversation with Roger Gumm, Schaefer Insurance Company, March 16, 1976.

2 There are a variety of problems associated with dual use which makes it unpopular with commuters; see Section 4.5.1.

The seed vans were, after all, only marketing tools for developing private interest in vanpooling. However, KCP knew of no company willing to write vanpool insurance for private individuals at rates resembling those of private autos; existing private vanpool operators interviewed by KCP all refused to discuss their own insurance coverage, a sign that they were aware of potential problems with their existing coverage.

A major breakthrough in KCP's effort to obtain reasonably priced private and fleet vanpool insurance occurred in early 1977 when their extensive discussions with the Insurance Services Office (ISO)¹ resulted in the announcement of a new nationwide policy affecting the classification and rating of these vehicles. The new policy recognized four basic categories of vanpooling (15):

- 1) Shared driving pools in which the van is used as part of a group arrangement involving alternating drivers and vehicles.
- 2) Privately owned, shared expense pools in which the van is used for commuting each workday and riders contribute to the expenses of operation.
- 3) Employer furnished pools in which the riders are employees of the same company and the pooling arrangement is an inducement to employment or a condition of employment or otherwise raises the possibility of insurance coverage under workmen's compensation statutes (and therefore lowers risk to the vanpool insurer).
- 4) Other pooling arrangements such as third party operators, multiple employer pools, or other situations in which the van is not privately owned and workmen's compensation clearly will not apply.

Under its new policy, the ISO considered all vanpools in the first two categories (i.e., all privately owned vans) as private passenger carpools for rating purposes; their insurance premiums would thus be identical to those of private automobiles of equal

¹ The ISO, which is supported by 1,300 member companies, collects and analyzes statistics and publishes classification and rating guides for the insurance industry.

value and with the same coverage. Vanpools which were not privately owned (i.e., those in categories 3 and 4) were to be rated under the new classification "vanpools" in the ISO's revised commercial rating manual which took effect July 1, 1977, if approved by the individual states). The appropriate rating factors, which were applied to the lowest commercial rate (i.e., the one for a small pickup truck used for business), are presented in Table 4-1.¹

TABLE 4-1. COMMERCIAL VANPOOL FACTORS

<u>Classification</u>	<u>Vehicle Capacity</u>			
	1-8	9-20	21-60	Over 60
Employer furnished	1.00	1.05	1.40	1.90
Other	1.10	1.25	1.80	2.30

For a (non-employer) leased twelve or fifteen-passenger van housed in Knoxville in 1977, these factors implied a premium of \$777 per year for coverage identical to that carried by KCP vans. This was \$15 per year more than KCP was then paying for its insurance.

While the adoption of the new vanpool rates table was a major breakthrough, it should be noted that the existence of the new table and the ISO policy did not guarantee the availability of insurance on a local basis (although the lack of a comprehensive policy had previously been a serious deterrent). Individual underwriters and insurance companies must voluntarily determine whether or not to write insurance at these rates. In Knoxville, there have been only limited problems of availability since the publication of the rates. The Knoxville Com-muter Pool retained its original underwriter and a total of five

¹ The factors reflect industry judgment rather than specific actuarial data; in several years (when sufficient data have been compiled), rates will be established based on past experience, as they are for other vehicle categories.

companies were offering insurance to private vanpoolers at ISO (i.e, private automobile) rates when the evaluation period ended.

Another KCP accomplishment in the field of insurance was the passage in 1977 of legislation extending the state's underinsured motorist coverage¹ to provide greater protection for passengers in pools.² The bill, which KCP developed in conjunction with the Tennessee Farmer's Insurance Company, provided a mechanism for the application of multiple policies in such a way that awards to the injured parties were maximized. Specifically, a passenger in a pool can now collect under both the liability coverage of the (at-fault) driver of another vehicle and the underinsured coverage of the car/vanpool driver (subject to the larger limit of coverage and the prorated share of coverages). Furthermore, any individual who carries such coverage as part of his or her personal automobile insurance policy can guarantee him or herself any specific level of protection desired, even while riding in a car or vanpool. Since an accident involving any high occupancy vehicle could easily result in each passenger's prorated share of the liable party's insurance being quite small (as illustrated in the example appearing earlier in this section), these provisions, which make the coverage under a variety of policies additive rather than potentially exclusive, can be extremely important. Commuters need no longer be exposed to the possibility of inadequate coverage simply because they choose to pool.

4.4 COMMUTER (WORKTRIP) RIDESHARING ACTIVITIES

4.4.1 Introduction

The range of commuter-oriented activities in which a broker might hypothetically become involved is very broad. In addition

¹ This type of policy is intended to protect the insured against loss caused by another party with inadequate coverage or assets.

² See Davis, (16).

to carpool and vanpool matching, the broker could use its data base to: 1) modify existing transit routes (or develop new ones) to capture increased ridership; 2) implement new express or subscription bus services; and 3) establish feeder services to new or existing transit routes, etc. The appropriate set of services for any given service area depend primarily upon the range of existing transportation options and the travel patterns of the area's commuters.

While KCP management considered all of these services as potential long range components of the comprehensive and balanced transportation system they sought to create, they were also mindful of the enormous commitment of staff and time required to implement such services. Consequently decisions were made during the project's design stage to limit initial commuter-oriented implementation to: 1) development of a strong data base of potential ridesharers; and 2) the matching of these individuals with each other to promote new or expanded carpools, vanpools, and/or buspools, while other services were under study. However, although carpool formation could be aided simply by promotion and information distribution, vanpools and buspools required a more active role by the brokerage's staff. It soon became apparent (from analysis of commuter travel patterns obtained through the matchlist surveying process) that there were insufficient demand densities to make new bus routes financially feasible.¹ However, there did appear to be sufficient concentrations to support vanpooling (as expected), and this KCP pursued with vigor.

¹ Even if the densities had been sufficient, neither KT nor any of the local private carriers had additional peak period fleet capacity with which to introduce new services. Furthermore, the economics of implementing new services in the peak only were (and are) not attractive.

4.4.2 Rideshare Surveying, Matching and Follow-Up¹

A major element in KCP's commuter ridesharing program was the surveying and matching of employees with similar travel patterns. The survey process served many functions by simultaneously providing KCP with: 1) a means of identifying individual travel needs; 2) a "master file" of commuters for future marketing efforts; and 3) a means of familiarizing the commuting public with the brokerage and its services. While commuters could provide the necessary identifying and travel information to KCP by directly telephoning a request for a "matchlist," the vast majority of those entered in KCP's master file were surveyed at their employment sites.

Surveying at Employment sites

As many areawide carpooling programs had previously determined, work sites were the logical focus for ridesharing surveys:²

- They provided a relatively inexpensive and efficient means of contacting large numbers of commuters.
- The service area population could be easily segmented on the basis of common destinations.
- Employer participation in the surveying and promotional process was effective in increasing the survey response rate among employees.
- Employers would bear some of the manpower and cost burden of implementing the survey process.

To implement the surveying process KCP's major service area was divided into thirty-seven "work locations," and surveying was concentrated in one or two such locations at a time. This market segmentation was essential to permit a reasonable

¹ More detailed descriptions of the procedures outlined in this section are contained in Beeson (1) and Knoxville Commuter Pool, Annual Report 1977-78 (42).

² In a study by Wagner (77), 90% of 80 carpool programs sponsored by the Federal Highway Administration relied on employer participation.

response time (i.e., between surveying and delivery of match-lists) by KCP and to ensure a sufficient density of surveyed commuters at each location (to facilitate effective matching). KCP's field representatives attempted to visit every major employer within each work location (often several times) to enlist their participation. In all, 829 companies (representing 86,634 employees) were contacted over the course of the demonstration and 391 (with 70,984 employees) chose to participate by allowing KCP to survey their workers.¹ Emphasis in the first year of surveying was on the area's largest employers; during the City period, KCP attempted to increase participation primarily in the downtown, which contains mostly small employers.

Involvement by participating employers varied widely. Some primarily provided interested employees with an opportunity to pick up a survey form; others displayed KCP's promotional literature, distributed surveys to all employees and strongly urged employee completion of the surveys (actually rideshare information forms).² Each participating employer was asked to designate one employee as a ridesharing coordinator, to act as the company's liaison to KCP and to help organize and implement promotional activities, survey distribution and collection, etc. As with employer participation in general, the coordinators' levels of activity spanned a wide range.³ Although good

¹ Section 5.3.1 provides more detailed statistics on employer participation.

² Of those who distributed surveys, some did so through company-wide meetings--an expensive but apparently effective approach. However, most companies forwarded them to supervisors, who were responsible for distributing the forms to their workers.

³ At Union Carbide, a large employer with three plants in Oak Ridge, the coordinators at each plant were exceptionally enthusiastic and active. After KCP had completed the initial matching process, they manually generated new matching information for each employee whose work shift or plant location changed.

quantitative data is lacking, KCP contends that employee response rates varied directly with the level of employer and coordinator participation.¹

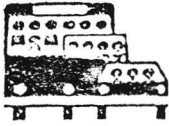
A sample of an early generation rideshare information form (or survey) is presented in Figure 4-4.² KCP's philosophy was to keep the form as simple and short as possible, in an effort to maximize the response rate. As experience was gained, the form was modified several times and the latest version, in a postcard format, is presented in Figure 4-5. The earliest forms did not request a response only from interested individuals; consequently many commuters, some under employer instructions to do so, completed the forms although they had no intention to rideshare. In a calculated gamble, KCP decided (at least at the project's outset) that the positive effect on commuter awareness and interest resulting from completing the survey and from receiving the brokerage's mailings would outweigh the possible negative effects of matching interested individuals with those without interest. There was also the hope that some individuals who did not originally intend to pool might change their minds after receiving a matchlist. Later in the demonstration, once public awareness had been achieved, KCP restricted new surveying to interested individuals.

Survey Collection

At the beginning of the demonstration, all surveys were collected at the employment sites and forwarded to KCP for processing. The principal disadvantages of this approach were the need for employer staff support (which might limit the number of participating employers) and the need to coordinate the timing of the collection process among multiple employers. (The ability to match commuters at different employers was an important aspect of KCP's service.) Later, an attempt was made to reduce the need for employer involvement and coordination by

¹ Statistics on survey completions are contained in Section 6.2.

² The earliest version was designed for direct encoding using optical scanners, but user confusion forced KCP to shift very quickly to the format shown in the figure.



Knoxville Commuter Pool

FILLING IN THIS FORM INCURS ABSOLUTELY NO COST OR OBLIGATION TO YOU

Please fill out this survey form which will help us assist you in finding a neighbor to share a ride to work. A computer will match you with others who live and work near you and who work the same hours as you. By filling out this form you will be provided a list of people with whom you can share a ride. If you are not interested in information on sharing a ride do not fill out this form.

PLEASE PRINT

Name ₁ ₂ ₃ ₄ ₅ Last: ₁₆ ₁₇ ₁₈ ₁₉ ₂₀ ₂₁ ₂₂ ₂₃ ₂₄ ₂₅ First: ₂₆

Home Address ₂₇ ₂₈ ₂₉ ₃₀ ₃₁ ₃₂ ₃₃ ₃₄ ₃₅ ₃₆ ₃₇ ₃₈ ₃₉ ₄₀ ₄₁ ₄₂ ₄₃ ₄₄ ₄₅ ₄₆ ₄₇ ₄₈ ₄₉ Street or Route

City ₅₀ ₅₁ ₅₂ ₅₃ ₅₄ ₅₅ ₅₆ ₅₇ ₅₈ ₅₉ Zip ₆₅ ₆₆ ₆₇ ₆₈ ₆₉

Social Security ₇₂ ₇₃ ₇₄ ₇₅ ₇₆ ₇₇ ₇₈ ₇₉ ₈₀

At what phone may you be contacted?
Home Phone ₃ ₄ ₅ ₆ ₇ ₈ ₉ or
Work Phone ₁₀ ₁₁ ₁₂ ₁₃ ₁₄ ₁₅ Ext. if any ₁₇ ₁₈ ₁₉ ₂₀ ₂₁

Where do you work?
Company Name ₂₂ ₂₃ ₂₄ ₂₅ ₂₆ ₂₇ ₂₈ ₂₉ ₃₀ ₃₁ ₃₂ ₃₃ ₃₄ ₃₅ ₃₆ ₃₇ ₃₈ ₃₉ ₄₀ ₄₁ ₄₂ ₄₃ ₄₄ ₄₅ ₄₆ ₄₇ ₄₈ ₄₉

Use map to locate your home grid number and letter. If you live outside Knox County, find your grid number from "Outside Knox County" list
Home location ₃₄ ₃₅ ₃₆ ₃₇

Normal work schedule. Please circle AM or PM (Please not in 24 hr. clock)

Start work	<input type="text" value=""/> ₃₈ <input type="text" value=""/> ₃₉ <input type="text" value=""/> ₄₀ <input type="text" value=""/> ₄₁	A.M. or P.M.	Stop Work	<input type="text" value=""/> ₄₃ <input type="text" value=""/> ₄₄ <input type="text" value=""/> ₄₅ <input type="text" value=""/> ₄₆	A.M. or P.M.
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HOW DO YOU USUALLY GET TO WORK NOW? (Please check one)

<input type="checkbox"/> Drive alone	<input type="checkbox"/> Carpool with 1 2 3 4 5 6 other people (Circle number of other riders)
<input type="checkbox"/> Express bus	<input type="checkbox"/> Vanpool with _____ other people (Number)
<input type="checkbox"/> Drive with other members of family	<input type="checkbox"/> Other _____ (Please Specify)
<input type="checkbox"/> Bus	

If you are presently in a pooling arrangement do you (Please circle one) Share Driving or are you a passenger?
Do you have a vehicle you want to use as a Ride* Sharing vehicle? (Circle one) Yes No ₅₀
If yes, is it a (Circle One) ₅₂ CAR VAN BUS STATION WAGON ₅₁
Would you like information on being a vanpool driver? (Circle one) Yes No ₅₃

FIGURE 4-4. EARLY KCP SURVEY FORM

IF you have filled out any of our survey forms previously and received match list information, you need not fill out another form unless one of the below cases applies to you. If you would like for the Knoxville Commuter Pool to update information from a previous survey, please check the box identified as "change of information," and circle the change (as change of address or telephone number). PLEASE DO NOT FILL OUT THE FORM IF YOU ARE NOT INTERESTED.

CHANGE OF INFORMATION REMOVE ME FROM YOUR FILE

PLEASE PRINT
NAME: Last

First Apt.

HOME ADDRESS

Nearest Crossroad or Subdivision _____

CITY ZIP CODE 37

SOCIAL SECURITY

PHONE NUMBER where you would prefer to be reached.
WORK- HOME- - Ext.

COMPANY NAME

HOME LOCATION
If map is supplied, please enter the grid number where you live. If no map is supplied, please leave these boxes blank; we will fill in for you.

NORMAL WORK SCHEDULE. Please circle AM or PM.
Start work AM or PM
Stop Work AM or PM
EXAMPLE: show 8:00AM: 08:00 AM or PM
and show 4:45PM as: 04:45 AM or PM

HOW DO YOU USUALLY GET TO WORK AT PRESENT? Check one:
 Drive alone Carpool Vanpool Express Bus Regular Bus 41

IN A POOLING ARRANGEMENT, WOULD YOU PREFER TO:
 Drive only Ride Only Share Driving 42

If you are presently in a pool, how long have you been participating?
 Years Months 43 45

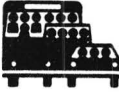
Would you like information on being a vanpool driver?
 Yes No 47 

FIGURE 4-5.
KCP'S POSTCARD
SURVEY FORM

switching to a mail-in form. However this proved unworkable because forms from a given work location tended to drift in over a period of weeks or even months, thus precluding a quick response by KCP. Consequently, KCP later reverted to employer collection of completed forms.

Matching

After receipt by KCP, all survey forms from a given work location were keypunched and computer processed to produce individual matchlists containing the names of others with whom the respondent might be able to share a ride and/or information on bus routes or operating vans which might reasonably serve the commuter. (See Figure 4-6.) Matches were based on common travel times, origins, and destinations. Individuals had to have arrival and departure times within a fifteen minute window to be considered a good match. To provide a means of coding home locations, KCP used a standardized map which divided the service area into grids of one square mile within Knoxville and nine square miles outside the city. For each individual, the computer program searched the file for others at that work location with the same travel times and home grid. If fewer than eight matches were found, the search was expanded to include all eight grids adjacent to the individual's home grid. KCP termed matched individuals with the same home grid and with adjacent home grids to be primary and secondary matches, respectively. Matches of individuals with operating vans and buses, which were initiated in late 1977, were based on the same criteria, except that primary matches referred to vehicles with the same origin and destination grids as the commuter, while secondary matches indicated vehicles which passed through the commuter's grids enroute. (Statistics on the matching of survey respondents are discussed in Section 5.3.2.)

Computer Hardware and Software

From the outset, KCP considered computerized matching of commuters a key part of its program. Under a prior contract with the Federal Highway Administration (FHWA), UT had modified the basic FHWA carpool matching software to increase its capa-

RIDESHARING INDIVIDUAL MATCHING LIST

PLEASE DISTRIBUTE TO:

██████████ ██████████ ██████████ SUTHERLAND ██████████ KNOXVILLE 37919

FROM GRID 66B TO GRID 85C THESE ARE YOUR WORKING HOURS: FROM 800 A.M. TO 430 P.M. AT CITY OF KNOX

THE FOLLOWING LIST CONTAINS POTENTIAL CARPOOL, VANPOOL AND BUS INFORMATION WHICH IS MATCHED AS CLOSELY AS POSSIBLE TO FIT YOUR COMMUTING SCHEDULE.

PLEASE FEEL FREE TO CONTACT ANY OF THOSE PEOPLE, YOU MAYBE CONTACTED BY ONE OR MORE OF THE BELOW LISTED PERSONS.

NAME	HOME ADDRESS	HOME ZIP	HOME PHONE	PREFER TO CARPOOL BY	POOLING VEHICLE	EMPLOYER	# PASSES IN CAR
██████████	██████████ SUTHERLAND AVE ██████████	37919	██████████	RIDE ONLY		TVA	00
██████████	██████████ E SUMMIT CIR ██████████ KNOXVILLE	37919	██████████	SHARE DRIVE		TVA	00
██████████	██████████ EASTERN DR. ██████████ KNOXVILLE	37919	██████████	SHARE DRIVE		TVA	00
██████████	██████████ SUTHERLAND AVE ██████████ KNOXVILLE	37919	██████████	RIDE ONLY		TVA	00
██████████	██████████ TOBLER LANE ██████████ KNOXVILLE	37919	██████████	RIDE ONLY		HUMAN SERVIC	00
██████████	██████████ LONGVIEW RD ██████████ KNOXVILLE	37919	██████████			HUMAN SERVIC	00
██████████	██████████ LONGVIEW RD ██████████ KNOXVILLE	37919	██████████			EMPLOYMENT C	00
██████████	██████████ TOWANCA TRAIL ██████████ KNOXVILLE	37919	██████████	RIDE ONLY		HUMAN SERVIC	00
██████████	██████████ SUTHERLAND ██████████ KNOXVILLE	37919	██████████			HUMAN SERVIC	00
██████████	██████████ LONGVIEW ██████████ KNOXVILLE	37919	██████████			HUMAN SERVIC	00
██████████	██████████ LONGVIEW RD ██████████ KNOXVILLE	37919	██████████			KNOX COUNTY	00
██████████	██████████ E SUMMIT CIR ██████████ KNOXVILLE	37919	██████████	RIDE ONLY		PARK BANK	00
██████████	██████████ SUTHERLAND ██████████ KNOXVILLE	37919	██████████	SHARE DRIVE		MFC	00

*****REGULAR BUS INFORMATION*****

PASSES THROUGH THIS HOME GRID WITH INTERMEDIATE STOPS, ENDING AT NIGHT 9:10PM. ROUTE NAME BEARDEN
FOR FURTHER INFORMATION PLEASE CONTACT THE KNOXVILLE TRANSIT AUTHORITY AT 546-2364.

FIGURE 4-6. SAMPLE MATCH LIST

bilities with respect to multiple employers; after KCP was formed at UT, further modifications dealing primarily with data input and output were quickly initiated.

The earliest work was begun on the University's computer system, but KCP quickly realized that its continued use was economically infeasible. Consequently arrangements were made with the Tennessee Office of Energy, and later with the Department of Transportation, to use the state's computer facility in Nashville (which included an IBM 370/158 and an AMDHL V7/06).¹ While this system's cost was absorbed by TDOT, the arrangement proved to be unsatisfactory for two reasons:

- Turnaround time was often very great, since KCP's jobs received a low priority.
- There was only limited capability for remote operation; virtually all output had to be mailed from Nashville to Knoxville.

These problems were particularly burdensome because KCP was attempting to further modify the software during this period.

KCP would have preferred to use a dedicated system, ideally featuring interactive matching capability. UMTA was also aware of the need for such a system (not just for Knoxville) and concurrently contracted with a private consultant to develop matching software for a combined interactive and batch processing microcomputer system. Since Knoxville was a perfect application for this system and was then in the process of modifying its own software, it became a testbed for UMTA's development effort. KCP was provided access to a federally funded account at a commercial timesharing facility for use for both on-going operations and software development, and began developing specifications for the new system.

KCP transferred its entire master file to the timesharing facility in March 1977, but used the system only for CBD

¹ This arrangement also had the advantage of satisfying the state's fund matching responsibility under the demonstration grant.

employees due to the timing of resurveying in the downtown, the need for a small data base for test purposes, and the high cost of operations on this facility. Development of software proceeded both in Knoxville and at the federal level throughout the remainder of the evaluation period. By January 1978, the microcomputer hardware had been delivered to KCP and software capable of identifying scheduled service (i.e., buses and/or vans passing through specific origins and destinations) had been installed. Some of the programs necessary for keeping track of and matching individuals to each other and to scheduled services were first demonstrated after the end of the evaluation period in October 1978.

Specifications for KCP's microcomputer hardware are presented in Table 4-2. The purchase price of the entire system, which is capable of handling up to 19,998 individuals and 1000 scheduled service units, was only \$13,000. However, a number of shortcomings of this system were soon identified:

- 1) The system was "single-thread;" i.e., only one terminal could be used at a time. Therefore programming and operating could not be handled simultaneously. More importantly, remote terminals could not be effectively utilized by major employers (tied into KCP's file).
- 2) Response time was relatively slow. It took an average of fifteen seconds to provide a set of matches for each inquiry.
- 3) The 19,998 name limitation on storage was too small for Knoxville (and certainly for many other possible sites).

Fortunately, each of these problems is hardware (rather than software) related, and significant advances in microcomputer technology have occurred since KCP's system was purchased. Indications are that a multi-user system capable of handling more than 60,000 individuals could now be purchased for approximately the same price paid by KCP in early 1978, and an additional investment of \$6,000 would expand storage capacity to greater than 600,000 individuals.

TABLE 4-2. HARDWARE SPECIFICATION FOR KCP'S MICROCOMPUTER

Central Processing Unit: Technical Design Lab (XITAN)
with 64K memory

Storage Device: Digital Systems
8" floppy diskettes
4 drives
double density
2.5 megabyte capacity

CRT Terminal: Beehive 100

Printer: Centronics bidirectional printer 703
(original was OKIDATA 110)

Development Software:
FORTRAN
text editor
macro assembler

Matchlist Distribution

Before the summer of 1977, KCP returned processed matchlists (in sealed envelopes with a cover letter and promotional literature) to employers for distribution at the worksite. Although this approach was viable, it had drawbacks. First, it relied on additional employer staff support, which might affect the number of employers willing to participate. Secondly, KCP could not know or control how quickly matchlists were being distributed; in one instance it was learned that a company coordinator had completely failed to distribute the results of an entire matching run. In response to such problems, KCP eventually shifted to direct mail distribution, which had the added advantage of providing address corrections for those who had moved since completing their survey.

Telephone Inquiries

For those commuters who worked at non-participating employers, as well as for those who became interested in ridesharing after their work site had been surveyed, KCP provided a telephone inquiry service. Callers were asked all information needed for rideshare information form completion; KCP staff then manually developed the matchlist (since computer processing would have required the individuals' entire work location to be

re-analyzed) and mailed it to the caller. This process generally took one or two days, although delays of up to two weeks occurred when project staff shortages were severe.

In actuality the telephone inquiry service handled many requests for information other than matchlists.¹ Calls were received requesting general vanpooling and bus schedule information, information on renting a van for personal use (a service which KCP did not provide), social service agency transportation aid (discussed in Section 4.5) and information on an almost limitless variety of other topics relating to transportation. While many of the calls related to services provided by organizations other than the brokerage, and were therefore referred elsewhere, KCP obviously served a much needed community function as a central point for transportation inquiries.

Updating Master File Information

In an effort to keep up with changes in listed individuals' home locations, work locations, and work schedules, as well as to identify new individuals, KCP intended to maintain its contact with area employers and thereby update its master file. This was to be accomplished in three ways:

- periodic resurveying at employer sites, preferably on an annual basis
- employer submission of updating information on personnel changes (Union Carbide only)
- a periodic mass mailing to all those listed in the master file

Each of these approaches proved to have significant drawbacks. Periodic resurveying was difficult to sell to employers since it required additional (periodic) effort on their part. Also both the employer liaison work and the actual implementation of resurveying required a significant staffing commitment

¹ Records for the period prior to October 1976 are unreliable. However after that date about 40% of all telephone calls and 60% of those dealing with KCP services were requests for matching information.

by KCP, which was practically infeasible in the City period due to the inability (resulting from hiring restrictions) to fill the part-time "Field Representative" staff positions. Consequently, the only area to receive a major resurveying during the demonstration was the Knoxville CBD, which had been characterized by a relatively low response rate during its initial surveying, and which was to be the target of additional brokerage activities. Union Carbide and Robertshaw were the only employers to actively and continually provide KCP with information on new employees and on changes in listed personnel's travel times and locations. Apparently other employers considered the burden of such reporting to be excessive. The mass mailing approach employed postcard surveys and promotional literature. Since the U.S. Postal Service provided automatic address corrections for commuters who moved, this updating method provided a great deal of useful information. However the response rate among those who presumably received the distribution was quite low; it is difficult to tell whether this reflected a low incidence of changes in commuter travel needs or simply respondent apathy. In spite of this possible drawback, KCP considered the mass mailing approach to be its most workable general updating procedure.

Follow-up

While in the early stages of the demonstration KCP was very actively involved in the vanpool formation process after people had been matched,¹ it had virtually no contact with other matchlist recipients. There was no on-going follow-up program for contacting individuals to promote (or quantify) the use of matchlists.² However, as evaluation results became available, KCP came to recognize that the process of simply

1 As discussed in Section 4.4.3.

2 This decision was made both because of a lack of staff to carry out such an operation and a belief that people would use the matchlists to form carpools without follow-up promotion.

distributing matchlists was having considerably less success among prospective carpoolers than was the more personalized approach it was employing for vanpool formation.

Consequently, in May 1978, KCP implemented a trial telephone follow-up marketing procedure. In the ensuing months, attempts were made to reach every CBD commuter in the master file to determine if he or she had begun to rideshare, and if not, whether they would appreciate KCP's further assistance in arranging a pool. The results were very promising; it appears that the telephone marketing campaign may have increased the number of people shifting to ridesharing by as much as 130% (compared to those influenced by matchlist receipt alone). (Detailed statistics are presented in Section 6.3).

4.4.3 Vanpool Operations

A unique aspect of this demonstration was the direct provision of \$331,624 for the acquisition of a fleet of fifty-one vans for pooling purposes. From the outset, KCP's intention was to use the vans to promote interest in ridesharing in general and demonstrate the feasibility, viability and attractiveness of vanpooling; the objective was to use the City's limited fleet to plant the "seed" from which a significantly larger group of privately owned vanpools would eventually spring. It was never KCP's intention to enlarge its own fleet to meet total commuter vanpooling demand.

As described in Section 4.3, the viability of the entire vanpooling plan was initially threatened by a variety of institutional constraints, all of which were eventually resolved (at least to a limited extent). KCP's efforts toward implementing its vanpooling plans are the subject of the following sections.

4.4.3.1 Van Acquisition

The city advertised a request for competitive bids for its first ten twelve-passenger vans on September 10, 1975, with quotations due nine days later. (Table 4-3 provides the full set of vehicle specifications.) An award was made to a local

TABLE 4-3. KCP VEHICLE SPECIFICATION¹

Model 1976: Twelve-Passenger Van

Wheel base within	125 inch to 138 inch range
Engine 8 cyl.	350 cu. inches
GVW rating	7,700 pounds
Front springs	1,720 pounds
Rear springs	2,570
Shock absorbers	Heavy-duty
Brakes	Front disc, power assisted
Steering	Power assist
Transmission	Automatic heavy-duty
Rear axle within	3.50 to 3.75 range
Tires	8.75 x 16.5, Black, 10 ply
Alternator	60 amp.
Battery	70 amp.
Gas Tank	24 gallons

Body Option Group such as Beauville/Royal Sportsman/Chateau including:

Tinted glass	all windows
Insulation	yes
Carpeting	yes
Bright bumpers	yes
Mirrors	Dual bright low mount 7 x 10 in., and interior
Windshield wipers	Two speed
Amp, oil gauges	yes
Two color paint	yes
Spare tire	yes
Color key decor	yes
Seats	cloth and vinyl combination
Air conditioning	yes
Doors	sliding door on side two doors on rear

Options (to be bid separately)

- Front-end stabilizer bar
- Electronic cruise speed control
- Auxiliary air conditioning (rear)
- Auxiliary heater (rear)
- AM-FM push-button stereo radio
- AM push-button radio with rear speaker
- Radial tires with comparable load capacity
- 35 gallon or large gas tank capacity
- 15 passenger seating configuration

¹ Minimum values are shown; bids were to note exceptions.

Chrysler-Plymouth dealer on September 29 and delivery took place on November 22. Subsequent deliveries, by the same dealer, were made in March (fifteen vans) and August (twenty-six vans) of the following year, as extensions of the initial procurement. Forty-six of the vehicles were twelve-passenger types (purchased at an average cost of \$6,035); the remainder were fifteen-passenger types (at an average cost of \$6,654). All of the vans were Plymouth Voyagers. (See Figure 4-7.)



FIGURE 4-7: KCP VAN WITH DECAL

4.4.3.2 Vanpool Formation and Operation

KCP's initial analysis indicated that the establishment of a viable vanpool required: 1) the interest of nine or more

people¹ with similar commuting patterns and a ten mile or more trip (one way); 2) at least one individual willing to assume the responsibilities of driver/coordinator; and 3) another individual willing to serve as a back-up driver.²

Formation Process

At the project's outset, KCP believed that vanpooling (unlike carpooling) was too new a concept to "sell itself;" except for a limited number of employer-based programs scattered around the country, the mode was virtually unknown. Thus while the prospective carpoolers were simply sent matchlists containing the names of potential ridesharers, KCP mounted a special effort to identify (through a report produced by the matching software) groups of individuals potentially meeting the vanpooling requirements (of number, location and commuting length) and telephone each of them to explain and promote vanpooling.³ If these calls identified a significant number of interested riders, a willing driver, and a back-up driver, KCP leased the driver one of its vans and the pool was formed.

As the project (and the public's awareness of vanpooling) grew, KCP was gradually able to reduce its role in individually forming the pools and deal primarily with each interested prospective driver/coordinator, who would then attempt to identify (usually with the aid of a KCP supplied matchlist) a sufficient group of riders.

¹ Although a pool could operate with fewer than nine passengers, KCP's proposed fare structure was based on eight paying passengers and a driver who rode free. For fifteen passenger vehicles, the fares were based on nine paying passengers.

² In the case of its own seed vans the added stipulation was required that the van's origin and destination not both be within Knoxville's city limits, to preclude any liability under the project's 13(c) agreement.

³ Promotion of the concept also included the displaying of vans at major employment sites and other marketing techniques; see Section 4.4.4.

A somewhat related development was KCP's decision (in early 1977) to allow the leasing of vans on a trial basis to selected prospective drivers who could not locate a sufficient number of passengers. These "trial vans" were established in the hope (and expectation) that actual operation of the van would attract sufficient additional ridership to make continuing operation viable. Typically the lease agreement in such cases was for one month, but successive renewals were often made until the vanpool reached sufficient ridership or the decision was made to terminate the trial.

Driver Selection & Responsibilities

KCP's criteria for selection of driver/coordinators was reasonably conservative, in an effort to maintain a high level of safety and to minimize insurance premiums. The basic requirements were that the person:

- be twenty-five years of age or older¹
- obtain a valid chauffeur's license
- have a responsible driving record (i.e., no chargeable accidents within three years)
- complete the National Safety Council's Defensive Driving Course (at KCP's expense) consisting of two four-hour classes

Initially, when KCP was individually telephoning prospective vanpoolers, drivers were selected from among those matched based on their willingness to undertake the job, compliance with the criteria (above) and their home location; selection of the back-up drivers followed the same process. As KCP took a less active role in vanpool formation, drivers contacted KCP to try to initiate their own vanpooling arrangements. In both cases, once a driver was identified, he/she completed: 1) an application stating such basic information as name, address,

¹ In one instance an exception was made (with the concurrence of the insurer) for a driver under twenty-five years old.

social security number, driving license number and record, etc. and 2) a leasing agreement.¹

KCP's approach was consistently to treat drivers as individual entrepreneurs. Thus only the driver of the vanpool was legally responsible to KCP (through the leasing agreement); riders had no legal responsibility either for the van or to KCP in general.² The driver was free to set fares, devise operating rules, etc., as long as he/she carried out the responsibilities called for in the leasing agreement. The primary elements were to:

- 1) maintain a valid chauffeur's license
- 2) secure and train the back-up driver
- 3) have maintenance performed on the van as specified
- 4) maintain data on van usage and expenses
- 5) notify riders and KCP when unable to make a trip
- 6) pay the commuting lease charges plus any personal use charges
- 7) notify KCP of any accidents and pay the first \$50 of loss if negligent
- 8) not discriminate against riders for reasons of race or sex

For its part, KCP agreed to:

- 1) provide insurance coverage for the van³

1 Copies of the driver application and leasing agreement are reproduced in Beeson et al (1).

2 Each rider did sign an agreement with the driver stating his or her acceptance of responsibility to pay regularly, understanding of the termination policy, etc.

3 Coverage was initially provided in the following amounts:

Bodily Injury and Property Damage Liability	\$1,000,000
Medical Payments	\$1,000
Comprehensive and Collision	\$100 Deductible
Uninsured Motorist	\$10,000/\$20,000

However in July, 1977, uninsured motorist coverage was raised to \$100,000/\$300,000.

- 2) reimburse the driver for expenses other than gasoline
- 3) perform routine maintenance
- 4) attempt to identify a sufficient number of riders to maintain vanpool viability

Under the terms of the lease, the driver could terminate by giving KCP thirty days notice in writing, or sooner by finding a replacement driver/coordinator. KCP could also terminate for any reason on thirty days notice or immediately for sufficient cause.

All of the leases for seed vans (regardless of their starting date) were written to expire on June 30, 1977, the original termination date of the demonstration. Although the vans were intended to "seed" private ownership, KCP did not choose to establish a shorter lease period in order to pressure operators into purchasing their own vans. This decision was made primarily because KCP was determined to keep as many vehicles leased and in the public's view as possible and because sufficient support arrangements for private operators (e.g., the abort program and the Knox Area Vanpoolers' Association (KAVA) discussed in Section 4.4.3.3) had not yet been implemented.

Lease Structure

The basic lease cost per month was developed based on the average commuting mileage (assuming twenty-one work days per month) and the size of the van (i.e., twelve or fifteen passenger). The lease cost covered all insurance, maintenance, gasoline (at an allowance of six cents per mile), depreciation, oil, etc.; however no charge was made for KCP's costs, overhead, etc. associated with administering the operation. The leases allowed for personal use of the vans at the rate of nine cents per mile plus gasoline.

The lease cost was based on two separate costing formats for vans travelling less or more than ninety miles per day. Figures 4-8, 4-9, and 4-10 present these costing schemes and the complete leasing cost as a function of mileage as of the

FIGURE 4-8. COSTING FORMAT FOR VEHICLES
TRAVELING UNDER 90 MILES ROUND TRIP

FIXED COST:

Original Vehicle Cost	\$6,022.00
Less Salvage Value	<u>- 2,000.00</u>
Total Depreciable Cost	4,022.00
Years	÷ <u>4</u>
Yearly Depreciation	1,005.50
 Sales Tax	 275.99
Years	÷ <u>4</u>
Yearly Sales Tax	69.00
 Yearly Depreciation	 1,005.50
Yearly Allowance Sales Tax	69.00
Insurance	762.00
License	<u>+ 25.00</u>
Total Annual Fixed Cost	\$1,861.50

MONTHLY FIXED COST: $(1,861.50 \div 12) = 155.13$

MILEAGE ASSOCIATED COST:

Gasoline	.060
Oil	.003
Maintenance	.015
Tires	<u>.015</u>
TOTAL	.093

MONTHLY MILEAGE COST

Daily round trip miles	<u> </u>
Number days van driven	<u> x21</u>
Total monthly miles	= <u> </u>
Mileage associated cost	<u> x\$.093</u>
	= <u> </u>

MONTHLY FIXED COST +\$155.13

TOTAL MONTHLY VAN LEASE CHARGE

Source: Beeson, et al. p. 45 (1).

FIGURE 4-9. COSTING FORMAT FOR VEHICLES
TRAVELING OVER 90 MILES ROUND TRIP

FIXED COST:

Yearly Allowance Sales Tax	\$ 69.00
Insurance	762.00
License	<u>25.00</u>
	\$856.00

MONTHLY FIXED COST: $(856.00 \div 12) = 71.33$

MILEAGE ASSOCIATED COST:

Depreciation*	.045
Gasoline	.060
Oil	.003
Maintenance	.015
Tires	<u>.138</u>
Mileage Assoc. Cost	.093

*Calculation of depreciation cost per mile

\$ 6,022	Original cost
<u>-2,000</u>	Salvage value
4,022	Total depreciable cost
90,000	Miles
\$ 0.045	Cost per mile

MONTHLY MILEAGE COST

Daily round trip miles	
Number days van driven	<u>x21</u>
Total monthly miles	=
Mileage associated cost	<u>x.138</u>

MONTHLY FIXED COST	+
TOTAL MONTHLY VAN LEASE CHARGE	=

Source: Beeson, et al. p. 46 (1).

Round Trip Miles/Day	Monthly Lease Charge	Gas Allowance	Amount Due KCP	Trial Period Lease Charge	Passenger Fares		
					Monthly	Weekly	Daily
20	\$199	\$25.20	\$173.80	\$124.36	\$24.88	\$5.92	\$1.18
25	209	31.51	177.50	130.61	26.13	6.22	1.24
30	219	37.80	181.20	136.86	27.38	6.52	1.30
35	229	44.10	184.90	143.11	28.63	6.82	1.36
40	329	50.40	188.60	149.36	29.88	7.11	1.42
45	251	56.70	194.30	156.86	31.38	7.47	1.49
50	263	63.00	200.00	164.36	32.88	7.83	1.56
55	273	69.30	203.70	204.74	34.13	8.13	1.63
60	283	75.60	207.40	212.24	35.38	8.42	1.68
65	295	81.90	213.10	221.24	36.88	8.78	1.76
70	307	88.20	218.80	230.24	38.38	9.14	1.83
75	317	94.50	222.50	237.74	39.63	9.44	1.89
80	327	100.80	226.20	245.24	40.88	9.73	1.95
85	341	107.10	233.90	255.75	42.63	10.15	2.03
90	355	113.40	241.60	266.24	44.38	10.57	2.11
95	373	119.70	253.30	279.74	46.63	11.10	2.22
100	391	126.00	265.00	293.24	48.88	11.64	2.33
105	409	132.30	276.70	306.74	51.13	12.17	2.43
110	427	138.60	288.40	320.24	53.38	12.71	2.54
115	441	144.90	296.10	330.74	55.13	13.13	2.63

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FIGURE 4-10. KNOXVILLE COMMUTER POOL FARE STRUCTURE (1978)
 (Based on 21 working days, 8 paying passengers)

Round Trip Miles/Day	Monthly Lease Charge	Gas Allowance	Amount Due KCP	Trial Period Lease Charge	Passenger Fares		
					Monthly	Weekly	Daily
120	\$455	\$151.20	\$303.80	\$341.24	\$56.88	\$13.54	\$2.71
125	465	157.50	307.50	348.74	58.13	13.84	2.77
130	475	163.80	311.20	356.24	59.38	14.14	2.83
135	487	170.10	316.90	365.24	60.88	14.50	2.90
140	499	176.40	322.60	374.24	62.38	14.85	2.97
145	509	182.70	326.30	381.74	63.63	15.15	3.03
150	519	189.00	330.00	389.24	64.88	15.45	3.09
155	529	195.30	333.70	396.74	66.13	15.75	3.15
160	539	201.60	337.40	404.24	67.38	16.05	3.21
165	549	207.90	341.10	411.74	68.63	16.35	3.27
170	559	214.20	344.80	419.24	69.88	16.65	3.33
175	569	220.50	348.50	426.74	71.13	16.95	3.39
180	579	226.80	352.20	434.24	72.38	17.25	3.45
185	589	233.10	355.90	441.74	73.63	17.55	3.51
190	599	239.40	359.60	449.24	74.88	17.85	3.57
195	609	245.70	363.30	456.74	76.13	18.15	3.63
200	619	252.00	367.00	464.24	77.38	18.45	3.69

FIGURE 4-10. KNOXVILLE COMMUTER POOL FARE STRUCTURE (1978)

(continued)

*Trial Lease Only:

20 to 50 miles based on 5 passengers

55 to 150 miles based on 6 passengers

end of the demonstration.^{1,2} Note that: 1) depreciation was calculated on a straight line basis, assuming a four-year or 90,000-mile vehicle life and \$2,000 salvage value; and 2) no interest charge associated with KCP's investment in the vehicle was considered (this represented an indirect subsidy arising from the use of federal--rather than private--funds to finance the purchase of the vehicles).

Fare Structure

As mentioned previously, KCP allowed drivers to establish their own fare levels and did not require them to report the amount of revenue they collected. However, KCP literature available to riders indicated their "fair share" of monthly costs (see Figure 4-10); KCP presumed that riders payed the proposed "fair share" or less, since otherwise they would probably have complained to KCP (and this did not occur).³ According to KCP, the "fair share" for a rider of a van amounted to one-eighth of the monthly lease cost for twelve-passenger vans or one-ninth of the cost for fifteen-passenger vehicles. Thus if a driver maintained the necessary minimum number of paying passengers, they (the drivers) would ride free; if he/she maintained higher ridership, they would make a profit.

1 These costs represent the third set since the initiation of the project. The initial costs were \$15 per month lower, reflecting the lower insurance costs during the first year of operation.

2 In the case of temporary "trial vans," where a minimum of eight paying riders had not been identified, the driver paid an amount equal to five or six monthly passenger fares (depending on whether the round trip traveled was less or more than fifty miles, respectively). However, some drivers apparently chose to divide the lease fee by the number of riders (if the minimum number was exceeded) so that riders benefited from high ridership levels; in such cases, no profit occurred.

3 Since most of the riders were not captive, the van drivers had to compete with private autos and carpools; this was an incentive to keep fares low.

Seed van drivers were given complete responsibility not only for setting fares but for establishing rules concerning the operation of their pools, such as whether regular passengers payed for missed days, vacations, etc. KCP recommended that riders pay their share during any vacation shorter than two weeks, but be exempted from paying for travel for any longer vacation.

Maintenance

For the first year of their ownership by KCP, new vans were covered by the Chrysler Corporation warranty, and covered services were therefore performed by dealers. After the expiration of the warranty, routine service was performed by Knoxville Transit under the terms of the original 13(c) agreement until 1977 when this provision was dropped and KCP had a choice of service providers. Emergency service was not covered by these requirements and could be performed when and wherever needed. Drivers were responsible for keeping records of the cost of expenses, keeping the vehicle clean, and arranging for service.¹ Whenever routine servicing was required, KCP and the driver would arrange a mutually satisfactory meeting place (preferably on-route) where a KCP staff member would deliver a back-up van and take possession of the van to be serviced. A similar procedure was used to return the driver's van after servicing was completed.

In the event of an accident or breakdown, the driver was instructed to treat the vehicle as if it were his/her own and act accordingly; KCP did not attempt to provide twenty-four hour backup van service, and drivers were advised to develop (in advance) alternative (typically carpool) plans for transporting riders to and from work in the event of an unforeseen problem.

¹ The KCP publication "How to Put Together a Vanpool" (43) indicates the recommended maintenance schedule.

4.4.3.3 Seed Van Sales and Related Activities

In early 1977 a decision was made to phase the brokerage out of its role as a van lessor. Since the very earliest days of the project, KCP had not intended to continue in that capacity indefinitely, and the sale of the vans at this time provided the funding necessary to continue brokerage operation considerably beyond the original termination date of June 30, 1977.¹

As discussed in Section 4.3.1, the sale of the vans (and the extension of the demonstration) required amending the project's 13(c) agreement. Following the successful conclusion of about six months of negotiations, the city received initial authorization from UMTA to sell the vans to current operators, with final approval subject to a review of the actual sales agreement. Three weeks later (in November 1977), UMTA concurred with the Conditional Sales Contract the city had developed, which stipulated that:

- 1) the owner continue to operate a commuter vanpool, keep it registered with and comply with KCP rules (see Figure 4-11) and offer to sell the vehicle back to the city at a depreciated price if pooling were discontinued;
- 2) the van could not provide service in competition with Knoxville Transit or any other franchised common carrier (i.e., if a traveler's origin and destination were within a quarter mile of an active route);
- 3) in the event of a breach, the city may obtain injunctive relief or \$500 in liquidated damages plus legal fees; and
- 4) the agreement was binding for four years or ninety-thousand miles following the van's initial service as a KCP seed van.

¹ Since KCP had included the cost of depreciation in its lease structure, it had by this time accumulated a sizeable account ostensibly earmarked for van replacement, although this usage was never really intended.

FIGURE 4-11. KNOXVILLE COMMUTER POOL (K.C.P.)
RULES AND REGULATIONS AS OF NOVEMBER 1, 1977

- 1) All drivers and back-up drivers must maintain a valid state chauffer's license at all times during the life of this agreement and must take the National Safety Council Defensive Driving Course.
- 2) Drivers must keep the passenger pool for each van at or above the minimum of 8 paying passengers.
- 3) Drivers must drive the van to and from his/her regular working location and pick up and deliver the other members of the pool.
- 4) Drivers must secure and train at least one back-up driver who has completed the National Safety Council Defensive Driving Course and who has a valid state chauffer's license.
- 5) Drivers must provide K.C.P. each month the following information: the commuter route, areas served, and number of passengers carried.
- 6) Drivers must be on time in picking up passengers, but should he/she be unable to pick up the passengers for some reason, i.e., van failure, he is responsible for promptly notifying all passengers in order that a prearranged alternative transportation to carry the riders can be used. Suggested prearranged alternative transportation is carpool.
- 7) Drivers must keep the van clean on the inside and outside, and drivers must exercise reasonable care in the operation, use, and control of the van.
- 8) Drivers shall not discriminate against any paying passenger or prospective paying passenger because of race, color, religion, or national origin.
- 9) Drivers must maintain insurance to cover liability and collision. Suggested levels of insurance are liability coverage for bodily injury at a minimum level of \$100,000 per person with \$500,000 per accident (\$100,000/\$500,000) plus \$25,000 coverage for property damage liability. Suggested medical payments insurance are a minumum of \$5,000 per person. Also, suggested is uninsured motorist coverage of \$100,000/\$500,000 and \$200 deductible collision insurance.

Finally, to nullify an existing city statute which would have required the vans to be sold to the highest bidder, regardless of their intended use, KCP drafted and the City Council approved (on November 29, 1977) an ordinance authorizing the conditional sales.

In terms of KCP's main objective of spurring the growth of vanpooling, simply offering its own vehicles for sale was not a solution; vans had been readily available from other sources throughout the demonstration, but little growth in private ownership had been noted. KCP had long attributed this slow growth in private operations to remaining institutional barriers, primarily with regard to financing and insurance, and to the lack of organized support services for these individuals; it had therefore begun addressing these problems well before its own fleet was sold:

- 1) A series of discussions with the Tennessee DOT led (in November 1977) to the establishment of a two-year vanpool abort program providing for 90% coverage (up to \$1,000) of any capital loss sustained by the operator (or the lending institution) upon the failure of the vanpool and the subsequent sale of the vehicle.¹ As the program's administrator for East Tennessee, KCP (actually the city) entered into agreements with each financial institution and with each van purchaser. The institutions agreed to provide 100% financing and promote the program. The purchaser agreed to carry specified insurance,¹ register with the Knox Area Vanpoolers' Association (discussed below) and deliver the vehicle to KCP for disposition in the event of failure.

¹ The State provided a \$45,000 appropriation for abort coverage and \$7,500 for administration and promotion; the local share was \$7,500. The establishment of a state program, rather than the use of the existing federal one, was necessitated by the commitment of all Federal Aid Highway Act/Federal Aid to Urban Systems (FAUS) funds to other needs; FAUS funds might otherwise have been used for this purpose.

2) The Knox Area Vanpooler's Association (KAVA) was formed by KCP to provide private operators (whether purchasers of seed vans or not) with the kind of services already provided to seed van lessees:

- assistance in locating riders (through KCP's on-going rideshare surveying and matching program)
- use (at full cost) of back-up vans retained by KCP for this purpose
- managerial assistance (upon request) in vanpool operations, accounting, economics, etc.

In addition, membership (which was free) entitled the operator to discounts on parts and maintenance for the van and any other personal vehicles at an expanding number of local businesses (twenty-one by the end of the evaluation period). Membership was required under the terms of the conditional sales contract for KCP seed vans as well as the vanpool abort program agreement.

Even with these inducements, seed van sales progressed slowly, although steadily. By the end of the demonstration, all fifty-one vans had been sold and an additional six (non-compulsory) owner/operators had joined KAVA. (See Section 6.4 for a more detailed discussion of van sales.)

4.4.4 Marketing and Promotional Activities

KCP used a very broad range of promotional activities to get its name and message across to the public. These included:

- radio and television advertisements
- printed material for mass distribution
- posters at employment sites

¹ \$100,000/\$300,000 bodily injury; \$25,000 property damage; \$5,000 medical; \$100,000/\$300,000 uninsured motorist. KCP actually recommended higher bodily injury limits of \$100,000/ \$500,000, as well as \$200 deductible collision coverage for most vanpoolers.

- advertising on seed and KAVA vans
- newspaper advertisements and articles
- billboards

KCP also conducted a number of slide presentations for local community/government organizations and a one day ridesharing conference in May 1976 which was attended by 130 people.¹ The basic thrust of these efforts was to familiarize the public with KCP and its program, to educate commuters about the high cost of driving and the benefits of ridesharing, and to promote the vanpool program.

Radio, television, and printed matter for employer/employee distribution provided the backbone of KCP's campaign. Throughout the demonstration, KCP made extensive use of peak hour radio broadcasting, which was considered an effective way of reaching automobile commuters. The number of ads (including both paid-for and public service spots) averaged as high as ninety-one per week in March 1976, but had dropped to about twenty-five per week by June 1978.

Television advertisements, because of their high cost, were limited entirely to free public service announcements. Over time, KCP became effective in obtaining this aid; although only eight spots appeared during the first ten months of the demonstration, thirty appeared each month from September to December 1976. The rate tapered off to an average of fifteen in subsequent months. In addition to these advertisements, KCP representatives made several appearances on local TV talk shows.

Promotional materials oriented principally to worksite surveying consisted of posters (typically changed every three months) and brochures which were designed to be distributed with the rideshare information form/card and with the matchlist. As the demonstration progressed, KCP also developed brochures for

¹ Similar conferences were also held in Atlanta, Chicago, and Los Angeles.

mass mailings to all individuals on the master file for updating and promotional purposes. Printed material was designed to look professional, but not expensive; pictures of people came to be used extensively on these materials in the belief that this increased their effectiveness. (See Figures 4-12 and 4-13.)

A number of promotional activities and materials were associated specifically with the vanpool program. All seed vans carried a decal (see Figure 4-14) with KCP's logo and phone number, and in the early days of the project, seed vans were strategically parked at major participating employers during surveying periods for promotional purposes. Several brochures were developed to explain the vanpooling concept, as was an 8½ by 11 inch book entitled "How to Put Together a Vanpool;" others dealt with specific topics such as 100% financing and abort insurance. KAVA vans also carried special decals (see Figure 4-15), and as part of this campaign a brochure indicating the benefits of membership was placed under the windshield wipers of any non-affiliated vans spotted parked in the downtown.

Newspaper and billboard advertisements were the earliest mass media approaches to building public awareness, but their use diminished over the course of the project. By June 1976, eleven articles or advertisements promoting KCP had appeared in local newspapers. Feedback from early UT surveys indicated that these were not very cost-effective and KCP decided to rely solely on free public service reporting (which roughly averaged one to two items per month thereafter). Sixteen billboards were posted in the initial six month period of operation, but KCP management decided these also were not cost-effective and they were subsequently dropped.

4.5 SOCIAL SERVICE AGENCY TRANSPORTATION

4.5.1 Approach to the Development of Services

One of the primary objectives of the Knoxville Transportation Brokerage was the establishment of a service to help social

You Can Do It, Too.....They Did!



Harry Carper and Fred Preston carpool to their jobs in downtown Knoxville each day. Both Harry and Fred were concerned about the availability rather than cost of gasoline when they began pooling, but appreciate the savings they have experienced.

Their carpool has given them the opportunity to become good friends, and they frequently discuss business and social matters of interest. "This is a real benefit to us," according to Harry, "our conversations are some of the most desirable advantages of carpooling."



Says van pool rider Joyce Wolfenbarger, "I know I can depend on our driver and the van to 'be there' so I don't worry about transportation." She and the other van pool riders talk about the pool's reliability and the freedom from traffic hassles as well as the money they save.

They also appreciate escape from parking problems at UT and downtown. Joyce says, "I don't know which is better—saving parking expense or saving time looking for a space."

Bob Pletz used to drive alone to his job downtown. He began riding the bus several years ago during the gasoline shortage but cites a number of benefits which keep him from going back to commuting alone. Bob says the bus is reliable, while relieving him of fighting traffic. Also, the bus stops in front of his office, compared to a walk of several blocks to a parking lot.

Because his car is used less, its "real" depreciation and insurance premiums have been lower than normal. Bob and his wife have thus delayed the purchase of a new car and use the savings to take more vacations.



Interested?

Just fill out the accompanying survey form and return it to your employer or mail it back to the Knoxville Commuter Pool. This will enable us to provide you with a list of ride*share options. This list will include carpool matching with your neighbors and any bus or vanpool information which could serve you.

Using this information, you can make your own decision as to the alternative which best suits your commuting needs. Remember, filling out this form incurs no cost or obligation to you. However, you can save a considerable amount of money by ride*sharing, as well as enjoy a number of other benefits.

You too can wake up to a better day.



Linda Van and Darlene Simpson like carpooling. They first contacted the Knoxville Commuter Pool to inquire about the carpool matching file because, as Linda states, "it's a great opportunity to make friends." KCP was able to match them with people working nearby who were also interested in carpooling.

Since then, the Knoxville Commuter Pool has helped Linda and Darlene locate more riders when one of their group moves or changes work schedule. And their former passengers have used KCP to help them locate new carpools, as well.



Martha Batson needed a way from her apartment to a business school downtown. She called the Knoxville Commuter Pool wanting to know what choices she had in getting there.

KCP told her about a Knoxville Transit bus route which ideally suited her needs. Says Martha, "The people at the Knoxville Commuter Pool were really helpful. I found the route and schedule information I needed, and I can ride the bus and get off within a block of where I'm going."

Please Orbach Along Perforation

FIGURE 4-12. KCP MARKETING EXHIBIT

***Here is what it costs
you to commute to work
alone in your car:***

Your Car Size	Total Cost including depreciation, maintenance, gas, oil, insurance	Your Daily Round Trip Miles	Your Daily Commute Cost
Standard	17¢ a mile	x _____	= _____
Int'mediate	16¢ a mile	x _____	= _____
Compact	13¢ a mile	x _____	= _____
Subcompact	11¢ a mile	x _____	= _____

Don't forget to add in parking costs if you have to pay for parking.

WE CAN HELP

***By Bus
Vanpool
Carpool***

We can provide information to help you find out about all these ideas—then you decide what you want to do.

Interested in saving money?

Fill out the attached Survey Form
and/or call
Knoxville Commuter Pool

The Knoxville Commuter Pool is a program of the City of Knoxville in co-operation with the U. S. Mass Transportation Administration and the Tennessee Department of Transportation.

Randy Tyree, Mayor, City of Knoxville

FIGURE 4-13. KCP
MARKETING EXHIBIT



FIGURE 4-14. SEED VAN DECAL

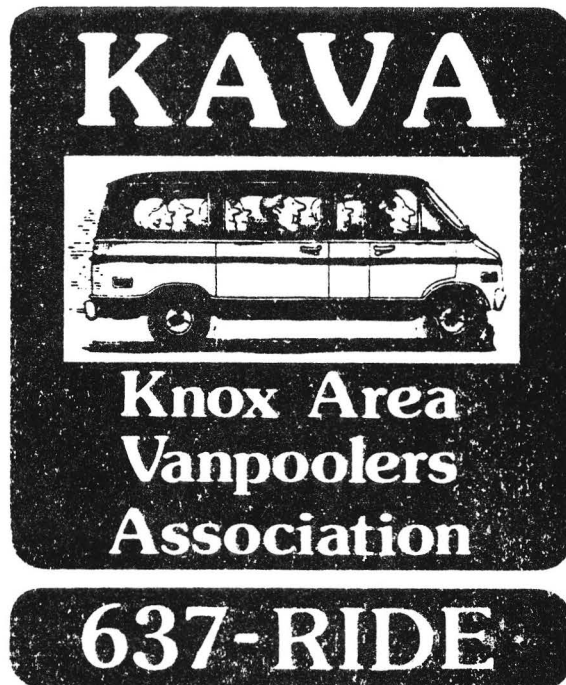


FIGURE 4-15. KAVA DECAL

service agencies solve their transportation problems. At the outset, KCP's approach was to examine the potential for mid-day use of commuter vans by social service agency clientele. Under this plan of "dual use," agency personnel would pick up and later return each vehicle to the commuters' work site; this implied very efficient utilization of each van, which would otherwise sit idle during the workday. Although the Tennessee Valley Authority had already implemented an eighteen-month "dual use" program (from July 1974 through January 1976) involving two local agencies and decided it was impracticable,¹ KCP's founders were convinced that the benefits were compelling enough to pursue it. However the approach was never implemented for three reasons:

- 1) Insurance costs for "dual use" of vehicles appeared prohibitively high (on the order of an additional \$1500/year for each van). (This was the principal reason the idea was dropped.)
- 2) Commuters were concerned that agency personnel might not be reliable in returning the vehicles as scheduled, leaving the commuters stranded at work.
- 3) Commuters expressed concern about whether the agencies would properly maintain the vehicles.

Once it became apparent that the efficient use of vans for both commuting and agency purposes would be impractical (at least in the short run), KCP began to examine other ways to address the agencies' problems. Initial effort was directed at identifying the transportation needs of individual social service agencies. This study began with a postcard screening survey administered to 179 local agencies.² Of the sixty-one

¹ TVA's experiment with dual use was abandoned because: 1) TVA drivers complained about the condition in which the vans were returned; 2) late return of vehicles occasionally inconvenienced TVA riders; 3) TVA and agency holiday schedules did not always coincide; 4) there were differences of opinion between TVA and the agencies over an appropriate cost; and 5) the program placed excessive time demands on TVA administrators.

² The results of these interviews are documented in a report by Owens and Fisher, 1977 (51).

responses received, thirty agencies stated having a current program for transporting some or all of their clientele and forty-nine indicated an interest in learning more about the Knoxville Commuter Pool. KCP chose to conduct detailed personal interviews with representatives of the twenty-two agencies which had both a current program and an interest in learning about KCP. While these interviews indicated that agency transportation needs varied greatly, it was clear that many were not satisfied with their existing situation because of: 1) an inability to meet identified demand; 2) the use of scarce resources (i.e., highly trained personnel) to provide transportation, and/or; 3) the high cost of providing service. Seventeen of the agencies said they would be interested in having an extra-agency organization handle the transporting of clients, provided that such services were equal to or better than those they presently offered. However it was apparent that the diversity of agency needs would imply highly individualized service designs and a very time consuming effort by KCP, on an agency by agency basis.

KCP's approach was to undertake a detailed "transportation audit" of each interested agency to identify clearly its current cost of transportation and its current and/or projected transportation service needs. Based on these needs, the cost constraints, and KCP's knowledge of available service providers, KCP would attempt to design a new or improved service for the agency. This proved to be a very time consuming process. Although initial contacts with local agencies began in April 1976, the first KCP designed service was not implemented until June 1977, and by the end of the demonstration only three service arrangements had actually been implemented (although others had been designed). (Detailed case studies of KCP's activities with specific local agencies are presented in Chapter 7.)

4.5.2 Volunteer Insurance

An interesting offshoot of KCP's search for van insurance was the discovery and promotion of the Volunteers Insurance

Service Organization (VIS) Insurance Plan for non-salaried persons serving VIS agency members. VIS is a non-profit organization whose activities involve a wide range of services associated with insurance for volunteers, one of which is a national insurance plan.

The plan, various aspects of which are underwritten by different insurance companies, provided the following four types of coverage at an annual cost of \$3.50 per year for each eligible individual:

- 1) accidental medical coverage up to \$2,500
- 2) accidental death or dismemberment coverage up to \$1,000,000 (not applicable to use of automobiles)
- 3) excess automobile liability insurance up to \$500,000 per person/\$1,000,000 per accident for bodily injury and \$50,000 per accident for property damage (protects over and above volunteer's own automobile policy limits)
- 4) legal defense in any suit seeking damages from the volunteer

Through its work with local agencies, KCP was aware that while volunteer transportation services were prevalent around Knoxville, volunteers seldom carried adequate insurance, and if so, it was acquired at relatively high cost. Thus the discovery of the VIS program appeared to yield an inexpensive solution to the problem. The major drawback was that a minimum of fifty-five volunteers had to be insured for an agency to join the program; the majority of Knoxville's social service agencies did not have this many volunteers. In October 1976, KCP distributed literature describing the plan to local area agencies and included an offer to obtain a KCP membership, through which volunteers of many agencies would be covered, if the minimum number of commitments were received. (Of course, agencies with fifty-five or more volunteers to insure could choose to obtain their own membership.) By November 1976, KCP had received commitments from three agencies for a total of seventy-six

individuals;¹ insurance coverage for these people became effective December 1, 1976.

In June 30, 1977, however, the excess automobile liability coverage (which KCP considered to be the most important component of the package) was dropped from the VIS program. For the next year, KCP continued its umbrella membership, but found the paperwork required each time an individual volunteer was added or dropped to be too much of a burden, considering the program's greatly reduced benefits. Consequently, on June 30, 1978, KCP cancelled its membership.

4.6 DOWNTOWN SERVICE AND FARE PROGRAM

Knoxville's CBD was part of KCP's original service area and as such was included in the areawide surveying and matching activities described in Section 4.4.2. However, the economic and transportation problems facing the downtown were unique, and KCP's recognition of this led in 1977 to the development of a comprehensive phased program of innovations aimed at:

- 1) increasing the level of ridesharing (including transit, carpools, and vanpools) to and from the downtown in an effort to reduce the number of vehicles entering the CBD. Increased availability of ridesharing options also increases mobility for the transit-dependent
- 2) decreasing peak period CBD traffic congestion
- 3) increasing the availability of parking in the downtown. For employees, parking is scarce and expensive unless employers assume the expense (about \$22/month/vehicle, with estimates of \$30 to \$50/month/vehicle for newly constructed spaces). Furthermore, commuter parking needs greatly restrict the availability of parking for shoppers
- 4) increasing the attractiveness of the downtown as an employment and shopping center. The current transportation problems in the CBD make it an expensive and not particularly attractive place to work and shop

¹ KCP is not aware of any agencies which obtained their own membership.

The program consists of five separate elements:

- 1) "Downtown Leads the Way" -- A three-part program which includes distribution of rideshare matching information to employees, a voluntary employer-sponsored financial incentive program for ridesharers, and the elimination of transit fares for intra-CBD trips.
- 2) Downtown Traffic Flow Plan -- Re-routing of buses in the CBD in conjunction with a variety of traffic flow changes.
- 3) Merchant Validation of Shoppers' Transit Fares -- A voluntary program to be promoted as a parallel to existing merchant parking validation schemes.
- 4) Expanded Fare-Free Zone -- Expansion of the CBD fare-free bus zone to serve the University of Tennessee (UT) and (probably) the adjacent Fort Sanders residential area.
- 5) Integrated Feeder Service -- A demand-responsive feeder service will replace the suburban collector loop on one bus route, which will experience increased service frequency.

To help fund the program's implementation, KCP applied to UMTA for a new demonstration grant, which was approved on March 12, 1979. However, rather than await the outcome of the application process, the city decided to implement "Downtown Leads the Way," the first element, in conjunction with its planned CBD resurveying effort in October-November 1977. Although difficulties in the mechanics and the financial support of the employer subsidy portion of the program have precluded its implementation (as of the date this report was written), the elimination of bus fares for travel within the CBD was accomplished on schedule. (See Figure 4-16.) Intra-zonal ridership increases have been dramatic and consistent (see Figure 4-17), but the total number of intra-CBD trips is still only about 285 per average weekday, probably reflecting the proximity of major activity centers within the zone and its relatively small size. Demand for service between the downtown and the Coliseum parking lot (on the edge of the zone) has been sufficient to require the addition of an extra bus run during the afternoon peak.

Since the downtown program will presumably be the subject of a later evaluation, it will not be discussed in detail within this report. However, it should be noted that the development of this program and its partial implementation required a significant staff effort for KCP in the midst of its on-going commuter and social service agency oriented activities.



FIGURE 4-16: KNOXVILLE TRANSIT BUS WITH KASH LOGO

4-74

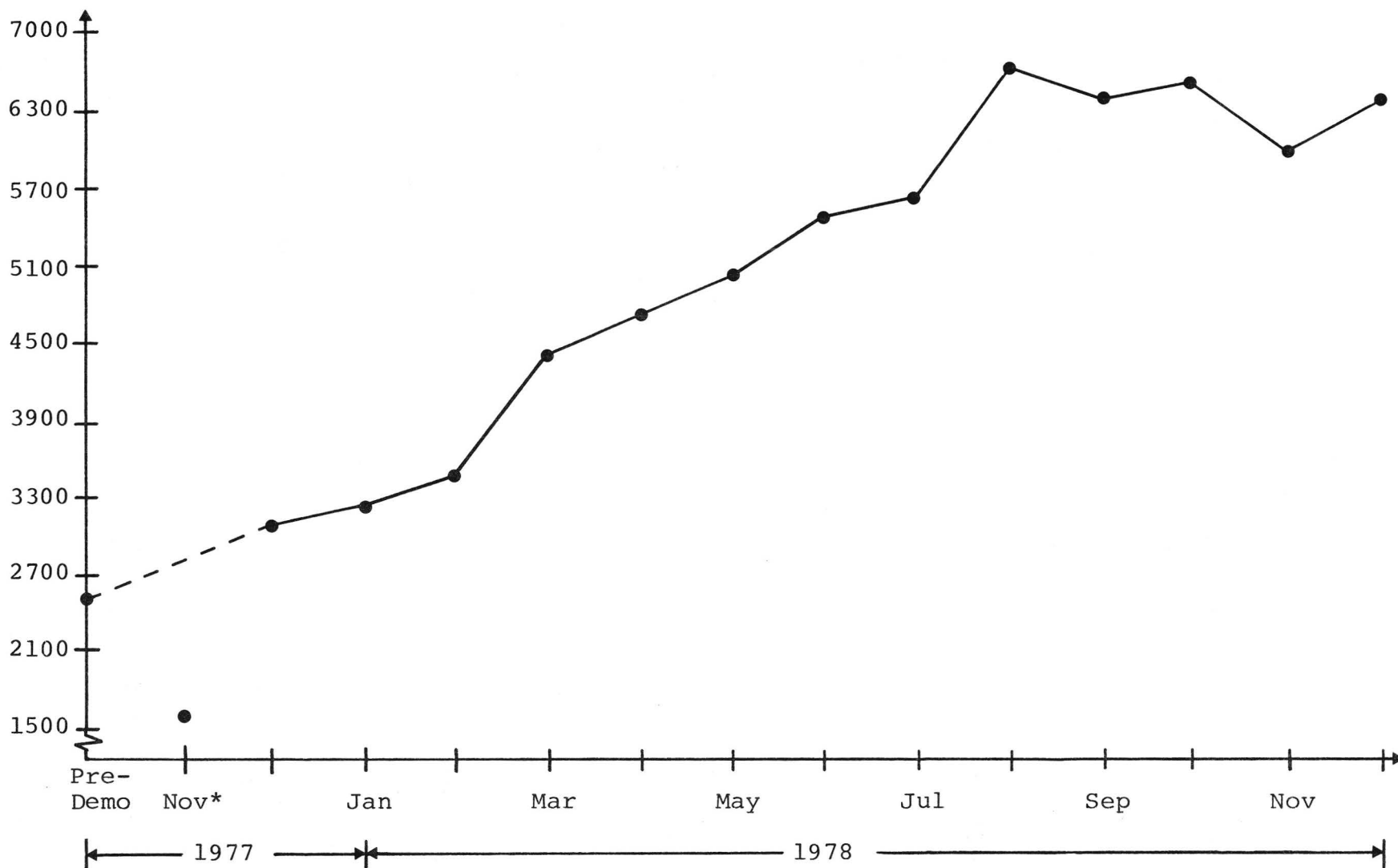


FIGURE 4-17. KNOXVILLE AREA SHORT HOP (KASH) FREE-FARE RIDERSHIP

*Value is for three weeks of KASH operation in November. It is probable that this number is unrepresentatively low because some unknowledgeable riders may have paid for transfers and full fares instead of requesting a KASH card. Such riders would not have been counted.

5. LEVEL OF SERVICE IMPACTS (COMMUTER SERVICES)

5.1 INTRODUCTION

In theory, the transportation broker's basic role is to match individual travelers' needs to existing transportation services (i.e., supply) and, where necessary, create or promote the creation of new supply to meet an unfulfilled need. In the area of commuter tripmaking, KCP's employee surveying and ride-share matching sought both to identify such needs and the potential suppliers of rideshare services (i.e., carpool or vanpool drivers and vehicles). Although original project plans called for the implementation of new express bus services (based upon needs identified in the surveying process), the density of the demand for such services was not sufficient to make them economically feasible.¹ Thus KCP's impact on the quantity and quality of commuting alternatives stemmed not from the implementation of specific new transit services, but from its effect on the availability of private ridesharing options.²

While carpools have traditionally formed without organized matching assistance, KCP's leadership believed that many individuals with an inclination or desire to pool may have been unable to locate suitable partners; matching information was intended to provide these people with essentially new commuting alternatives. Furthermore, the broker's continuing mass media and employee-directed rideshare marketing campaigns were aimed at educating those not already predisposed to pool about the benefits ridesharing might offer them. While these activities served to stimulate the demand for pooling, they also stimulated supply, since any individual traveller could choose to be a service provider.

1 Even if the demand had been sufficient, KT apparently did not have additional buses available to introduce new peak period services.

2 Although the seed vanpool operation was in fact publicly administered, it dealt with vanpool operators as private entrepreneurs. In other locales (e.g., Minneapolis), private corporations have served as the van lessor.

This chapter addresses the level of service of the various modes available to Knoxville area commuters and thus subject to KCP's brokerage efforts. It begins with an overview of the characteristics of the major commuting modes available in Knoxville, in terms of their costs to users, their convenience, etc. It then examines KCP's effectiveness in providing individual travelers with these options.

5.2 CHARACTERISTICS OF COMMUTER RIDESHARING MODES

5.2.1 Taxonomy of Commuting Modes

As in many American metropolitan areas, most Knoxville area commuters have a choice of several modes for travel to and from work:

- 1) Driving Alone - Driving alone in a personal or company-owned vehicle is the most frequently used mode in Knoxville, as it is in most of the nation. A major thrust of KCP's efforts was to convince these individuals (who constituted approximately 69% of the workforce) to utilize more energy efficient and economical ridesharing modes.
- 2) Ridesharing - KCP defined ridesharing rather broadly to include not only carpooling and vanpooling, but bus riding (or "buspooling") as well.
 - a) A carpool may be defined as two or more commuters traveling to and/or from work on a regular basis in the same, privately owned, vehicle.¹ Carpool arrangements may take on a variety of forms. One individual may consistently drive, while the passengers share in the expenses by paying the driver; alternatively, several or all of the members may share the driving, with no exchange of money taking place.

Although door-to-door service is typical, checkpoint systems, involving one or more pick-up and/or delivery sites, are also

¹ A very common arrangement involves members of the same household traveling to one or more jobs or other activities together. For the purpose of this report such "family carpools" (which carry approximately 8.9% of Knoxville area commuters) has (where data permitted) been considered as distinct from "true" carpooling unless one or more non-family members travelled with the group.

common. Arrangements are often made on a very informal basis, and while there is usually greater incentive to carpool when commutes are long, very short trips may be pooled as well, particularly if the members are neighbors or friends.

- b) In vanpooling, a single individual consistently drives the pooling vehicle (which may be owned or leased) and explicitly charges a "fare" to passengers. The use of a passenger van seating from twelve to fifteen people is typically what differentiates this new mode from those carpools in which a single individual always drives and is reimbursed (at least partially) by the riders. Perhaps the most important distinction between the two modes, however, is that in vanpooling the operator usually attempts to cover or exceed virtually all costs (including depreciation and other fixed expenses) through the collection of fares; in one driver carpools involving reimbursement, there is typically an assumption that the vehicle is owned for non-commuting purposes and only (some or all) operating expenses are shared; fixed costs are usually ignored.

The attempt to cover fixed costs has significant economic implications on the structure of vanpooling arrangements. Characteristically, a minimum of eight or nine paying passengers is required to make vanpool fares low enough to be attractive to riders. Furthermore, a relatively long commute (usually ten miles or more each way) is needed to reduce the relative impact of the fixed costs on total fare and to balance off the potentially long pick-up and drop-off times resulting from such high ridership (although check-point systems can minimize the latter effect). For long commutes, vanpooling can provide significant cost savings over carpooling (as will be shown below) since the operating costs (which for long trips constitute the major expense) are shared by so many individuals.

- c) Riding the bus (or "buspooling") is a "ridesharing" alternative available almost exclusively to those commuting to or within the City of Knoxville, through KT's fixed local route services and a variety of express bus routes. Extremely limited service is also available to a small number of sites outside the city. KCP originally hoped to identify potential new markets for viable bus operation through its surveying effort, thus expanding the coverage (and utilization) of this energy efficient and potentially very economical mode.

At the start of the demonstration, approximately 26% of all SMSA commuters used carpooling as their primary mode; about 3.5% relied on transit and perhaps 130 people (many of them employees at TVA) were vanpoolers.

- 3) Other Modes - A variety of modes such as walking, bicycling, taxicabs, etc. are available or feasible for a relatively small proportion of the area's commuters. These modes were not of concern to KCP nor will they be dealt with further in this evaluation.

5.2.2 Cost Considerations of Modal Choice

The various vehicular modal choices have considerably different cost characteristics. By far the most expensive (in most instances) is for an individual to drive alone to work. If the individual carools, his cost of travel will be some fraction of the cost of driving alone. For example, if two people carpool and share the driving equally, each individual's mileage related costs will be cut approximately in half;¹ if their arrangement is such that one individual only drives and the other only rides, the fraction of the cost assumed by each will be dependent on the specific financial arrangement upon which they have agreed. Obviously, as the number of people in the pool increases, the costs to each individual will typically decrease markedly, unless exceptional circuitry is involved. Of course there is no guarantee that the agreed upon allocation of costs among drivers and riders will be realistic or equitable; for example, in some one-driver carpools only operating expenses or simply gasoline costs are shared.

In vanpooling, the costs to both the driver/coordinator and his or her passengers (for a particular trip) will also vary as a function of the fixed costs, the number of passengers, and the driver's philosophy about how costs should be spread. For

¹ There may be some additional cost due to circuitry. There is a dearth of good data about how much circuitry is involved in ridesharing arrangements, and further study in this area is clearly needed. Wagner (77) uses an estimate of one-half mile per passenger per one-way trip as an average.

example, KCP's publicized cost structure was based on the concept of the driver riding free and the total cost being covered by eight paying passengers. If the pool contained more than eight passengers, the driver could choose to take the additional fares as profit (to the extent revenues exceeded actual total costs), or to reduce each passenger's fare to reflect their reduced share of total cost.

If available, the least expensive vehicular alternative from the passenger's perspective is generally to ride the bus. As detailed in Chapter 3, the majority of Knoxville's bus riders paid between 25¢ and 40¢ per (one-way) trip on a local bus and 50¢ per express bus trip in 1975; 1978 fares were 35¢ to 45¢ and 60¢ respectively.

It is essential to recognize that perceived (rather than actual) costs are the important factor in mode choice and that many people fail to properly perceive the hidden costs embodied in their decision. Thus a comparison of the various modal options based on fully allocated fixed costs is unlikely to be a useful tool for understanding commuter behavior. Figure 5-1 provides a comparison of the costs of the various modes (as a function of distance), based on a variety of assumptions about the sharing and perception of commuting costs.¹

Line 1 indicates the total daily cost of driving a standard sized automobile the indicated number of miles (round trip). However, if the vehicle would be retained for other uses even if it were not used for commuting, the driver is likely to consider (and perceive) only the operating cost of commuting with the vehicle, shown by Line 2. Line 3 indicates the average operating cost for each of two carpoolers who equally share the driving; this is identical in the cost to the passenger of a two person carpool in which the passenger splits the operating cost with the driver (implying that the driver

¹ Costs for single occupant autos and for carpools are based on information presented in "Cost of Owning and Operating an Automobile," FHWA, 1976 (25), adjusted to reflect prices in the Knoxville area. Vanpool costs are based on KCP's "Fair Share" rate schedule. Bus fares are those of Knoxville Transit.

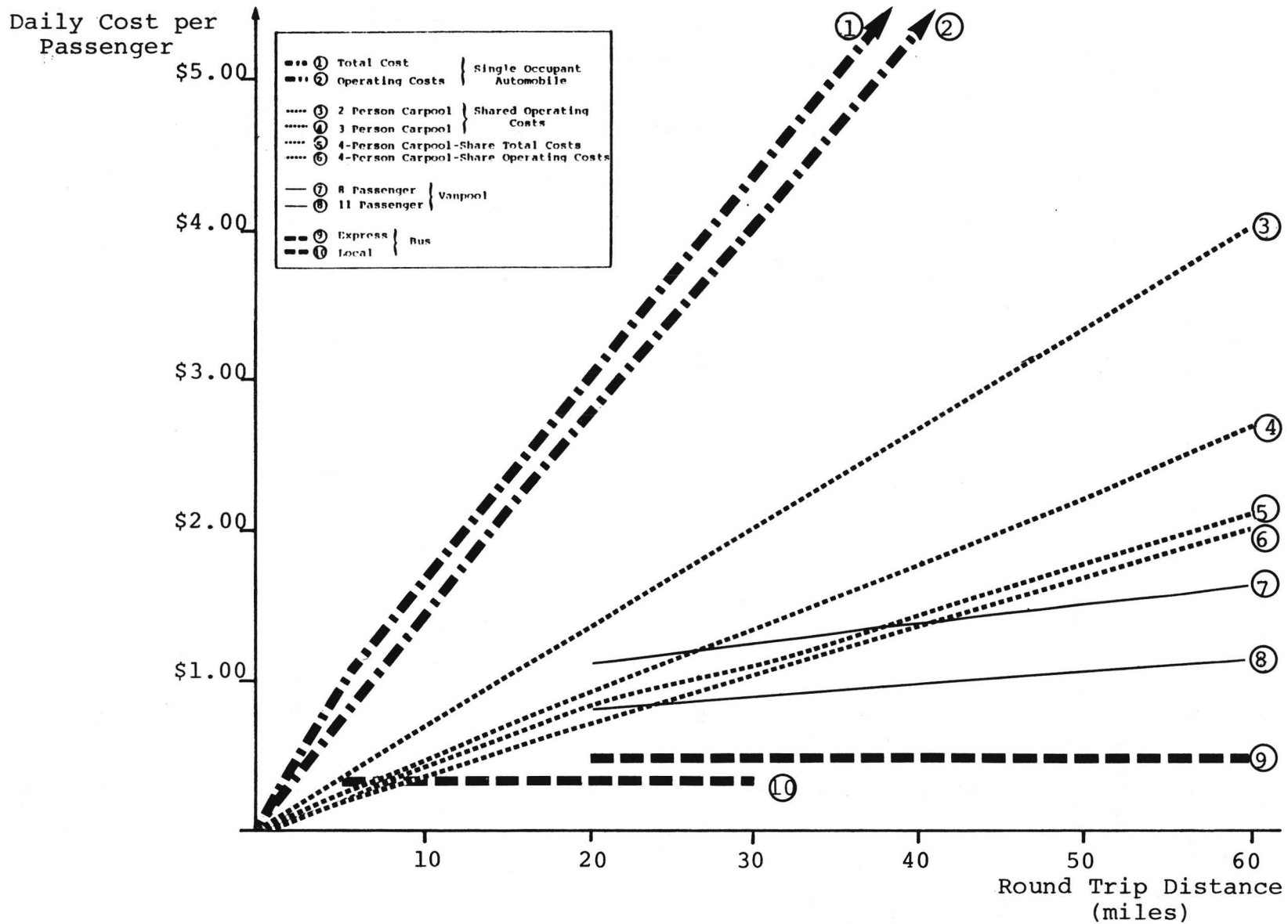


FIGURE 5-1. COSTS OF COMMUTING BY VARIOUS MODES (USER SIDE)

absorbs all of the fixed cost). Lines 4 and 6 indicate similar costs for carpool arrangements in which operating costs are split three and four ways, respectively.

Line 5 indicates the cost to each driver or passenger in a four person carpool in which total costs are perceived and equally shared; this is not typical, but it provides the appropriate economic comparison for vanpooling alternatives, in which total costs are explicitly shared by the passengers. Line 7 indicates the daily cost for vanpooling under KCP's "fair share" rates for eight paying passengers; Line 8 indicates the cost if there are eleven paying passengers and the driver reduces all fares to reflect the added revenue. Finally, Lines 9 and 10 represent the cost of traveling by express bus and local bus, respectively.

According to the graph, high occupancy carpools (e.g., Lines 3, 4 and 5) are often the least expensive commuting modes for shorter trips - if one considers only operating costs. However, for a four person carpool considering total costs, an eight passenger vanpool (Line 7) is less expensive for trips over twenty-five miles, and the vanpoolers' savings rise significantly as mileage increases. A two person carpool in which only operating costs are shared (Line 3) is more expensive than an eight passenger vanpool for distances greater than thirty-one miles round trip. Driving alone is the most expensive alternative for most trips even if one considers only operating costs. Clearly the perceived costs (upon which mode choices are made) for the various pooling alternatives can vary widely, and depend strongly on the exact nature of those alternatives.

Since the costs of owning and operating an automobile have risen faster than disposable income in recent years, one might expect the inherent cost advantage of ridesharing alternatives to become an important factor in modal choice. However, a variety of studies (2, 4, 33) have indicated that only severe financial disincentives (far in excess of the events of the recent past) would be required to shift a significant number of commuters away from their decision to drive alone.

5.2.3 Non-Financial Considerations

There is growing evidence that, at least at present prices, characteristics other than cost are most often the determining factors in an individual's choice of worktrip mode (30). Clearly the various modes have important non-financial attributes which characterize their level of service to the user. Several of these are summarized in Table 5-1.

Driving alone provides the greatest personal flexibility and control, while conventional transit provides the least; carpooling and vanpooling fall somewhere in between these two extremes, with vanpooling typically providing the passenger somewhat less flexibility simply because he must coordinate with a greater number of individuals. (It should be noted that many poolers find the social aspect of pooling to be one of its strongest advantages.) While someone who needs a personal vehicle for work would not find it possible to be a passenger in a pooling arrangement, he or she might find driving the pool to be a viable option. However, those who often work overtime on short notice (and do not have an available back-up mode) or generally have irregular hours would probably find carpooling or vanpooling infeasible.

Travel time for someone driving alone is typically the shortest, except where parking is a difficult and time consuming process (as it is for some Knoxville CBD workers) or where priority treatments are available for high occupancy vehicles.¹ Carpool and vanpool travel times will depend upon the specific operating arrangement and/or the origins and destinations of the members: for example, checkpoint systems sometimes have travel times very close to that achieved by driving alone,² while those involving door-to-door service may or may not compare favorably with taking one's own car. The efficiency of bus service is

¹ This is not the case in Knoxville, except that a limited number of employers have experimented with preferential parking.

² Depending on access and wait time.

TABLE 5-1. TYPICAL SERVICE CHARACTERISTICS FOR VARIOUS MODES¹

	<u>Solo Driver</u>	<u>Car Pool</u>	<u>Van Pool</u>	<u>Express Bus</u>	<u>Local Bus</u>
Directness of Route	Direct	Circuitous	Circuitous	Variable	Indirect
Travel Time	Shortest	Intermediate	Intermediate	Intermediate	Longest
Schedule Flexibility	Driver discretion	Semi- fixed	Usually fixed	Fixed (multiple)	Fixed (multiple)
Door-to-Door	Yes	Usually	Sometimes	No	No
Privacy	Yes	Limited	Limited	None	None
Arrangement	At discretion	Arranged	Arranged	None	None
Parking Needs	Yes	Yes	Yes	No	No

¹ Expanded from Womack (80).

highly location dependent; some trips may compare favorably with the automobile while others may be so circuitous as to be virtually infeasible.

Modal reliability (in terms of on-time arrival and departure) can be extremely variable. Those driving alone have complete discretion over their departure times. In contrast, with pooling arrangements, coordination of departure times can occasionally prove to be a problem, at least until firm rules have been established. While advocates contend that pooling reduces tardiness and absenteeism, this has never really been proven. The reliability of bus service depends greatly on the quality of the particular system, and on the commuter's origin and destination; those requiring a transfer often have considerably greater travel time variability--particularly in Knoxville, where peak period headways on most routes are fifteen to thirty minutes.

While it might seem that driving alone is by far the most convenient and flexible mode, it does have drawbacks, both to the individual and the community. For example, it is the least efficient of the vehicular options in terms of energy usage, and many feel that driving alone is more of a chore than a luxury. Also, those who leave their automobile at home in their shift to a ridesharing mode may be providing much needed mobility for other family members.

An important characteristic of mode choice decisions is that the traveler's (subjective) perceptions of the various modal attributes may not coincide with objective measurements. (For example, solo drivers may overestimate the increased travel time associated with pooling.) Furthermore, personal attitudes about the differences among modes can vary greatly. (Whereas some individuals see the social aspect of pooling as a positive factor, others consider it a potential source of disagreement and "hassle.") Thus the individual's attitudes towards the various modes and their perceived attributes may be the most important determinant of an individual's proclivity to ride-share.

5.2.4 Conclusion

While many among Knoxville's commuter population used some form of shared riding to get to work, as in most American cities the majority chose to drive alone.¹ This constituted an enormous waste of limited energy resources, strained highway and parking lot capacity, and often left those without access to an automobile virtually immobile. KCP's ridesharing program aimed at each of these ills by trying to: 1) convince solo drivers of the benefits of ridesharing; and 2) ease their way into shared riding by matching them with other prospective poolers and offering some of them a viable new mode--vanpooling.

5.3 KCP COMMUTER SERVICES

5.3.1 Market Penetration/Coverage

KCP's original service area, the sixteen-county ETDD, had a 1976 working population of approximately 293,200;² of these, about 66% (or 194,600) worked within the four SMSA counties where KCP concentrated its efforts. Anyone residing in KCP's service area was technically eligible to utilize the broker's services--thus its potential coverage could be considered 100%. However to benefit from KCP's services, one had to be aware of their existence. Therefore a more reasonable definition of coverage would probably be based on commuter awareness.

Although KCP utilized mass media campaigns throughout the demonstration, employee surveying activities were the most important element of its promotional program. The surveying was designed to familiarize workers with KCP's services, as well as to identify those individuals interested in pooling. However, to reach the employees, KCP first had to convince management to allow (and support) the surveying process. Thus KCP's success in gaining employer participation was an important prerequisite to effective promotion of its services.

1 Nationally, about 72% of all worktrip automobile seats are empty (80).

2 Estimated from sources 22, 40, 67, and 71.

Figure 5-2 presents the history of KCP's contact with employers and the resulting level of participation. During the first year, 520 employers were contacted and 324 (62%) chose to participate. Since efforts during the first nine months of 1977 were directed toward re-surveying, few new contacts were made until late in the year, when KCP made a concerted effort to involve employers in downtown Knoxville. This campaign (part of "Downtown Leads the Way") brought total contacts and participants to 829 and 391, respectively. (For a discussion of why some employers chose not to participate, see Section 6.2.)

The 829 businesses contacted employed about 87,000 people, or 45% of the SMSA workforce. Although KCP achieved participation by only 47% of the employers contacted, its success rate was high with large employers--consequently about 71,000 people (or 36% of the area's workforce) were employed at the participating companies.¹ The promotional material distributed and displayed at these employers in conjunction with the survey process ensured that the vast majority of these employees were aware of KCP's existence, and (at least to some extent) its purpose.

KCP's mass media promotional campaigns were designed to increase awareness among those employed at non-participating companies, as well as to reinforce the knowledge of those reached at their worksites. In a 1978 random survey of commuters working in the SMSA (including those at both participating and non-participating employers) 73% claimed to have heard of KCP, a number far in excess of the employment at participating companies.² Furthermore, of those who had heard of the organization, 56% stated mass media campaigns

1 In contrast, a study of eighty areawide carpool matching programs conducted for FHWA showed that the percentage of area employees at participating worksites averaged only 25% (77).

2 Survey G2 is discussed in Appendix B. Result is within $\pm 3\%$ at the 90% confidence level.

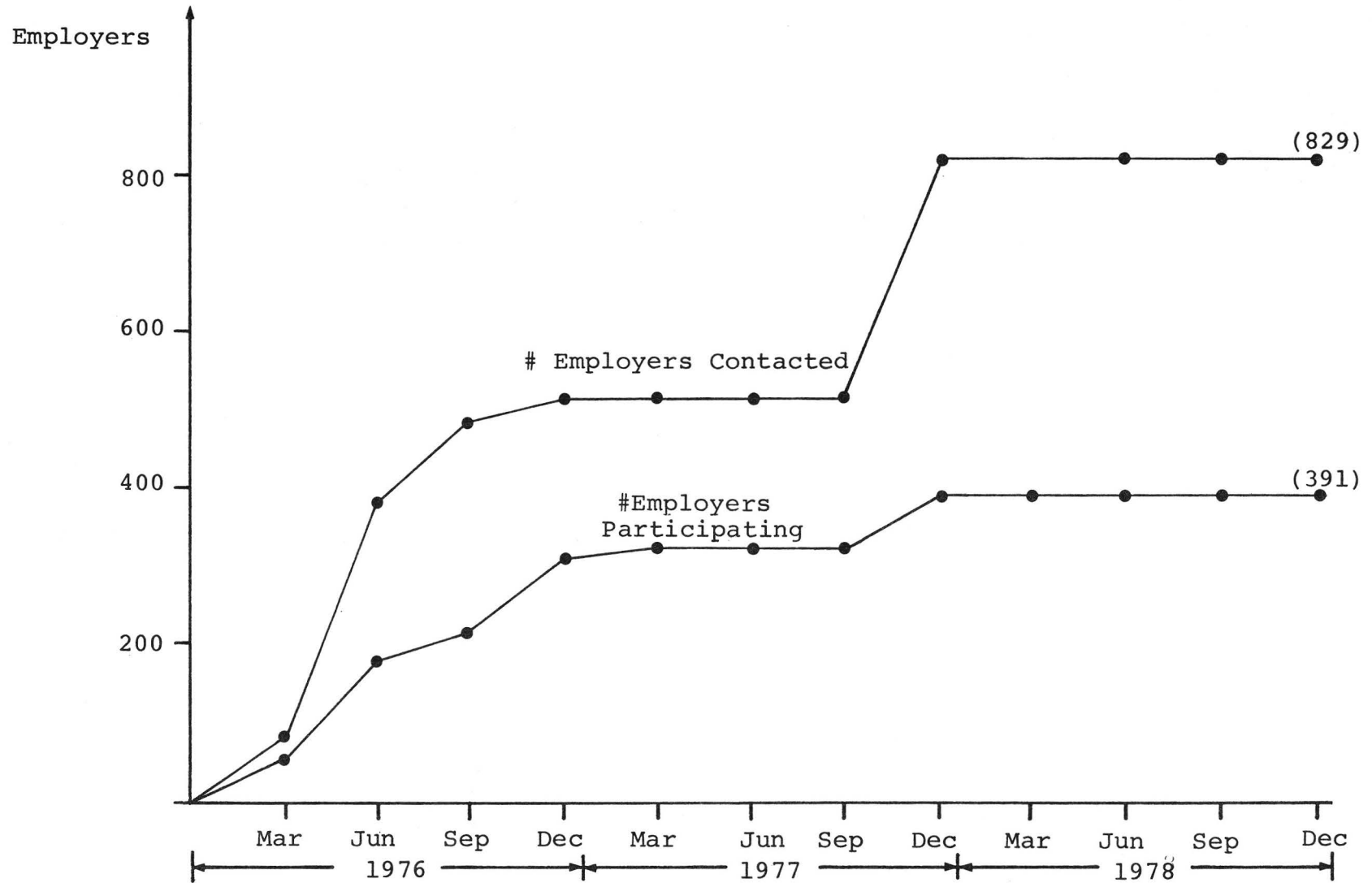


FIGURE 5-2. KCP EMPLOYER CONTACT AND PARTICIPATION HISTORY

(including television, radio, newspapers, and van sightings) as their source of knowledge.¹ However, few of the surveyed commuters could accurately identify the modes with which KCP was involved. Almost half (43%) believed that KCP worked only on vanpooling and only about 3% realized that the organization could provide information concerning carpools, vanpools, and buses.²

While awareness of KCP and the number of people exposed to the surveying process at their place of employment are meaningful measures of coverage, the real indication of market penetration (actually a measure of demand) is the number of people who sought ridesharing assistance from KCP by requesting a matchlist. A total of 23,815 people or about 12% of the market population sought this assistance from KCP;³ this is significantly higher than the average of 4.3% among carpooling programs throughout the country (22).

5.3.2 Matching Effectiveness

The means by which KCP provided ridesharing options to commuters was the matchlist, which contained the names of potential pool "mates" and/or information about vanpools or bus routes presumably meeting the commuter's needs. The purpose of this section is to examine the quantity and quality of matches made by KCP; clearly both affected the usefulness of the lists.

Figure 5-3 indicates the distribution of the total number of matches with other individuals on lists distributed to Knoxville

1 See Sections 4.4.4 and 9.7 for more detailed discussions of this subject.

2 More specifically, the survey indicated $2.9\% \pm 1.3\%$ at the 90% confidence level.

3 The figure consists of 22,415 surveyed at their worksites and 1400 who telephoned KCP directly.

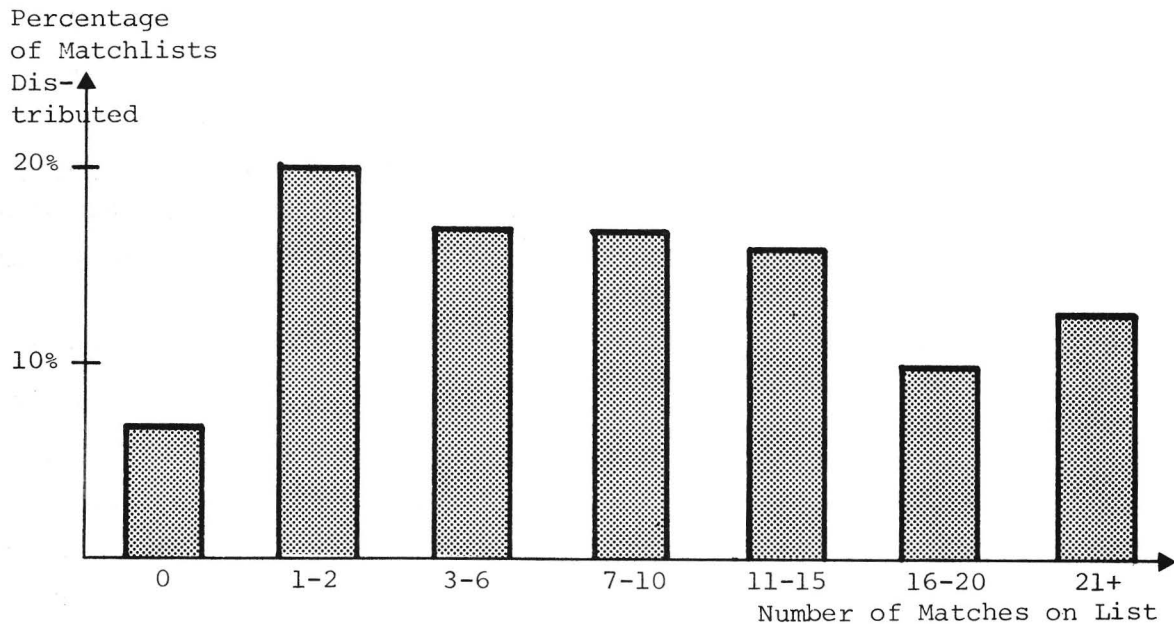


FIGURE 5-3 DISTRIBUTION OF TOTAL MATCHES

CBD commuters surveyed at their employment sites in 1977.¹ The mean number of matches received was 10.0 and only 7% received lists containing no names (i.e., could not be matched). The most frequent number of matches was one, which was received by 15% of the commuters.

¹ Unfortunately statistics on the quantity of matches on lists distributed to other groups of commuters during the demonstration were not tabulated by KCP and are irretrievable for all practical purposes. While the CBD is a unique worksite, it is unclear whether the statistics on the number of matches received by downtown commuters are atypical of matchlist recipients in general. Approximately 18% of the downtown's 14,000 employees were on the master file, which is considerably higher than the 11% penetration obtained for the entire SMSA. However response rates at many large employers rivaled the rate obtained in the downtown and some major worksites have commuter populations as large as the entire CBD workforce (and with closer destinations and travel time requirements). Consequently it is not apparent whether most matchlists contained more or fewer names than those received by CBD employees.

While eight paying passengers was KCP's minimum standard for vanpooling, it is improbable that everyone on a matchlist would wish to join the pool. Therefore it seems more reasonable to consider a number like ten or eleven matches to be the minimum number which might have resulted in a viable vanpool. As many as 39% of the commuters received matchlists containing eleven or more names; however, since many of these individuals had commuting distances of less than ten miles each way, vanpooling would still not have been attractive. (A 1978 survey of matchlist recipients working in the Knoxville CBD indicated that only 5.2% had received enough matches and had long enough commutes to make formation of a new vanpool reasonable.¹⁾

Figure 5-4 indicates the distribution of primary and secondary matches.² The mean number of primary matches was 5.7, and only 7% of the commuters failed to receive at least one. The majority of commuters (55%) received no secondary matches; this primarily reflected KCP's policy decision only to provide secondary matches when the individual received fewer than eight primary matches. Since pick-up and drop-off times can be especially important to vanpoolers (because there are so many individuals involved), the percentage of matchlists with enough primary matches to support a vanpool is particularly interesting; only 17% of the group received eleven or more primary matches.³

Figure 5-5 indicates the distribution of express and local bus matches. (Note that only CBD employees received such matches, since the software to provide them was implemented after all other geographic areas had been processed.) In spite

1 Survey K2, described in Appendix B. Note that the requirements for joining an existing pool would be less stringent.

2 Primary matches involved individuals having the same home grid; secondary matches were those with individuals in an adjacent home grid. Grids were one square mile within Knoxville and nine square miles elsewhere.

3 However, since many vanpoolers meet at a common pickup point, secondary matches should not be discounted too strongly.

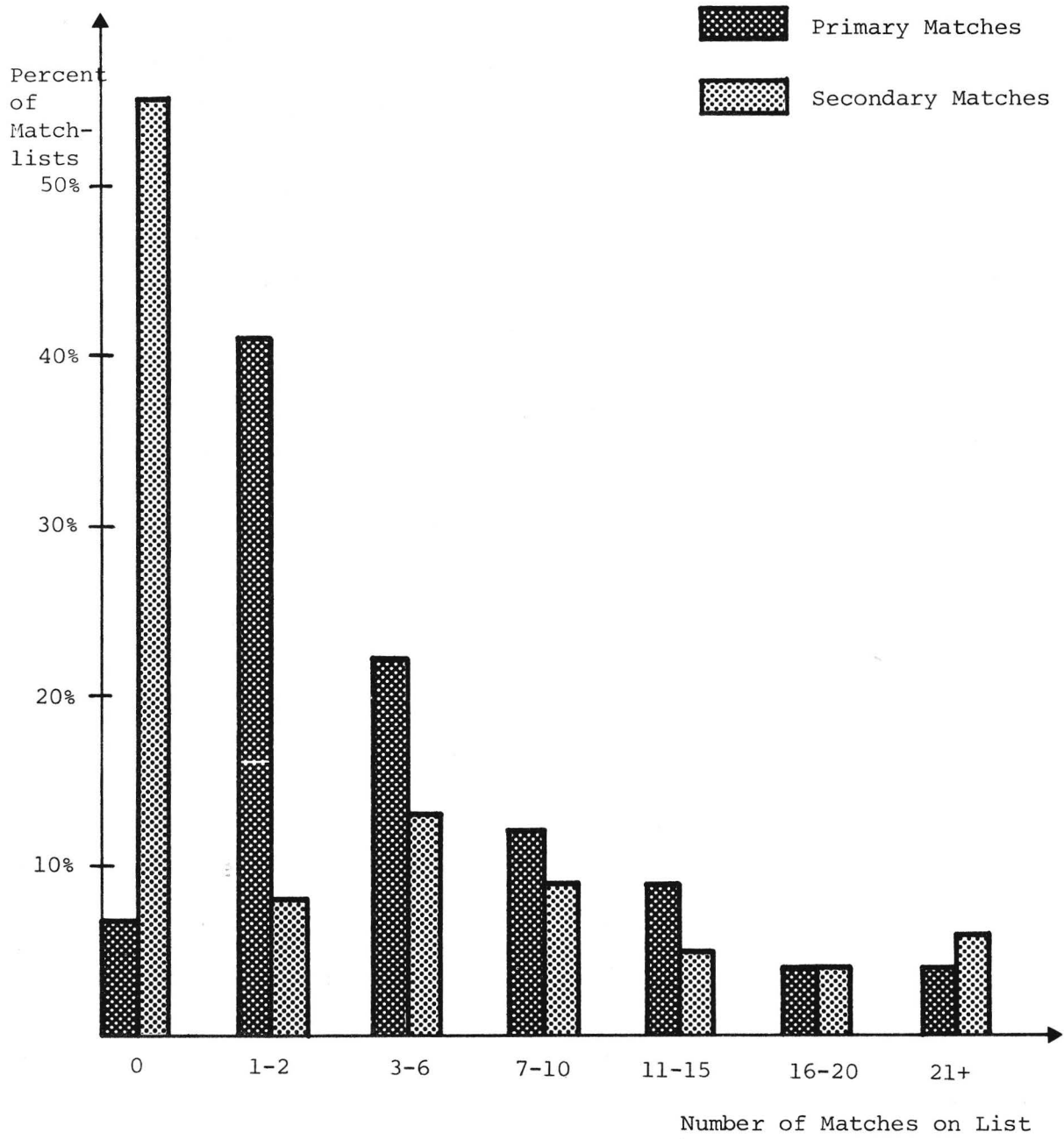


FIGURE 5-4. DISTRIBUTION OF PRIMARY AND SECONDARY MATCHES

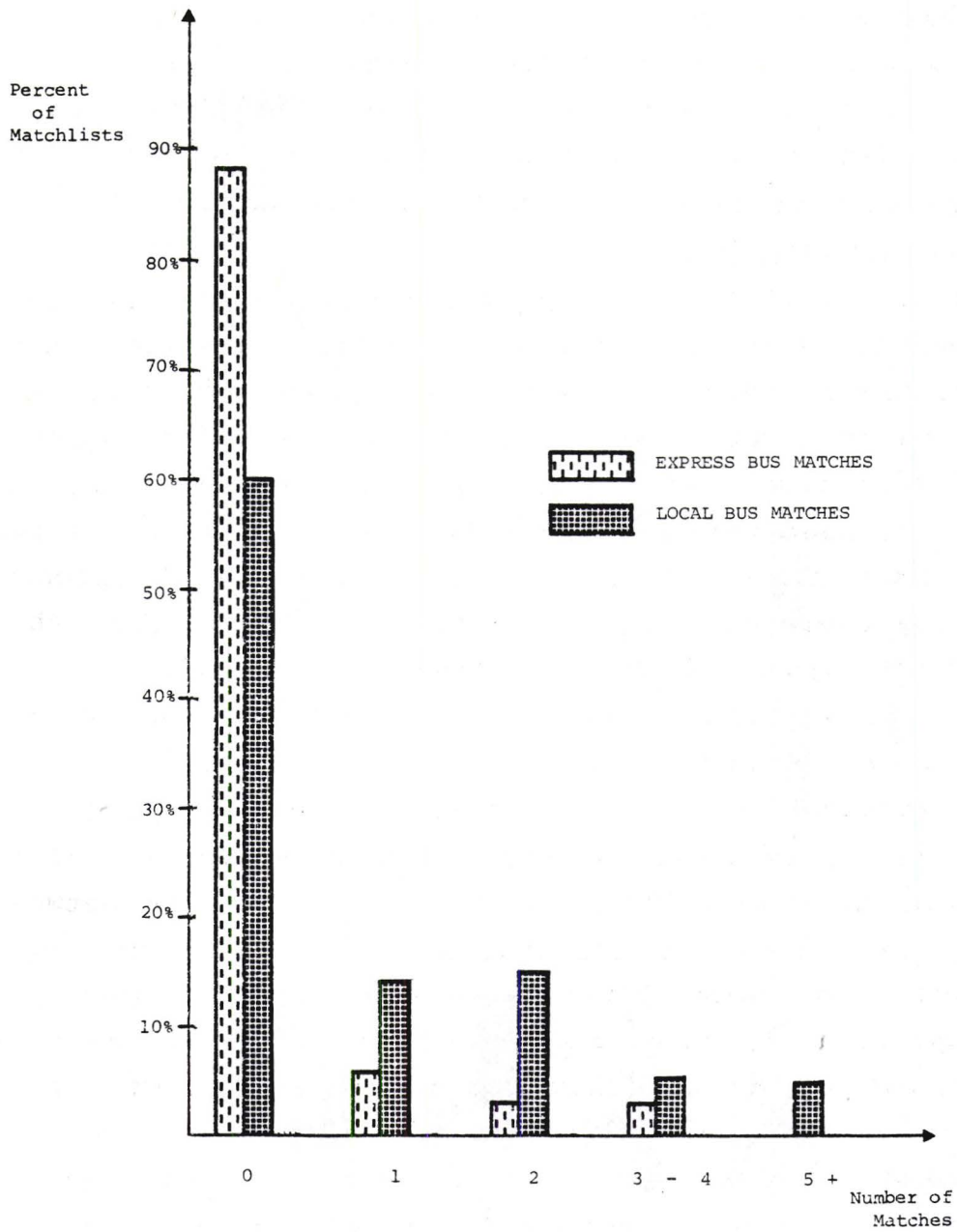


FIGURE 5-5. DISTRIBUTION OF BUS MATCHES

of the fact that all of these commuters worked in the CBD, which has by far the area's best local and express bus coverage, only 46% percent received at least one bus match. This provides a good indication of the areal coverage of Knoxville's bus service for CBD workers, bearing in mind the fact that since the matches were based on one square mile grids, a match could conceivably entail an access distance of up to 1.4 miles. Van matches were also provided for CBD workers; however, fewer than one percent of the matchlists sent to these workers listed an operating van which the individual could conceivably join.

The only statistics on matches available for commuters outside the CBD relate to those who telephoned KCP for assistance. However, these individuals were not representative of matchlist recipients as a whole since they often worked for employers who did not participate in the program. Consequently their chances of being matched were considerably lower than those at participating companies. Matchlists sent to those telephoning for assistance averaged 4.5 total matches (slightly less than half that of employees of participating CBD firms) and, interestingly, this statistic did not change significantly over the course of the demonstration.

An important aspect of the quality of KCP's matching process was its responsiveness. Although comprehensive records are not available, many individuals waited several months between completing the rideshare information form and receiving their matchlist. Following the downtown surveying in late 1977, it took approximately three months before matchlists were mailed. A major factor in the delay was the repeated computer processing difficulties KCP experienced, both because of software development problems and delivery times to and from remote facilities. However a second factor was the decision to wait for survey returns from all participating employers at a given work location before making a matching run. This decision involved an important trade-off between the comprehensiveness of the master file (which affects the ability to provide a given

quantity of matches) and the delay in delivering the lists (which is a measure of quality). An analysis by Margolin and Misch (44) indicated that matchlist utilization is highly dependent on a speedy distribution of the matchlists.

In addition to how many names were supplied to an individual and how quickly they were provided, the usefulness of the matches depended greatly on the inherent quality of the data base (i.e., the master file). Since commuter records are made obsolete by shift changes, employment changes, and changes in residence, periodic updating is absolutely essential. Although KCP initially believed yearly resurveying/updating was a reasonable minimum, staffing limitations made this frequency unattainable during the demonstration, except in the CBD. Consequently, the data on the file was generally not as current as KCP had desired. One (albeit partial) indicator of how up to date the listing was the U.S. Postal Service's address correction rate on mass mailings, which averaged about 9% of all names. However, this reflected only changes in residence. Data concerning how current the master file was with respect to work locations and times were not available, but it is likely that the statistics would vary significantly by employer.

An additional issue relating to the quality of matchlist information is the level of interest of those on file. As indicated in Chapter 4, KCP originally sought to include as many employees in the file as possible, regardless of their interest. However this policy had major implications for the value of the matchlists to those who really were interested. Specifically, evaluation surveys indicated that throughout the project a relatively constant average of about 30% of all matchlist recipients were not interested in remaining on file. This implies that only about two-thirds of the names on a typical matchlist represented potential pool mates. Thus those people who received only one or two names may not actually have received a viable match. Perhaps more importantly, the credibility of the matchlist may have been destroyed for any

individual who called the first one or two names on his or her list, only to find those listed uninterested.

Finally there is the issue of whether or not the matchlist recipient perceived the matches received as "inconvenient." This question, as well as the general discussion of matchlist utilization, is addressed in Section 6.3.



6. COMMUTER RESPONSE TO KCP'S SERVICES

6.1 INTRODUCTION

KCP's objectives with respect to commuter travel were many, but the key to achieving all of them was to increase the use of commuter ridesharing -- by carpool, vanpool, and bus. Each of the broker's commuter-oriented activities were designed to accomplish this goal by providing employees with the information and opportunities it believed were needed to facilitate mode shifts. The vanpool program was designed to offer a new mode to large enough groups with long commutes, and the promotional campaigns were intended to educate the public about the high cost of driving alone and the benefits of sharing rides. However, in terms of implementation the cornerstone of the program to increase ridesharing was the surveying of commuters and the subsequent matching of those with similar travel patterns. The surveying/matching process served as both promotion and a means of identifying potential ridesharers. It provided commuters with the names of possible pool-mates, bus service¹ and operating vans¹ which might suit their needs; it provided KCP with a large data base of potential ridesharers toward which to direct future marketing efforts, a means of identifying clusters of employees who might be good vanpooling prospects, and an indicator of demand for its services.

An important aspect of the surveying and matching process is the significant supply-demand interaction involved. If a large number of employees at a given site are not interested in pooling, the broker cannot typically provide an individual who is interested with sufficient information, since he or she is unlikely to be matched with many others. A related problem is that mode shifts to pooling do not result from an individual's decision to pool but from a group's decision to travel together. This significantly increases the broker's challenge.

¹ For downtown employees only.

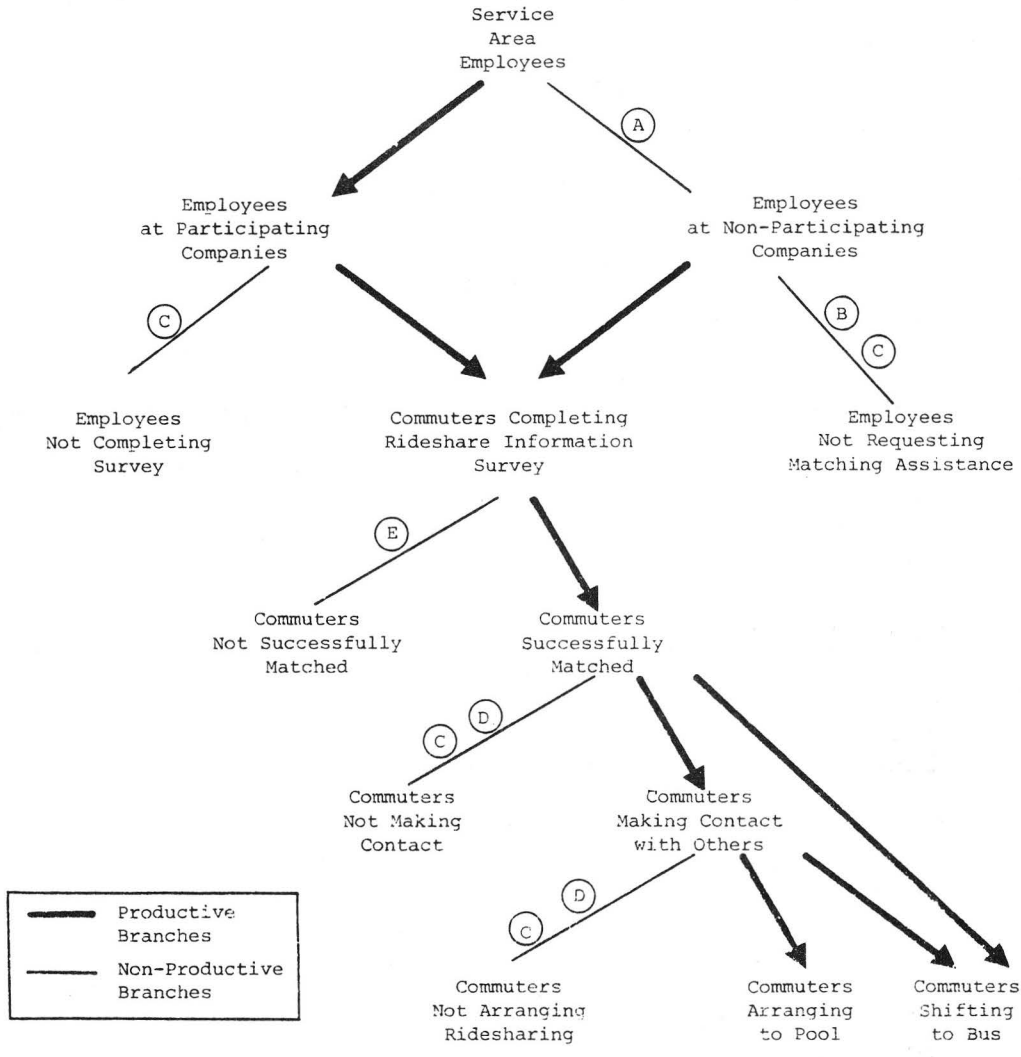
The successful achievement of modal diversion through the survey/matching process thus relies on a complex set of interactions among the broker and individual commuters, with many potential sources of failure. The nature of the process, in terms of the way it subdivides the commuter population, is depicted in Figure 6-1, and described below:¹

- 1) The potential ridesharer must be identified. This is accomplished a) by the individual's completion of a rideshare information form either at an employer or indirectly by telephone and b) by the broker's cataloging of the individual's record onto a master file. The more effective the broker is in gaining employer participation, the greater will be the number of people exposed to the full promotional campaign. Commuters reached at their worksite are more likely to complete the form than those employed by non-participating employers.
- 2) The potential ridesharer must be successfully matched. While this step requires competent action by the broker, its success depends primarily upon having a large number of names for each work location on the master file.
- 3) Contact must be made between matched commuters. The successful matching of commuters does not ensure their use of the information supplied by the broker to contact others. Problems can arise because the matches do not appear satisfactory to the recipient, or because the recipient simply fails to act. (For those interested in bus service, this step may or may not be pursued.)
- 4) An agreement to rideshare must be made and implemented. Even after contact is made, ridesharing may not be arranged. The person contacted may not have a real interest in ridesharing, the match may be perceived as inconvenient, negotiations over the arrangement may not prove successful, etc.

Even if each of these steps is successfully carried out, the new ridesharing arrangement may not result in a mode shift, or the mode shift produced may not increase the use of ride-sharing; for example, some individuals may simply shift from

¹ The figure illustrates the basic process, excluding KCP's follow-up telephone marketing procedures.

IDENTIFICATION
 MATCHING
 CONTACT
 ARRANGEMENT



— Productive Branches
 — Non-Productive Branches

Key to Reasons for Non-Productive Branching:

- A - Broker's inability to convince management to participate
- B - Lack of awareness
- C - Lack of interest by commuters
- D - Poorly perceived matches
- E - Insufficient density of demand

FIGURE 6-1. THE RIDESHARE MATCHING PROCESS-COMMUTER SUBSETS

one carpool to another, or from a carpool to a bus. However, while the aggregate number of new people shifting to ridesharing modes provides a very basic and important measure of the broker's overall impact, it provides little insight into which aspects of this multi-stage process worked effectively and which did not; to do so requires a more detailed approach.

Chapter 5 described the characteristics of the various commuting modes and examined KCP's effectiveness in providing commuters with a choice of travel options. This chapter addresses commuter response to KCP's services in terms of: 1) the completion of rideshare information surveys at participating employers; 2) telephoned requests for matching assistance; 3) the use of the distributed forms in contacting others; and 4) the culmination of the process in the achievement of ridesharing arrangements. It goes on to look at the aggregate impact of this process on mode split and related travel characteristics of commuters.

6.2 SURVEY COMPLETION STATISTICS

While anyone in KCP's service area could telephone a request for matching assistance, the principal way in which interested potential ridesharers were identified was through employer-based rideshare information surveys. Section 5.3.1 presented statistics on the number, percentage and employment of participating employers; this section examines the response among commuters at participating worksites, as well as among those who telephoned KCP for assistance.

Figure 6-2 provides a chronology of the exposure of employees at their worksites and of their response through survey completion. It indicates that the majority of employees at participating companies were reached by December 1976. During the first nine months of 1977, no new employers began to participate, but limited resurveying was performed. In the last quarter of 1977, the comprehensive resurveying of downtown Knoxville exposed several thousand new employees to at-work

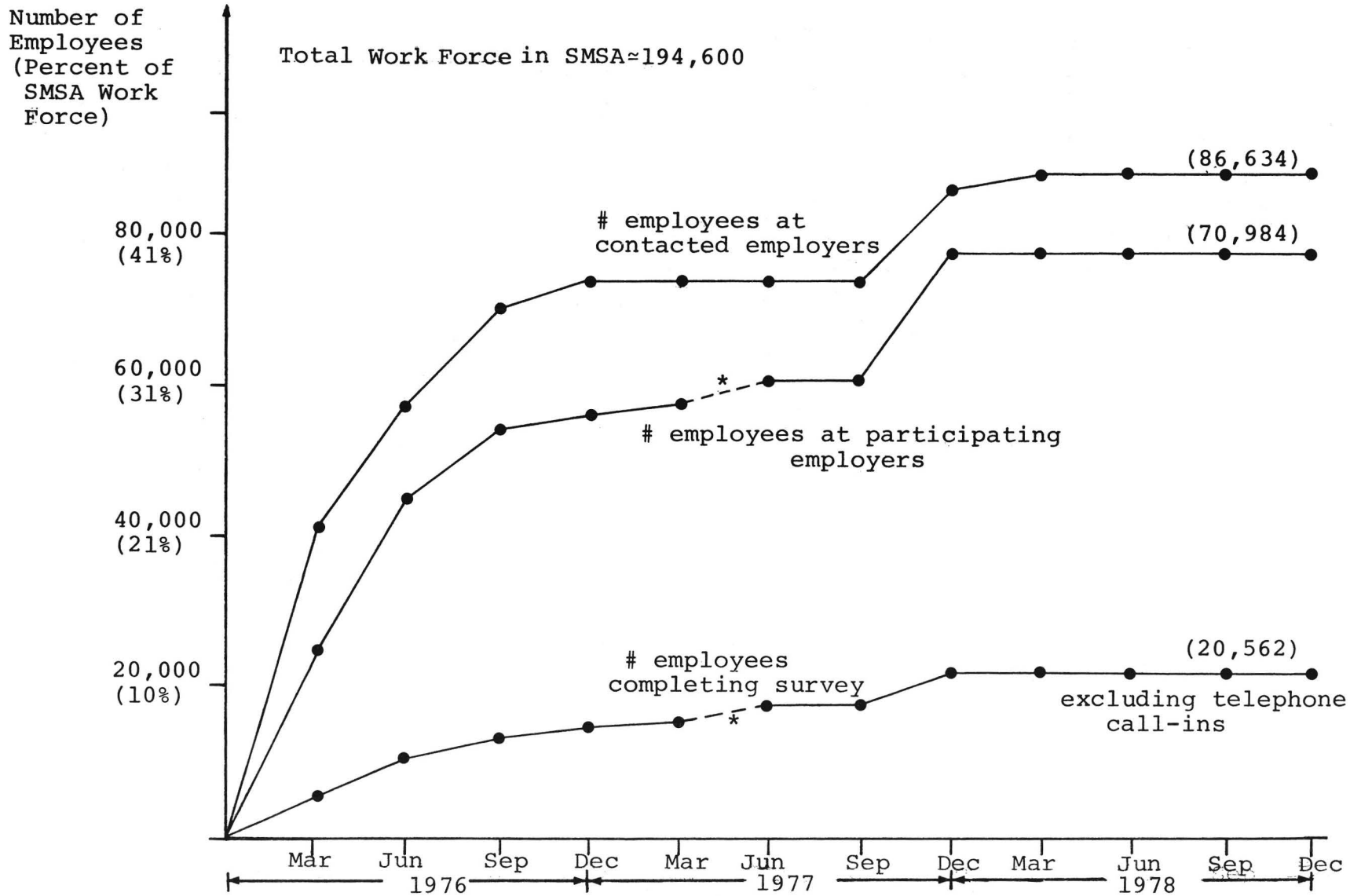


FIGURE 6.2 KCP EMPLOYEE CONTACT AND PARTICIPATION HISTORY

*The increase in employees surveyed during this quarter was the result of KCP's re-surveying effort.

promotion and KCP's survey form. Finally, no significant resurveying took place in 1978--thus the number of exposed employees remained constant.

Overall, about 29% of the employees at participating firms completed rideshare information surveys. However there were great variations among employers, with completion rates ranging from less than 1% to as high as about 95%. Table 6-1 indicates the results at the larger participating employers; they averaged about a 40% response rate, which was significantly higher than the 16% average for smaller employers. KCP believes that variations in response correlate strongly with management's interest and support. This is probably true, although interviews conducted by the evaluation contractor with several of the larger employers identified a number of other factors thought to keep response rates low:

- irregular work shifts/overtime
- desire to use a vehicle for lunchtime errands
- low status image
- saturation of the pooling market

Although annual resurveying of employee worksites was originally planned, staffing problems made so great an effort infeasible. Only in the downtown was a comprehensive resurveying (coupled with a successful attempt to increase the number of participating employers) undertaken; this raised the percentage of the CBD workforce completing surveys from 13% to 20%. A total of about 800 new employees were added to the master file.

Those not surveyed at their worksites always had the option of telephoning KCP for assistance. Figure 6-3 indicates the number of matchlists requested (and distributed) to telephone callers each month during the evaluation period.¹ By far the

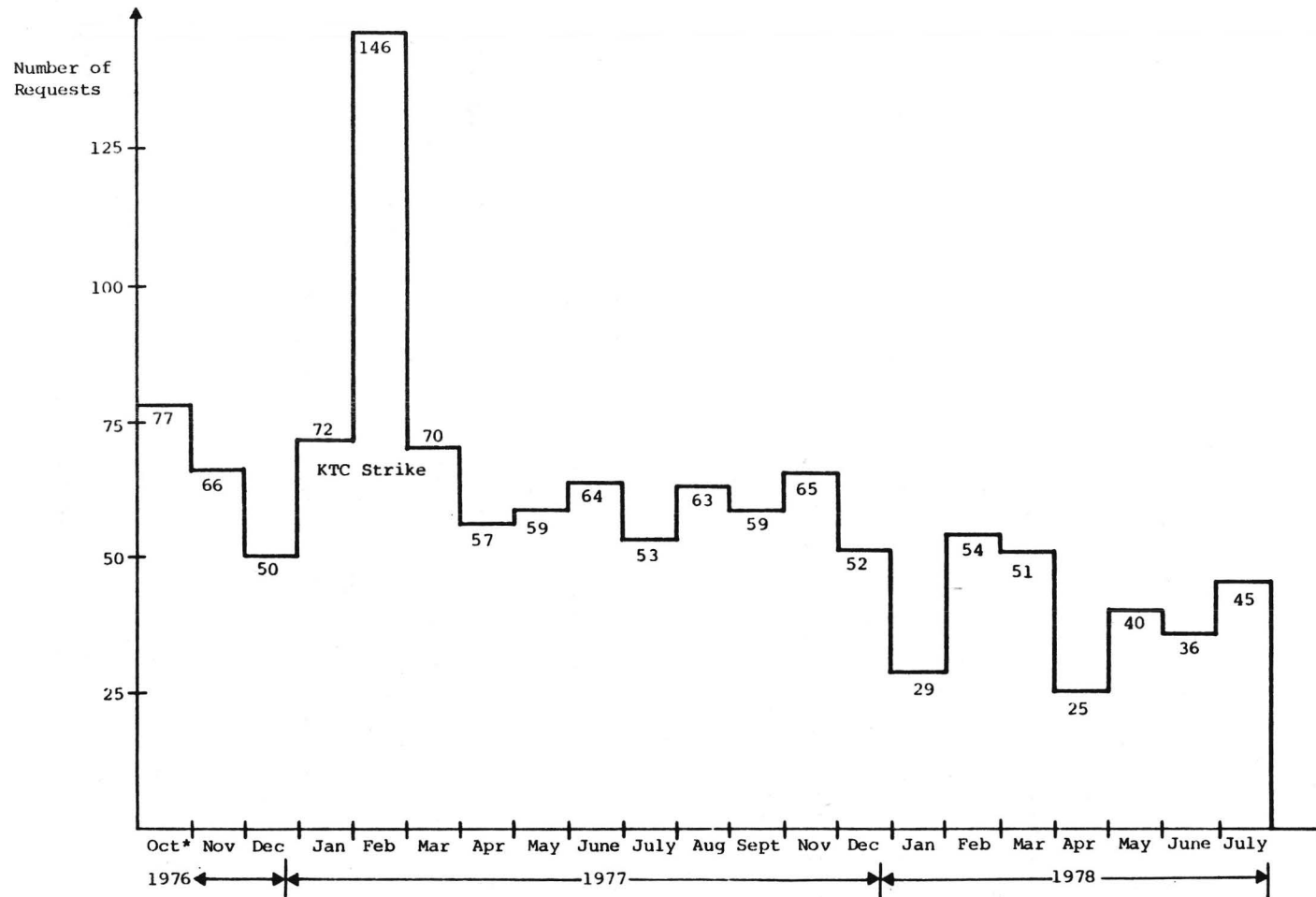
¹ Reliable data is not available for the period prior to October, 1976.

TABLE 6-1. PARTICIPATION RATES AT LARGE EMPLOYERS

COMPANY	EMPLOYMENT	NUMBER RESPONDING ¹	PERCENT RESPONDING
Union Carbide, K-25	4400	3229	73%
Union Carbide, X-10	3400	2675	79
Union Carbide, Y-12	6000	2608	43
University of Tennessee	5000	1126	23
Levi Strauss, Cherry St.	1529	1059	69
Walter State College	1000	913	91
Rust Engineering	1700	771	45
Robertshaw Controls	1300	690	53
East Tennessee State Hospital	600	385	64
Levi Strauss, Powell	600	301	50
Knoxville News Sentinel	604	274	45
Dempster Dumpster	625	260	42
Knoxville Utility Board	1100	173	16
UT Hospital	1600	169	11
Southern Athletic	600	145	24
St. Mary's Hospital ²	1000	100	10
ERDA	800	95	12
Palm Beach Company	800	75	9
Allied Chemical Corporation ²	1800	15	1
Ft. Sander's Hospital	1200	11	1
Standard Knitting Mills ²	2300	8	-
Rohm & Haas ²	800	3	-
TOTAL	38,758	15,602	40

¹ As of August 1978.

² At these companies, surveys were not universally distributed; interested employees had to take the initiative to obtain the forms.



*Pre-October 1976 data unavailable.

FIGURE 6-3. TELEPHONED MATCHLIST REQUESTS BY MONTH

greatest number of requests were recorded in February 1977, when the transit strike began. Aside from that one month, the graph indicates a modest (but statistically significant) decline in calls over the period. This tends to support to the hypothesis that those commuters with the strongest interest may have called in the early months.

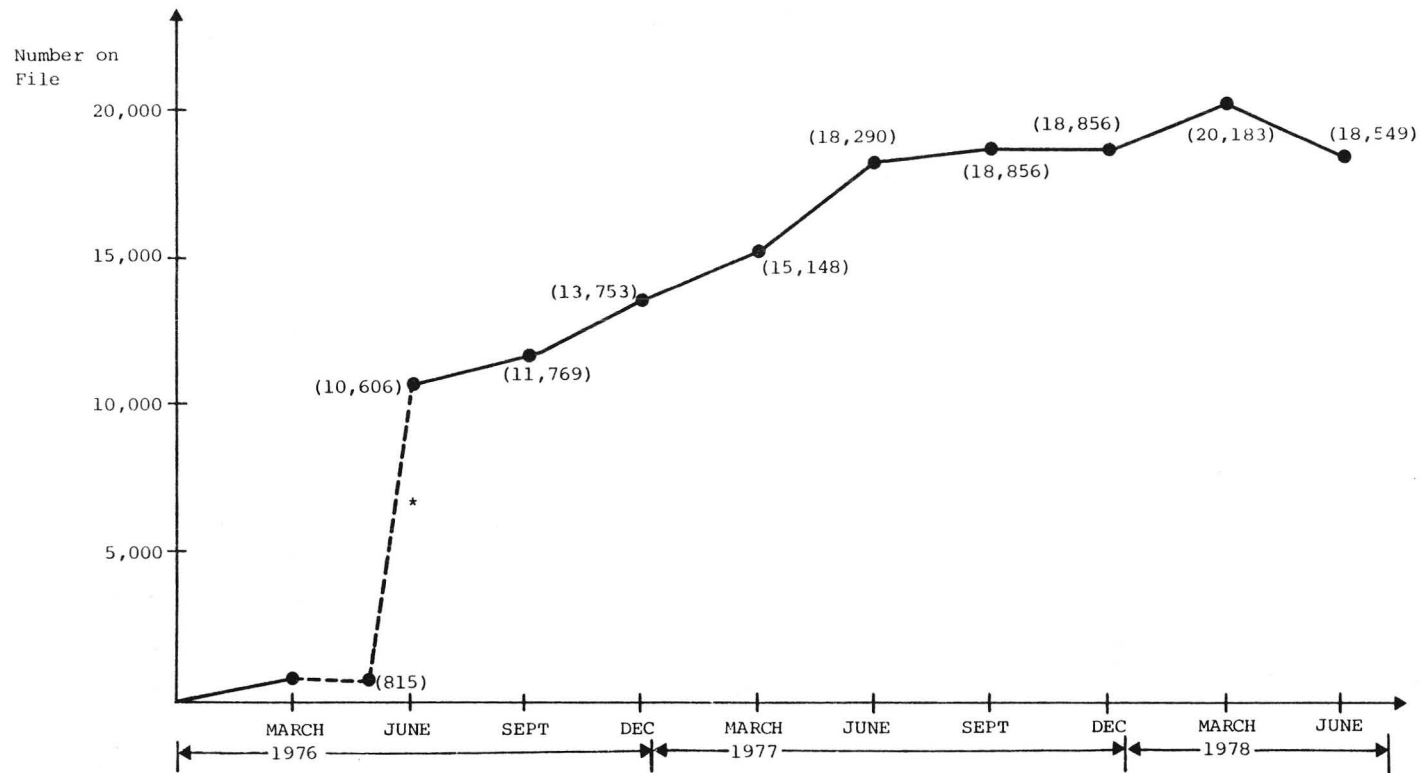
Figure 6-4 illustrates the growth of KCP's master file of commuters over the course of the evaluation period, reflecting both surveys completed at worksites and phoned requests for matches.¹ The figure indicates the actual number of commuters on file; thus the values have been adjusted to reflect deletions necessitated by specific requests, employer supplied information on terminations, and postal service notices on returned mail.² The 18,549 total at the end of the evaluation period represented about 9.5% of the SMSA workforce; only a relatively small number of non-SMSA employed commuters were on the file, although these people were fully eligible for assistance.

6.3 MATCHLIST UTILIZATION

Obviously, the most appropriate summary measure of the matching program's effectiveness is how many people utilized the matchlists (or were influenced by them) to form or augment ridesharing arrangements. However, it is also instructive to examine why (and to what extent) matchlists were not used by their recipients; such an analysis helps to explain the observed results and provides some insights into the possible ways in which the process could be improved. This section addresses the overall issue of matchlist use and non-use.

1 The sharp growth in the file between May and June 1976 resulted from the solution of a computer problem which had precluded entering names gathered over previous months onto the file.

2 KCP estimates that approximately 10% of all employees surveyed were eventually deleted from the file.



* Between March and May 1976, names could not be added to the master file due to computer problems, although surveying continued.

FIGURE 6-4. GROWTH OF MASTER FILE

The analysis is based on surveys of matchlist recipients conducted during February and March 1977¹ and May and June 1978.² The 1977 group consisted of 465 commuters who primarily worked outside the downtown;³ the 1978 group was comprised of 240 downtown employees.⁴ All had completed ride-sharing information forms.

As indicated in Table 6-2, significant numbers of those surveyed in both groups (36% and 29%) claimed not to have received a matchlist. While it is known that there were some problems with matchlist distribution by employers to the earlier group, the 1978 (downtown) employees received their lists by direct mail. While some small fraction of the 1978 group may not have received their information due to changes of address, lost mail, etc., it is quite likely that many of those who claimed not to have received a matchlist simply did not recall the event. Among those who responded that they had received a list, 14% of the 1977 and 5% of the 1978 survey populations indicated that the lists contained neither potential carpool, vanpool, nor bus matches.⁵ Consequently, only about 54% of the areawide (1977) and 67% of the CBD (1978) survey populations claimed to have received usable (or "valid") matchlists.

Of those receiving usable information, approximately 14% of the areawide and 8% of the CBD respondents contacted someone on

1 Survey K1, Appendix B.

2 Surveys K2 and KCP Telephone, Appendix B.

3 About 7% of core area employees were located in the downtown.

4 Since it was considered important that the evaluation surveys be conducted no more than six months following matchlist distribution, and major distributions took place only during the first year (areawide) and in late 1977 (CBD), only the two surveys mentioned above were considered productive to perform.

5 Bus matches apply only to the 1978 (downtown) group. The improvement from 1977 to 1978 probably reflected the higher (on-file) employment density in the CBD rather than an actual change in KCP's matching capabilities.

TABLE 6-2. RECEIPT OF MATCHLIST FORMS

	<u>Spring 1977</u>	<u>Spring 1978</u>
Number surveyed	465	240
% Receiving no form	36% (+4%) ¹	29% (+5%)
% Receiving form	64% (+4%)	71% (+5%)
	<hr/>	<hr/>
	100%	100%
Of those receiving form: ²		
a. % with no information	14% (+4%)	5% (+3%)
b. % with bus information only	NA ³	2% (+2%)
c. % with names only	86% (+4%)	47% (+7%)
d. % with bus information and names	NA ³	46% (+7%)
	<hr/>	<hr/>
	100%	100%

1 Numbers in parentheses indicate the size of the confidence interval at the 90% level.

2 And recalling the information contained on the form.

3 Not applicable for spring 1977 survey; forms at that time contained no bus information.

his or her list about forming a pool; nearly 15% of the 1977 group and 7% of the 1978 group who received matchlists indicated that they were contacted by others. (The close correspondence between the percentages "contacting others" and "contacted by others" in each survey was to be expected, and supports the validity of the survey results.) The net result was that contact occurred (actively and/or passively) with 22% of people receiving matchlists. The surveys did not identify any common characteristic which distinguished those who contacted others from those who did not.¹

A number of reasons for the low level of matchlist utilization were indicated by both of the surveys:

- the master file contained the names of many people not really interested in pooling
- some commuters with an interest in pooling were already doing so
- the matching process created matches that some individuals perceived as inconvenient
- some recipients had changed jobs, working hours, and/or home addresses and therefore could not utilize their lists
- some individuals did not fully complete their ride-share information forms, resulting in inadequate listings for them on others' matchlists.

Another factor may have been the long delays between the time when commuters completed their rideshare information forms and when they received their matchlists. As many as 90% or more experienced waits of over one month; some waited as much as 4 1/2 months. While the impact of these delays on matchlist utilization is difficult to determine, Margolin and Misch (44) found long waits to be a significant deterrent to usage.

Until late 1977 KCP solicited management's aid in encouraging all employees to complete forms, regardless of their current interest. KCP reasoned that the act of completing the

¹ This may or may not have been a result of the relatively small sample of users involved.

survey would increase awareness of the brokerage and its goals, and once an individual was on the master file he/she could be easily reached through mass mailings. In some cases employers were very aggressive in attempting to maximize their employee completion rate, and there appear to have been isolated cases where forms were completed by lower level management (rather than by the employee) in an effort to appear successful. However, when the 1977 survey indicated that many disinterested individuals were on file and that the value of matchlists to interested individuals was thereby being reduced, KCP decided to change its strategy and add only interested new commuters. Thus, it is not surprising that the percentage of those surveyed indicating that they had "no intention to pool" dropped from thirty-two to seventeen percent between those surveyed in 1977 and those in 1978. However, the aggregate percentage indicating a lack of real interest in pooling (i.e., such responses as "no intention," "changed mind about pooling," and "not yet acted"--see Table 6-3) remained quite high, at 37% and 32% for the area-wide and CBD groups, respectively.

Another factor apparently limiting the utilization of matchlists was the existence of satisfactory pooling arrangements. Of those who received matchlists and did not contact others, 15% of the areawide and 11% of the CBD respondents claimed that they had not contacted others because they were already in a suitable pool. Obviously, this should not necessarily preclude matchlist use, since one could generally augment his/her pool. However, many of these individuals apparently wanted matchlists as a backup or for future use. As the spring

TABLE 6-3. RESPONDENTS INDICATING NO INTEREST IN POOLING
(% Not Using Matchlist)

<u>Response</u>	<u>Spring 1977</u>	<u>Spring 1978</u>
"No intention to pool"	31.6%	16.8%
"Changed mind about pooling"	4.2%	12.8%
"Have not yet acted"	1.3%	2.7%
AGGREGATE	37.1%	32.3%

1977 survey and another survey¹ of the general commuting population indicated, carpool formation and deformation is an ongoing process. In the former survey, approximately 15% of the respondents not using their matchlists changed modes between the time they received their matchlists and when they were surveyed. Mode changes included shifts from ridesharing to non-ridesharing, and between ridesharing modes. In the aggregate, however, no net change was observed. Similar patterns were found among the general public in the second survey, but, again, no significant overall change was observed.

As one would expect, the perceived convenience of a potential match appeared to have been an important factor in matchlist utilization. The matching process relies on a grid coordinate system overlaid on a map of the service area; individuals sharing the same beginning and ending grids (or adjacent grids) and the same working hours are considered to match. However, the grid system does not take into account the topography or the specific location of major highways. Therefore, individuals living or working in the same grid may have origins or destinations that would require significant additional travel if they were to pool. More than 16% of the 1977 respondents who received a valid matchlist indicated that they had not called individuals on their lists because they considered the matches to be inconvenient. (This would extrapolate to between 12 and 20% of all areawide matchlist recipients who received valid lists.) However, nearly 28% of those employed in the CBD and receiving valid lists claimed "inconvenient matches" as their reason for not contacting anyone. (This would imply that between 22 and 34% of all downtown employees who received valid matchlists failed to make a contact because of the inconvenience of the matches.) In analyzing this data, it is important to recognize that some of the reasons given by respondents for not having made contact should probably be viewed with at least some

¹ Survey G2; see Appendix B.

skepticism. Many of those claiming "inconvenient matches" or similar reasons, for example, may simply have used the quality of the matchlist as an excuse, rather than state that they were not really interested in pooling or that they just lacked the commitment and/or nerve to call a stranger about pooling (a reason which not a single respondent gave for inaction).

Only a small percentage of respondents were determined to have moved or changed jobs between the times they submitted ridesharing information and when they were surveyed (less than 1% and 2% respectively for the 1977 survey, and 2% and 4% for the 1978 survey). However, the actual percentages may have been significantly greater, since those who moved far enough to change telephone numbers would have been among those not reached by the surveyors.

The primary goal of the matching program, of course, was not only to get people to use their matchlists to contact others, but to have them make new ridesharing arrangements. However, both the 1977 and 1978 surveys indicated that even among those who made contact, ridesharing frequently was not arranged. Only 15.4% and 6.7% of those respondents making contact in 1977 and 1978 actually arranged to rideshare. Among those not making arrangements, the single most significant factor appeared to be schedule differences (45% of the people surveyed stated this as their reason for not arranging ridesharing); apparently KCP's fifteen minute wide "matching window" resulted in an unacceptably long wait for a significant number of people. The second most frequently mentioned reason (stated by 24% of the people responding) was the distance between either origins or destinations (or both). Five percent of those failing to arrange to pool cited the fact that none of those interested were willing or able to drive.

In spite of all the potential barriers, a small percentage of matchlist recipients did arrange to rideshare together or began to utilize a bus option identified on their matchlist. The 1977 survey (of 465 people) identified ten individuals (representing approximately 3.4% of those acknowledging

receiving matchlists or 2.2% of those to whom lists were distributed) who began ridesharing as a direct result of receiving a list. Among the 240 CBD employees surveyed in 1978, four used their matchlists to change modes (constituting 2.3% of those acknowledging receiving matchlists or 1.6% of all respondents). Between the two surveys, of the thirteen individuals for whom data were available, ten were still pooling by the time the survey was made, but only three represented a shift from driving alone to a ridesharing mode.

Data from the first few months of KCP's telephone marketing campaign, which was initiated in May 1978 and was directed primarily at CBD workers, indicated that $4.3\% \pm 1.0\%$ of these employees listed on the master file had changed to ridesharing as a result of matchlist use. However, many of the identified individuals were TVA employees who began riding the bus or joined a TVA vanpool-- activities which were subsidized by their employer. Thus it would probably be misleading to extrapolate these results to the CBD or the remainder of the service area.

It is clear that the use of KCP matchlists was disappointingly low. A number of probable reasons for these results have already been presented, but one additional factor deserves special mention. KCP's basic ridesharing program relied entirely upon having relative strangers contact one another. This alone was a significant barrier to high matchlist utilization, since many individuals find making such calls very difficult, and therefore tend to delay them, often indefinitely. The problem is exacerbated when an individual encounters other difficulties such as those already described.

The "telephone marketing" approach was developed primarily to minimize this barrier by having KCP initiate the contacts to individuals, thereby ensuring that when potential ridesharers do contact one another they will each know that the other is interested. At the end of the evaluation period, this program was still in its infancy, but KCP was convinced that the new approach would be considerably more effective at achieving mode shifts than simple matchlist distribution. Initial results have

been very promising; by the end of the demonstration the combined matchlist/telephone approach had achieved mode shifts among 7.8% of those reached, compared to a figure of approximately 3.4% for those CBD employees who simply received matchlists.

6.4 VANPOOL OPERATIONS

6.4.1 Seed Vans

While areawide commuter travel behavior was not greatly influenced by KCP's ridesharing program, the seed van portion attracted significant interest. As Figure 6-5 indicates, the growth in seed van leases was both quick and virtually constant from the program's outset.

Although in the earliest months KCP had to "sell" the vanpooling concept by calling each prospective pooler, as demand grew those interested in operating a van eventually took the initiative and made their own calls. In slightly more than a year, KCP managed to reach its target of leasing forty-seven or forty-eight of its vehicles.¹ The "trial" vanpool approach (involving the provisional start-up of vans with fewer than eight passengers) contributed significantly to this growth; 61% of the forty-nine trials initiated in the UT period reached operational status. By the summer of 1977, a backlog of prospective pool operators had been assembled. The drop-off in leases over that summer resulted not from a lack of demand, but from the policy decision not to re-lease failed vans when sale of the fleet was considered imminent. The sharp drop in leases beginning in January 1978 actually represents the sale of the vans to their operators.

Interest in becoming a vanpool operator was substantial. During the first year of the demonstration a total of 1321

¹ The remaining three of four vans were required for backup and promotional purposes.

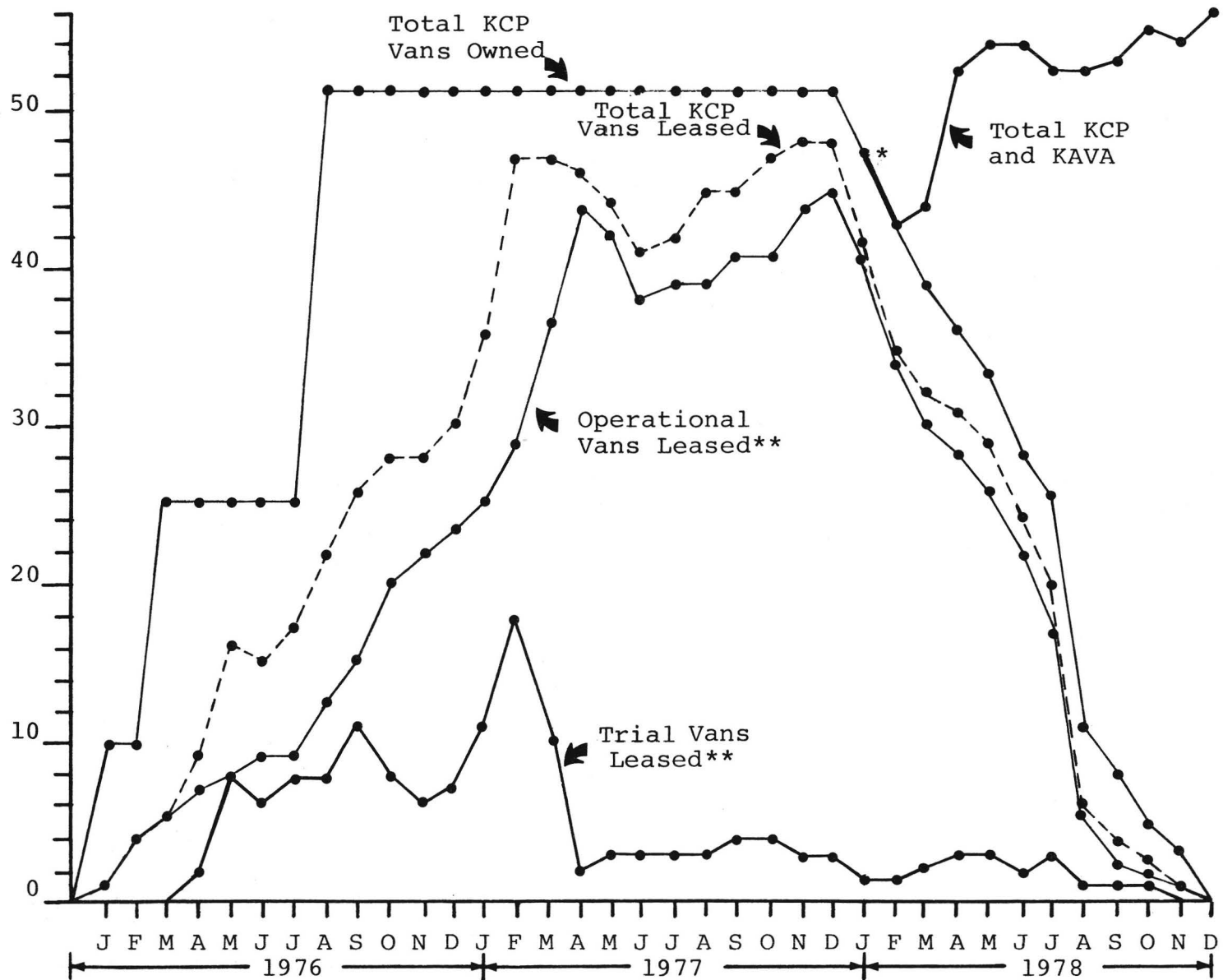


FIGURE 6-5. HISTORY OF KCP VAN OWNERSHIP AND OPERATION

*KAVA began in January, 1978.

**Operational vans had eight or more paying passengers; trial vans had fewer than eight passengers.

(8.9%) of those completing rideshare information forms at their employer indicated such an interest. In addition 275 of the people telephoning KCP gave this as the reason for their call.

The strong interest in vanpool operation (and the backlog of prospective drivers developed by mid-1977) was important to KCP from an operational standpoint since it provided the ability to offset operator turnovers. In the City period, such turnovers averaged 2.6 (or about 7% of the operating fleet) each month. (It is important to recognize, however, that operator turnovers do not imply disbanding of the pool.)

Although any commuter who met KCP's driver requirements, had a twenty mile or more round trip and had located enough riders, could lease a van, the motivations and the travel patterns were apparently most conducive at the three Union Carbide plants in Oak Ridge. In September 1976, when KCP had twenty-nine vans leased, twenty of them were serving these three plants.¹ Since the seed van program was designed to demonstrate the feasibility of this mode to the area's commuters, KCP decided to limit the number of vans leased to Union Carbide people to twenty-five to ensure exposure at other employers.

Figure 6-6 indicates the growth in seed vanpool ridership over the course of the demonstration. As was to be expected, ridership growth mirrored that of vans leased. Ridership per van (including the driver) averaged 10.0 and 11.0 for the UT and City periods, respectively. During the UT period, round trip distances averaged fifty-six miles per day (with a range from thirty to 150); in the City period the average trip length increased to sixty-six miles per day.

¹ One factor contributing to the early growth of vanpooling at Oak Ridge may have been that between the program's start and the deregulation of vanpooling on March 28, 1976, KCP could only operate its vans in areas which had joined the new regional transportation authority. Since only Knoxville and Oak Ridge joined, and KCP was hesitant to place vans in Knoxville because of its 13(c) liabilities, early emphasis was concentrated on Oak Ridge.

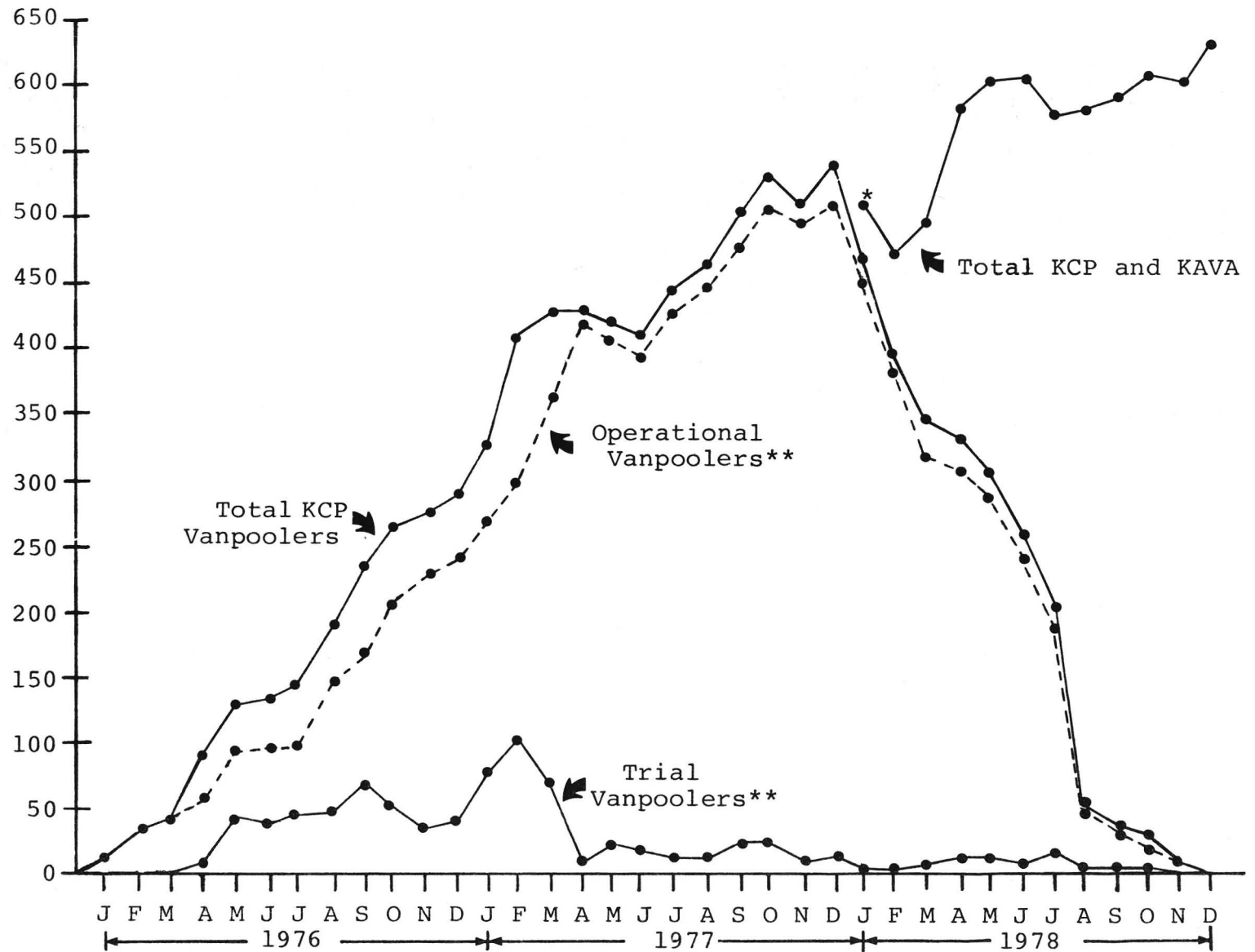


FIGURE 6-6. HISTORY OF KCP VAN RIDERSHIP

*KAVA began in January, 1978.

**Operational vans had eight or more passengers, trial vans had fewer than eight passengers.

A late 1976 survey conducted by UT provides an interesting profile of seed vanriders.¹ Of the 294 people surveyed, only 7% indicated that they did not have an automobile available for commuting. A further indication that these were primarily "choice riders" is provided by their modes of access to the van (see Figure 6-7); 54% of the riders used an automobile to reach a common pick-up point. Of those not picked up at their homes, the average access distance was 2.8 miles.

Figure 6-8 indicates the former mode of the surveyed poolers. Almost two thirds were already either carpooling or using transit before shifting to the van; the remainder obviously drove alone. On the average each new seed van removed 5.3 automobiles from the road (i.e., for the line-haul portion of the trip).

The percentages of male and female vanpoolers (64% male) mirrored the areawide mix of employees. Only 20% of those surveyed were professionals, but this may reflect the nature of the participating employers' workforces more than any other factor.

6.4.2 Non-Seed Vanpooling

The seed vans were intended to spur the growth of private vanpooling by showing that the concept was both sound and attractive. However, while the seed vans were popular, the growth of private vanpooling during the demonstration was apparently far less substantial than had been hoped. By September 1976, KCP had made contact with a total of ten individuals who were operating their own, privately owned vanpools. All of them had contacted the broker for assistance, primarily with respect to fares and cost accounting. The number of private vans in contact with KCP remained constant until January 1978 when it dropped to six. Even with the initiation of KAVA--which was developed to spur private vanpooling--this

¹ See Survey F, Appendix B. Additional results are documented in Wiersig and Wegmann (79). Approximately 50% of all seed vanpool riders completed UT's survey.

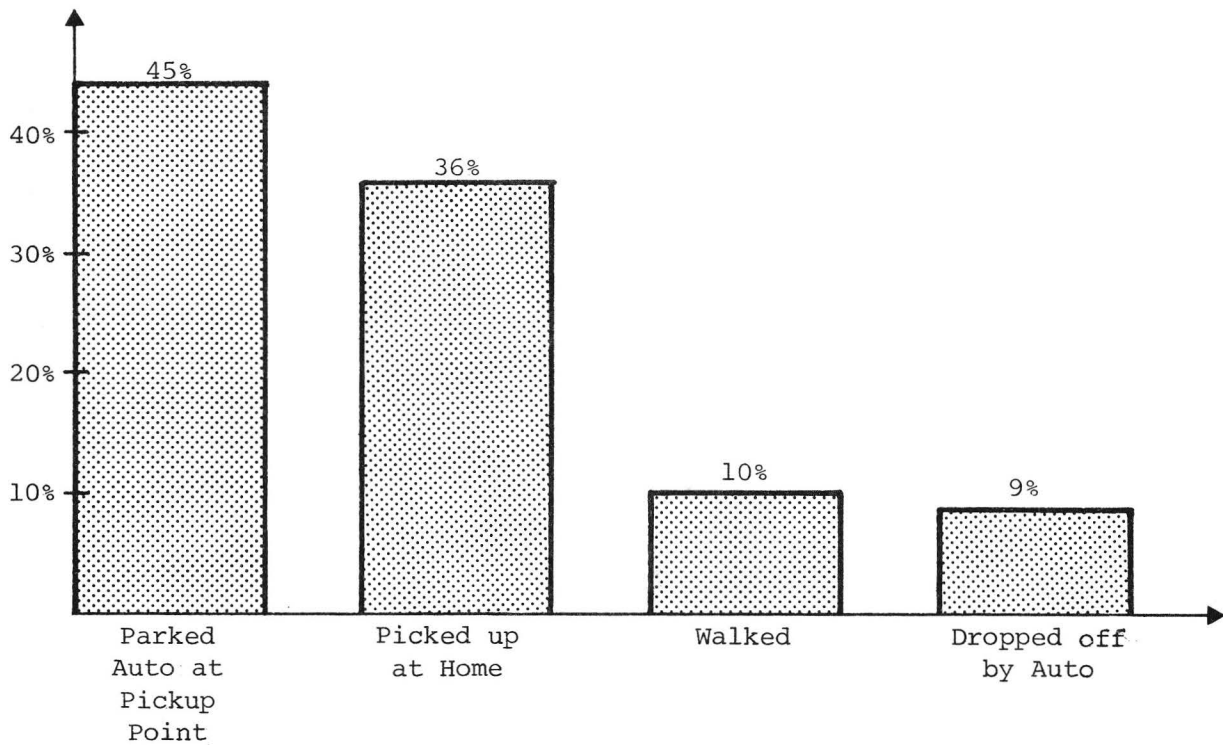


FIGURE 6-7. ACCESS MODE OF KCP VANPOOLERS (UT PERIOD ONLY)

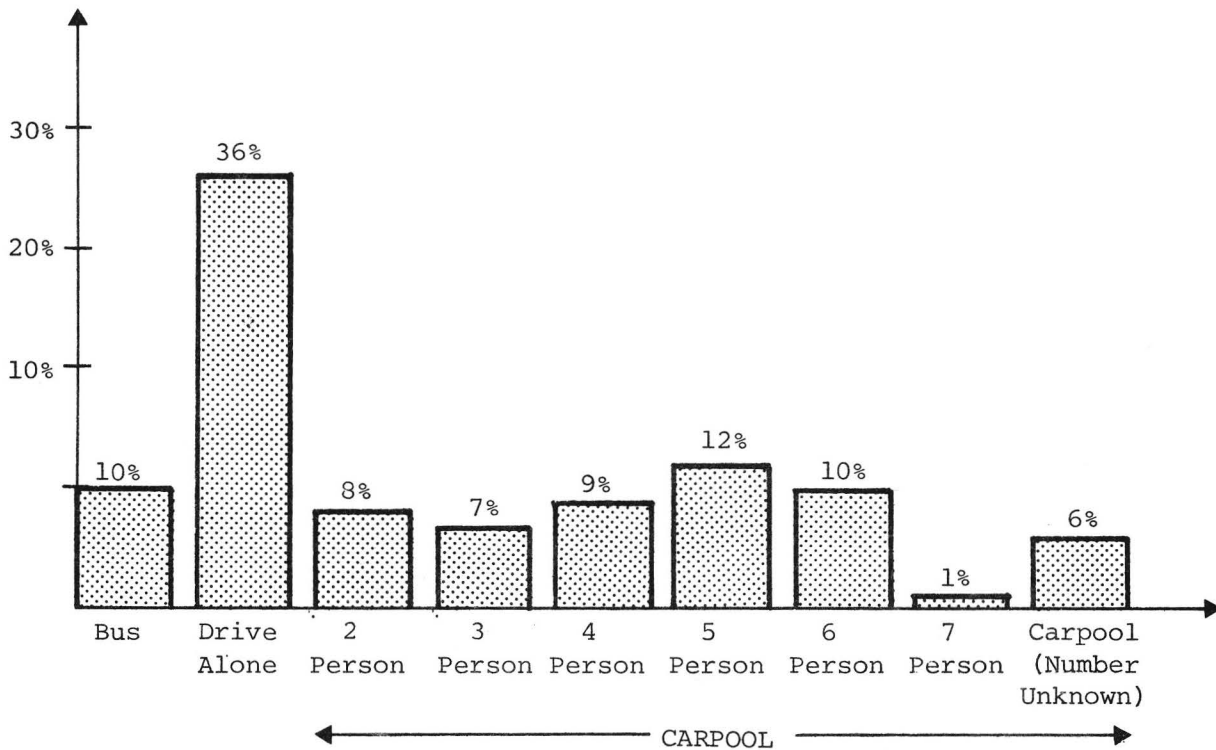


FIGURE 6-8. FORMER MODE OF KCP VANPOOLERS (UT PERIOD ONLY)

number did not rise. Although there may well have been additional growth in the number of private vanpools not specifically known to KCP, there is no data to indicate that such growth was widespread. In terms of the overall goals of the seed van program, the lack of real growth among private vanpoolers (at least as of the end of the demonstration period) represented a clear disappointment.

There are a number of possible explanations for this situation:

- 1) KCP's seed van lease rates were artificially low compared to the true cost of private operation because:
 - KCP vehicles were purchased in quantity at a relatively low price.
 - The grant funding for the vehicles precluded any financing charge and therefore no such charge was included in the lease rate (or rider's fare); however, private operators benefited from the lower insurance rates established by the ISO. These two factors virtually cancelled each other out.
 - KCP rates may not have reflected the true cost of maintenance.
 - Those leasing KCP vans did not pay for backup van use.

Consequently if a private individual tried to match KCP's "fair share" rider fares, he/she would have been less likely to be profitable. If actually perceived, these costing differences may have kept demand for KCP vehicles high at the expense of private fleet growth. Also the absence of financial liability in a KCP lease (as compared to that experienced by a van purchaser) is quite likely to have had a significant effect on the development of the private fleet. Given the continual turnover among van operators, an individual may very well have chosen to wait his turn for a KCP van rather than commit to purchasing his own vehicle.

- 2) While KCP had been very effective in eliminating or overcoming the institutional barriers to its own seed vanpool program by mid-1976, it was still working hard in 1978 to ease the way for private owners. The problems which continued to face private entrepreneurs were primarily financing and

insurance; these were eventually resolved, but the results of the efforts may not be observed for some time to come.

- 3) It is possible that, except at a few employment sites, there simply was insufficient vanpooling demand (given the existing economics and employment densities) to support a greater number of vanpools.¹
- 4) KCP's promotion of private vanpool ownership was relatively limited, especially before its own fleet was "fully" leased.

6.4.3 Seed Van Sales and the Knox Area Vanpoolers Association

Figure 6-9 indicates the success which KCP had in selling its seed van fleet to existing operators. Between December 1977 and December 1978, all the vans were sold, at sales prices which averaged \$3,983 per vehicle.

However, apparently reflecting the lack of growth in non-seed vanpools since late 1976, KAVA membership during the demonstration was limited to the six "private" vanpools known to KCP and to all seed van purchasers (who were required to join).

6.5 IMPACTS ON COMMUTERS

It is clear from the surveys of the areawide commuting population and of matchlist recipients that by the end of the demonstration KCP's commuter-oriented activities had not had a great impact on such travel aspects as mode choice, automobile ownership, etc. It is difficult (based on the small samples used in many of the surveys and the fact that not all geographic areas were sampled) to state these impacts exactly, but the most favorable survey² results indicated that 5.9%±1.1% of match-

¹ Note that while TVA's vanpooling program was highly successful, the program was significantly subsidized, yielding "fares" about 1/3 lower than KCP's for similar mileage.

² KCP's telephone survey of downtown employees in 1978. The other surveys of matchlist recipients indicated 3.4%±1.7% (Survey K1) and 2.3%±1.9% (Survey K2) at the 90% confidence level. See Appendix B for details on all surveys.

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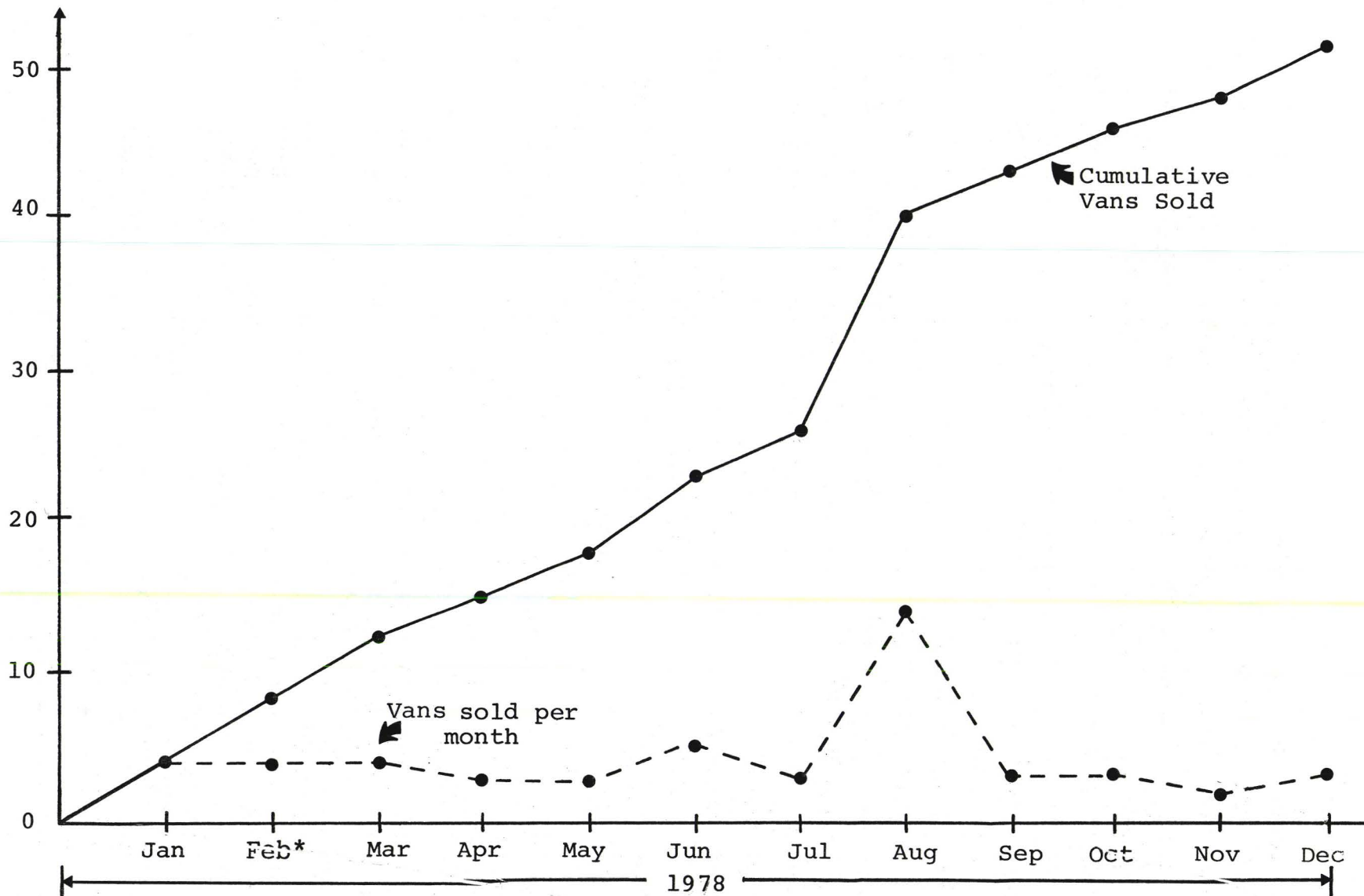


FIGURE 6-9. HISTORY OF KCP VAN SALES

*Vans sold includes one van "sold" to an insurance company following an accident in January 1978.

list recipients had shifted modes as a result of KCP activities; this would extrapolate to approximately 1% of that area's employment. One would also expect some impact among those who had not received matchlists; however, the areawide commuter survey performed at the end of the evaluation period,¹ identified only 0.8%±0.7% of the population as having shifted to ridesharing or having changed their ridesharing arrangements as a result of KCP's activities.²

Of those identified by the surveys as having been influenced, fewer than half were diverted to ridesharing from driving a single occupant auto, and survey data indicated that half of these had shifted back to driving alone by the time they were surveyed. Consequently, the lasting impact of the demonstration on such community problems as traffic congestion was virtually nil.

However, the foundation of the brokerage approach is its attention to individual (rather than aggregate) needs. From the perspective of many individuals aided by KCP, its impact was substantial:

- 1) Perhaps as many as 1000 commuters were introduced to vanpooling--a previously little used (and, as practiced, illegal) mode. About 109 of these people, the vanpool driver/operators, became private transportation providers.
- 2) Several people who were formerly the only users of a Continental Trailways bus route connecting east Knoxville with Oak Ridge were saved both time and money by KCP. They had been paying a weekly fare of \$11.00 for their worktrip and had been forced to put up with extremely long headways and circuitous routing. KCP placed some into an operating vanpool and the remainder into a carpool, substantially reducing their travel cost and simultaneously providing them with more responsive service. (Continental Trailways also benefited by being allowed to drop the route, at a significant cost savings.)

¹ Survey G2.

² At the 90% confidence level.

- 3) When Knoxville Transit decided to eliminate two express bus runs serving the Levi Strauss Company's plant in Powell for lack of ridership, the firm turned to KCP for help with displaced riders. In response, KCP helped form one vanpool and three carpools to carry all of these commuters.
- 4) More than 2000 people seeking transportation assistance from KCP over the telephone were sent either matchlists or other requested information, or referred to an appropriate carrier, etc.

Thus, while KCP's overall impact on areawide commuting was apparently quite small, it provided important services for a limited number of people. Perhaps more importantly, however, the broker's existence and activities provided an opportunity to experiment with the kinds of concepts and procedures which might prove increasingly valuable in an era of higher energy costs and uncertain fuel supplies. Whether or not these benefits outweigh the effort's costs (discussed in Chapter 8) is clearly a matter of policy.

7. CASE STUDIES OF BROKERED SERVICES FOR SOCIAL SERVICE AGENCIES

7.1 INTRODUCTION

The development of KCP's basic approach to the problem of social service agency transportation was the subject of Section 4.5. This chapter presents case studies which detail the interactions between KCP and each of the social service agencies with which it worked to develop new transportation services or arrangements during the course of the demonstration.

The chapter presents:

- three cases in which service was implemented (two of which were still underway at the end of the demonstration)
- three cases in which KCP designed a service which was never implemented by the client agency

7.2 KNOXVILLE EARLY CHILDHOOD DEVELOPMENT CENTER (KECDC)

KECDC is a private, non-profit day-care center established in January 1976 to operate a full-time educational program for infants and toddlers. In 1977, it served fifty-five children from Knoxville and Knox County, twenty-seven of whom were from low income families and were therefore eligible for Title XX funds,¹ which cover the provision of transportation. Since many of the eligible children were from families without automobiles, the Center decided to apply for federal funds to purchase its own van and implement a pick-up and delivery service for the eligible children. However, since the processing of the grant and the purchase and delivery of the van were expected to take several months, TVA (a sponsor of the Center) offered to "sell" them a van for \$1, with the understanding that the van would be sold back to TVA for the same sum six months later; under the terms of the agreement, KECDC was also required to pay

¹ Under the Social Security Act.

the interest on the note used to purchase the van, which amounted to \$350 per quarter. The agency provided its own driver and was responsible for maintaining the vehicle.

Since the agency had not secured its own van by the end of the initial six-month agreement, TVA extended the arrangement for another six months. During this time, the agency applied to the City of Knoxville for Community Development Funds to purchase its vehicle. Although this request was quickly approved, it was clear that the van could not be obtained soon enough to preclude a cessation of service. At this point the agency contacted KCP, which responded by auditing the Center's costs and concluding that its total cost of providing transportation (including the payments to TVA, gasoline, maintenance, insurance and drivers' wages) was approximately \$7890 per year (or about 63¢ per mile), far in excess of its annual budget for this purpose of \$6930. The audit also indicated that agency personnel (particularly the director) were devoting significant time to the provision of transportation services, rather than their professional duties, and that the level of service being provided (in terms of on-time performance and the inability to contact the vehicle enroute--since it was not radio equipped) was inferior to the alternative of contract service.

To make this alternative financially feasible, the Director of DPTS suggested that the Community Development Office subsidize KECDC's transportation costs for four years at \$1500 per year in lieu of purchasing the agency's own van. The money would be used to help the agency buy improved service at a lower price from a private provider "brokered" by KCP. This approach was agreed to by all parties, and TVA agreed to extend its agreement with KECDC to preclude any interruption in service.

KCP's eventual approach to "brokering" a service arrangement between KECDC and Loy Bus Lines (the only respondent to the city's request for competitive bids) was somewhat unusual. Instead of simply arranging a contract between the two parties, KCP chose to bind itself contractually to each. Thus in June, 1977, KCP contracted to provide to KECDC the subscription

service for a maximum of fifteen children at 55¢/mile of productive travel; there was no charge for deadhead mileage. At the same time, KCP contracted with Loy Bus Lines to provide the service using one of its fifteen-passenger vans at 45¢/mile (including deadhead mileage). The 10¢/mile differential was intended to cover KCP's administrative costs plus the cost of deadheading. This dual-contract approach was used because KCP anticipated eventually working with a large number of social service agencies and this approach would allow Loy (or other providers) to deal with only one customer (KCP), thereby minimizing the time required by providers to deal with administrative problems related to the contract(s).¹

Service was implemented in July 1977. The arrangements provided KECDC with a cost savings of approximately \$1000 per year and spared the agency from worrying about maintaining the vehicle or providing a back-up vehicle or driver in case of emergencies or breakdowns. Furthermore, Loy's service was provided by trained, experienced drivers, which offered the promise of a higher level of safety. At the end of the demonstration, the service was still being provided under the original contract and very few problems had arisen. KECDC was quite satisfied with both the transportation service and the contractual arrangement.

7.3 ARNSTEIN JEWISH COMMUNITY CENTER (AJCC)

AJCC is a community center offering activities (including crafts, swimming, music, games) to approximately 250 people, most of whom are youth or senior citizens. Although the Center's membership is fairly affluent, over 80% are transit dependent; yet prior to contacting KCP, the Center had only provided transportation service on an ad hoc basis for special

¹ Loy Bus Lines contends, however, that this arrangement was not significantly easier than working directly with the agencies.

activities. For these events, a van and driver were typically obtained from Loy Bus Lines for the greater of \$19 per day or 45¢ per mile. This service was considered too expensive for regular use, so members relied on the voluntary assistance of family, friends and/or AJCC staff. The Center was dissatisfied with this situation because:

- 1) The senior citizens were uncomfortable with dependence on others. They wanted transportation they could pay for, thus avoiding any "obligations."
- 2) It was difficult to get volunteers during periods of inclement weather; when they were available, the clients were concerned about safety.
- 3) Volunteers were generally not properly insured.

AJCC therefore decided to look for an alternative means of transporting clients, and turned to KCP for help. KCP began its audit of the Center's transportation needs in April 1976. Basically, AJCC desired off-peak, demand-responsive service capable of transporting five to fifteen passengers between their homes and the Center. Although the Center's activities were scheduled on a regular (weekly) basis, members did not always attend the same program each week, and sometimes changed their minds about attending at the last minute. It was therefore necessary that the service be very flexible and able to respond quickly to changes. As in the KECDC case, KCP utilized the city's competitive bidding procedure to locate an interested provider and again Loy was the only respondent.

When it became clear that the same bus company would supply transportation to both KECDC and AJCC, KCP examined the possibility of utilizing the same vehicle for both agencies. Since KECDC required peak-period subscription service and AJCC needed off-peak demand-responsive service, KCP hoped that by using one vehicle for both services, that vehicle would approach 100% utilization (thereby making the "package" more attractive to the service provider, resulting in lower costs to the agencies). However, this approach was not particularly attractive to Loy because he had four vans which he used interchangeably; there

was no extra benefit to earmarking one van solely for KECDC and AJCC. Consequently the idea was discarded.

Transportation for AJCC's senior citizen group was implemented in July 1977, a year-and-a-half after discussions had first begun. This delay apparently was due to difficulties in coordinating communication among the four parties involved (i.e., KCP, AJCC, KECDC and Loy.) As with KECDC, KCP contracted with both AJCC and Loy Bus Lines. Under the terms of the contract AJCC agreed to pay KCP 55¢/productive mile plus \$10.20/trip for deadhead mileage. KCP contracted to pay Loy Bus Lines 45¢/mile (regardless of whether deadhead or productive). The \$0.10 per mile differential was again intended to cover administrative costs and help pay for deadhead mileage costs.

Unlike the KECDC experience, however, difficulties soon arose due to a long chain of communication regarding the specific transportation needs each week and deadhead mileage as explained below:

- communication - A representative of AJCC would telephone an order to KCP, who would then forward it to Loy Bus Lines. Frequently, when Loy's driver(s) appeared at the first stop listed, he would find that the information concerning names and addresses was inaccurate or incomplete. It is unclear where the information flow was breaking down, but it is apparent (in retrospect) that a need existed for written requests for service. While this would likely have caused slight delays, it would have greatly facilitated the accurate processing of information.
- deadhead mileage - According to Loy Bus Lines, the average trip for AJCC entailed forty-eight deadhead miles and twenty productive miles. (The deadhead mileage arose primarily from the distance between Loy's terminal and the West Knoxville area where most AJCC members resided. This distance of about twelve miles was traversed four times for most trips.¹) While AJCC paid KCP \$10.20 for dead-

¹ The van had to travel once in each direction to pick up members and deliver them to the Center, and then once in each direction to return them to their homes. Leaving the vans in West Knoxville during the Center's activity would have been more expensive because additional driver hours would have been required (while the driver waited at the Center).

heading plus 55¢/mile for productive miles, yielding an average of about \$21 in revenue per trip, KCP was forced to pay Loy 45¢ for each mile, resulting in an average cost of \$31/ trip. Thus KCP lost approximately \$10 every time AJCC utilized Loy Bus Lines.

As a result of these problems, in December 1977 (approximately six months after service began), KCP exercised its option of canceling the Transportation Services Agreement. Since that time, there has been no contact between KCP and the AJCC senior citizen group.

7.4 YOUNG MEN'S CHRISTIAN ASSOCIATION (YMCA)

The downtown YMCA is a community center offering a variety of activities to its 2000 members. In addition to providing exercise facilities for adults, it operates an after-school day-care program for approximately twenty elementary school children. Each weekday, the organization picks up the children at their elementary schools and transports them to the YMCA.

The YMCA owns a single fifteen-passenger van, which was initially available five days a week to transport the children to the after-school program. However, in 1977, the vehicle was diverted to another purpose one day each week, leaving the after-school program without transportation on that day. The group's director first contacted Loy Bus Lines, which was already providing another YMCA program with a bus at a cost of \$25 per day. Loy quoted about \$23 per day for a van for the after-school program,¹ but this was beyond the group's budget.

The director then contacted KCP (in November 1977), apparently in the belief that the broker could supply the YMCA with one of its commuter vans. By then, however, KCP had already decided to serve social service agencies through the use of outside contractors. In previous arrangements (i.e., KECDC and AJCC), KCP had contracted with both the agency and the

¹ Since the group's needs were minimal (about twelve productive and six deadhead miles per day), the quote was based on a minimum daily charge rather than on actual mileage.

supplier, retaining a 10¢ per mile differential for its own administrative costs. However, in this case it was apparent that even without the differential, the YMCA's per mile cost would be excessive. Therefore, KCP advised the YMCA's director to negotiate directly with Loy Bus Lines, but it also advised him that Loy was offering service to KCP at a minimum of only \$18 per day. The YMCA subsequently contracted with Loy at the \$18 rate; the service was still in effect at the end of the demonstration and the Association was very pleased with the arrangement.

7.5 YOUNG WOMEN'S CHRISTIAN ASSOCIATION (YWCA)

The Phyllis Wheatley suburban branch of the YWCA is a community center providing activity space for a variety of community groups and after-school day-care service for approximately ten children. In a program similar to the YMCA's, children are picked up at their elementary schools and delivered to the YWCA for activities. Staff members were using their private cars to transport the children, which was considered unsatisfactory because the drivers were not properly insured for carrying groups.

Early in 1977 the YWCA began to look for alternatives. After several months of unsuccessful efforts, the director called KCP.¹ At first she was simply informed of Loy Bus Line's service and mileage charge. However, when she called back later to arrange service, it became apparent that because the desired daily mileage was relatively low, the per mile charge she had been quoted was inapplicable; i.e., the YWCA would be held to Loy's \$18/day minimum. Since this exceeded the agency's transportation budget, the director sought another alternative. She eventually found a church able to transport five of the children for 75¢ each per trip and a private

¹ She had found the name in the phone book when first seeking alternatives, but had not called initially, believing KCP to be involved in commuter services only.

"chauffering" company, the Bassetts, willing to carry the remaining five (also at 75¢/child).

7.6 TATE SCHOOL OF DISCOVERY

Tate's is a private school offering classes for three-year-olds to fourth-graders. It is located on two campuses (east and west of Knoxville) and serves about 250 students, generally residing in the West Knoxville, Maryville, and Kingston areas. Parents have always carpooled their children to school on a strictly voluntary basis, but since the parents felt inconvenienced by this arrangement (and stated a willingness to pay for transportation), the Tates approached KCP in the fall of 1977 to try to arrange a subscription service.

KCP designed a questionnaire (for distribution to parents) to determine the specific transportation needs of the students. After reviewing the responses, KCP designed a limited stop bus service for the western residents and a door-to-door van service for those living in the east. KCP reasoned that the western area contained too many children to utilize a single van and that door-to-door service would have greatly exceeded the Tate's estimate of how much the parents were willing to spend.¹ KCP therefore proposed a system utilizing centralized bus stops for the pick-up and delivery of children living on the western area.

For students living in the eastern locations, KCP proposed a door-to-door van service. Vans were considered feasible in this case because a relatively small number of students were involved, and a service provider (Loy) was located fairly close by. In addition, KCP expected that this service would mate well with the service provided to KECDC, enabling the same vehicle to be used to supply service to both without having to return to

¹ In addition there were no van-operating suppliers who could economically serve the western residents. Specifically, Loy was located too far away to keep deadhead mileage within reason.

the terminal. This would have significantly lowered deadheading costs. KCP also proposed an alternative service arrangement utilizing buses for both the east and west populations.

Tate's School presented these proposals to the parents, but none was accepted. The bus services were considered inadequate because they still required the parents to transport the children to and from the central stops; the van service was rejected on the basis of cost. Consequently, no service was ever implemented for Tate's School, and the parents are continuing to transport their children themselves.

7.7 KNOXVILLE AREA COMPREHENSIVE REHABILITATION CONSORTIUM (KACRC)

Late in the demonstration, the KACRC, which consists of four member agencies, submitted an application to the Tennessee Department of Transportation for a \$42,960 capital grant for the purchase of six vans. At KACRC's request, KCP undertook a study of the agencies involved to determine the best means of coordinating the vans' use. The study recommended that the three agencies located in Knox County use KCP as a broker and service coordinator.¹ Under the proposed plan, KCP would have arranged to lease the agencies' vehicles to a private contractor who would in turn have operated the service. KCP would also have monitored the contractor's performance. However, by the end of the demonstration, no action had been taken by KACRC.

¹ The report recommended that the fourth agency, which was located in Anderson County, use the ETDD's RIDE program as its broker/coordinator.

8. BROKERAGE ECONOMICS

8.1 INTRODUCTION

While real estate and security brokers typically finance their operations by charging a fee to either the buyer, the seller, or both, the transportation broker (at least to date) has generally not attempted this.¹ However, there is no intrinsic reason why an effective transportation broker could not charge for its services. The broker can provide the traveler with a cost savings and/or increased mobility; the service provider can benefit from additional business. Hence, the broker's services can be valuable enough to both parties to merit a fee. However, in KCP's case, as a public entity with public goals, supported primarily by a federal demonstration grant, charging for its services was thought to be simultaneously inappropriate and counterproductive (since charges would probably reduce the broker's market penetration). In essence, therefore, the net cost of many of KCP's operations amounted to a subsidization of those modes which were promoted. For example, the cost of promoting, surveying, and matching car-poolers and vanpoolers should be considered in this light.

As a pioneering demonstration project in a unique setting, KCP's actual experiences may not be typical of future public brokerages. However, an analysis of the costs KCP incurred over the thirty-two months of the evaluation period provides some insight into the structure and magnitude of brokerage costs in general. This is particularly true for KCP's twelve months in the city government; the majority of its efforts during that period were basically operational in nature and the costs of its developmental activities are reasonably separable.

¹ The differential mileage pricing scheme KCP applied to contract services for social service agencies is a notable exception.

The discussion of brokerage costs presented in this chapter is divided into two parts. The first deals with the cost of brokerage activities by function disaggregated into two time periods, reflecting operation by UT and the city, respectively. The second looks solely at the economics of the seed vanpool leasing program; this is instructive because: 1) third party vanpool operation by a public entity was an innovative activity, and 2) private operation of a vanpool leasing program was (and is) a possible alternative approach which can best be compared if these costs are clearly separated from other brokerage functions.

8.2 BROKERAGE COSTS

Since the Knoxville Commuter Pool engaged in a wide variety of activities over the course of the demonstration, any analysis of the economics and cost effectiveness of the broker's operations should be performed on a functional (rather than aggregate) basis. In this section, wherever such cost allocations were both possible and meaningful, they have been applied. Unfortunately, however desirable functional costing may be, such assignments cannot escape being somewhat arbitrary, due to the inherent overlap of activities in brokerage operation. As a prime example, since matchlist surveying and processing contribute to the formation of both carpools and vanpools, and there is no reasonable way to segregate out a "vanpool portion" of such costs, one must take care in interpreting "the cost of vanpool operations." In this case, it relates to the cost of adding vanpooling to an ongoing areawide carpool matching program; i.e., basic surveying and matching costs are not included, and thus the cost is relatively small.

An important consideration in analyzing the transferability of KCP's costs is that since its operations were performed as part of an innovative federal demonstration, certain costs it experienced may not otherwise have occurred or have to be repeated by others. These include such start-up activities as the negotiation of a 13(c) agreement, the elimination of

restrictive state regulatory controls, the development of major new software, and special reporting and evaluation activities (in excess of demonstration management needs) required for the SMD and UT evaluations. An accurate assessment of the actual costs of operation would require removing these special costs from overall expenditures. Furthermore, one should recognize that KCP's experimentation with a variety of approaches and procedures could largely be avoided by future brokers who would have the benefit of KCP's experiences to build upon.

KCP's non-demonstration specific costs can be categorized into several functions, as indicated below:

- employee surveying
- matchlist processing
- social service agency needs and supplier identification
- institutional activities
- promotional activities
- vanpool program operation
- social service contract service provision

The first three items listed above related directly to KCP's role of matching supply and demand. Institutional and promotional activities were directly supportive of the matching functions and facilitated their acceptance and operation. The last two items related to the actual provision of transportation services and, to some extent, relied on KCP's matching and support functions. However, KCP chose to consider these two functions as separate "businesses" for cost accounting purposes; consequently they form a potentially useful body of data on possible third party costs for performing these activities.

Brokerage funding came from a wide variety of sources. Although the Service and Methods Demonstration grant was the major source of support, KCP also utilized:

- 1) CETA personnel paid for by federal and local funds
- 2) support from non-KCP staff within DPTS
- 3) a computer time-sharing system in Massachusetts made available through an account billed directly to UMTA's Office of Technology Development
- 4) the state computer system in Nashville
- 5) free physical space and utilities in Knoxville's City Hall

Table 8-1 indicates the actual and/or estimated funds contributed by these sources. Since the purpose of this section is to detail and examine the costs of brokerage operation (rather than simply the expenditure of SMD funding), it is important that all revenue sources be included, regardless of source.

Table 8-2 indicates the aggregate costs of the broker's major functional activities. Although KCP did not generally assign its administrative costs (which totalled approximately 23% of net expenditures) to specific operating functions, this table reflects an allocation of administrative expenses over all categories on the basis of their normalized operating cost percentages (i.e., after excluding "administration" and direct computer costs). This provides a reasonable picture of the overall costs associated with any subset of the functions.

In actuality, each cost had two basic components: start-up and on-going. Start-up costs included such activities as the development of internal operating procedures and the hiring and training of personnel. On-going costs reflected day-to-day operations after the initial "fixed" start-up costs had been absorbed. It is extremely difficult to draw a line between these two basic components, particularly on a functional basis. However the transition of brokerage operations to the city in July 1977 provides a useful (if perhaps imperfect) divider. The great majority of the start-up costs (e.g., initial software development, UT evaluation activities, development of procedures, training of personnel, etc.) were incurred in the twenty months before the transition. While some additional

TABLE 8-1. KCP OPERATING REVENUE SOURCES

(October 1976 through June 1978)

UMTA SMD Grant ¹	\$997,959
CETA Personnel	18,944
DPTS Support	13,202
UMTA Computer Account (estimate)	25,000
Tennessee Computer System	
State Office of Energy (estimate)	4,000
Tennessee DOT	<u>6,296</u>
	\$1,065,401
Amount Remaining in "Operating" Funds on June 30, 1978 ²	<u>327,317</u>
TOTAL REVENUE EXPENDED DURING EVALUATION PERIOD	\$738,084

¹ 31% of the SMD grant was initially utilized for the purchase of vans. However, this capital revenue became operating revenue as both the depreciation fund and revenue from the sale of vans were used for operations.

² Includes the value of the remaining van fleet (approximately \$1,000,600).

TABLE 8-2. KCP COSTS BY FUNCTION
(October, 1975 through June, 1978)

Function	Brokerage Expenses	Allocated Administration Expenses	Direct Expenses	Gross Expenses	Gross Revenues	Net: Expenses
Surveying & Phone Inquiry ¹	\$59,307	\$22,542	—	\$81,515	—	\$81,515
Matchlist Processing	61,507	22,542	\$10,296	88,049	—	88,049
SSA Activity ²	18,987	6,351	6,128	31,466	\$7,425	24,041
PR/Promotion ¹	110,475	38,543	—	149,018	—	149,018
Institutional ¹ Activity	62,914	21,092	—	84,006	—	84,006
Seed Van Operations ³	60,466	—	279,726	340,192	282,059	58,133
Software Development	47,219	16,890	25,000	89,109	—	89,109
Evaluation ¹	117,902	40,015	—	157,917	—	157,917
TOTAL	\$538,777	\$167,641	\$321,150	\$1,027,568	\$289,484	\$738,084

¹ Direct expenses are not segregated from labor for this function.

² Social Service Agency.

³ The \$60,466 listed for this function includes all administration and overhead costs attributable to the vanpool operation; KCP specifically segregated vanpool administration, etc. from general administration (which has been allocated over all other categories, as shown in the third column).

"one-time" costs were absorbed during the City period (primarily microcomputer software development and evaluation reporting and surveying), these items are identifiable. Thus the City period can be viewed as a relatively good "model" for estimating the continuing operational costs of similar brokerage activities in other locales.

The remainder of this section addresses each brokerage function, examining the expenditures and operating revenues associated with each and the cost per individual processed (where possible and meaningful). In analyzing this data, it is important to note that many of the broker's functions were characterized by relatively large, discrete costs of implementation; as a result, the average cost per individual processed may differ markedly from the marginal costs of processing additional people. For example, the costs of surveying and matching a worksite will be relatively high per individual if the response is light, but much lower if the response is heavy, since the costs do not rise linearly with the number of surveys collected. Whenever response rates are low, the overcapacity which typically results is reflected in high average costs. Thus while the cost per individual processed may be an interesting measure of KCP's effectiveness in various functions, it may be very misleading as an indicator of total cost for other brokerage implementations.

8.2.1 Rideshare Surveying and Matching

Statistics relating to KCP's costs of rideshare surveying and matching are detailed in Table 8-3. Over the life of the project, the cost per employee surveyed and matched averaged \$7.68. However, the rise in cost between the UT and City periods was extremely high--the cost per individual more than doubled from one period to the other; one might have expected a drop during the City period since start-up costs would have already been absorbed.

However, differences in the employee groups approached and surveyed during these two periods probably account for most of the cost differential. During the UT period all large employers

TABLE 8-3. KCP COSTS OF RIDESHARE SURVEYING AND MATCHING

	UT Period	City Period	Evaluation Period Total
Cost of Contacting & Surveying	\$49,493	\$32,022	\$81,515
Number of Employers Contacted (average employment)	520 (116)	350 (30)	870 (82)
Number of Employers Participating (% of those contacted)	324 (62)	133 (38)	457 (53)
Cost/Participating Employer	\$153	\$241	\$178
Number of Employees Surveyed/(Matchlists Distributed) ¹	19,703	3,206	22,909
Cost/Employee Surveyed	\$2.51	\$9.99	\$3.56
Cost of Matchlist Processing	\$77,969	\$16,376	\$94,345
Cost/Matchlist Distributed	\$3.96	\$5.11	\$4.12
Total Cost/Employee Surveyed and Matched	\$6.47	\$15.10	\$7.68

¹ Including call-ins; UT period call-ins were estimated by simply doubling the number from the last half of the period (the number of call-ins during the first half was not retained by KCP).

in the area were contacted; during the City period, a great deal of surveying effort was directed at the CBD, where most employers were small and where surveying among many of the most receptive employers had already taken place. In fact, the majority of the surveying funds expended in the City period were used for resurveying, which identified only newly interested employees plus those whose situation had changed. During this latter period, KCP representatives spent less money per employer contacted, but considerably more per employer surveyed. Note that the cost per employee surveyed actually quadrupled between periods.

An obvious implication of the wide range of costs (and response rates) which KCP experienced over the course of its surveying and matching program is that it is difficult to predict with any confidence the cost of conducting such an operation. While concentration on employers is apparently a cost-effective approach, Table 6-1 indicated that even among this group participation rates varied widely. More research aimed at identifying attributes which characterize participating employers might help future surveying efforts concentrate their resources on the most promising candidates.

8.2.2 Identifying Social Service Agency Transportation Needs

The nature of the broker's efforts directed at social service agency transportation problems was very different during the UT and City periods. In the initial twenty months, KCP concentrated on surveying as many agencies as possible to identify their needs; during the City period the effort was directed entirely toward arranging for, implementing, and administering service at a limited number of agencies. It is therefore reasonable to attribute the UT and City period costs to start-up and on-going operation, respectively.

Table 8-4 illustrates these costs in detail. During the UT period \$24,745 was spent on the program's design, implementation of the post card survey and follow-up interviews of Greater

TABLE 8-4. SOCIAL SERVICE AGENCY COSTS AND REVENUE
(October 1975 through June 1978)

	UT Period	City Period	Evaluation Period
Cost of KCP Operation & Administration	\$24,745	\$593	\$25,338
<hr/>			
Contract Services			
Costs	—	\$6,128	\$6,128
Revenues	—	-(7,425)	7,425
Net Cost	—	-(1,297)	1,297
<hr/>			
Total Cost (Revenue)	\$24,745	(\$704)	\$24,041

Knoxville agencies, the organization of the Volunteer Insurance Program membership, and related activities. During the City period, contract services produced a net profit of \$1,297; this more than offset allocated administrative costs to yield a net profit of \$704 for the period.

8.2.3 Promotional Activity

Promotional activity was one of the major categories of expense for the brokerage, comprising approximately 20% of costs overall and 30% of costs exclusive of (demonstration-related) software development and evaluation. The \$149,018 spent on this function supported many activities, including:

- radio and television public service announcements
- paid radio advertising
- brochures
- posters
- display of vans

Roughly 85% of the expenditures occurred during the UT period and much of that was concentrated between March and December 1976. A survey in April 1977¹ (the last administered to the

¹ The fourth administration of Survey G1; see Appendix B.

general public during the demonstration) indicated that 35% of those aware of KCP had first learned about it from television; another 31% mentioned their place of employment. Newspapers, radio, friends, and KCP vans accounted for 9%, 7%, 8%, and 9%, respectively.

A survey of core area commuters at the end of the evaluation period indicated that about 73% or 142,000 were aware of KCP.¹ This implies an average cost of about \$1.05 per commuter reached directly or indirectly by the broker's promotional efforts.

8.2.4 Institutional Activity

About 97% of the \$84,006 expended on institutional activities was spent during the UT period when KCP was forced to concentrate considerable effort on legislative changes needed to deregulate vanpooling and on obtaining reasonably priced vanpool insurance. KCP's activities in these areas were path-breaking; thus, it is unlikely that such large expenditures would be required to implement similar projects elsewhere. On the other hand, the laws in many states still restrict vanpooling and other innovative services; and, therefore, institutional barriers should be carefully assessed before making judgments about the costs and/or feasibility of implementing new services in other locales.

8.2.5 Seed Van Operations

Administration of vanpool operations cost KCP \$60,466 over the course of the evaluation period,² or about \$63 per operating van per month. Operating expenses (including both fixed and variable costs, but not administration) totaled \$205,246; revenues were \$207,579, resulting in an overall

1 Survey G2.

2 This was specifically accounted for by KCP. It does not represent an allocation of overall administrative expense.

profit of \$2,333 before administrative expenses. However, this resulted from a profit of \$7,807 during the UT period and a loss of \$5,474 during the City period; the chief difference between the periods was the rapid rise in maintenance costs as the fleet aged. More detailed statistics on the cost and operation of the program are contained in Section 8.3.

8.2.6 Software Development

Expenditures for software development totaled \$89,109 over the course of the evaluation period, with 55% of this spent during the UT period. Direct expenses (primarily computer time charges) totaled \$25,000 (or 28% of expenditures), mostly to cover development and testing of software for the microcomputer system.

8.2.7 Evaluation and Research Activities

A total of \$157,917 (approximately 21% of overall expenditures) was directed at evaluation and research activities. About 93% of these funds were utilized at the University of Tennessee for a wide range of studies, much of which is documented in Davis (16) and Wegmann (78). The remaining funds were expended by the grantee for project management and in support of this SMD evaluation.

8.3 SEED VAN OPERATIONS

This section details the cost of the seed vanpool program and the utilization of the fleet.

8.3.1 Cost of Operations

Table 8-5 presents a disaggregation of vanpool program costs by time period and cost category. Administrative expenses primarily covered the cost of the two full-time staff members who were committed to the program; one was responsible almost exclusively for maintenance-related tasks while the other

TABLE 8-5. NET COSTS OF VANPOOL OPERATION

	UT Period 1/76-6/76	City Period 7/77-6/78	Evaluation Period 1/76-6/78
ADMINISTRATION	\$38,094	\$22,372	\$60,466
FIXED COSTS			
Insurance	30,596	22,897	53,493
Depreciation Reserve	52,519	48,646	101,165
Licensing & Registration	1,179	851	2,030
TOTAL	\$84,294	\$72,394	\$156,688
VARIABLE COSTS ¹			
Fuel for Back-up Fleet	2,852	2,152	5,004
Maintenance	6,727	35,432	42,159
Miscellaneous	595	800	1,395
TOTAL	\$10,174	\$38,384	\$48,558
TOTAL NON-ADMINISTRATIVE COST	\$94,468	\$110,778	\$205,246
TOTAL REVENUE	\$102,275	\$105,304	\$207,579
PROFIT (LOSS)	\$7,807	(\$5,474)	\$2,333
PROFIT (LOSS): Including Administrative Costs	(\$30,287)	(\$27,846)	(\$58,133)
VAN-MONTHS OF OPERATION	497	462	959
TOTAL COST/VAN MONTH			
Excluding Administration	\$190	\$240	\$214
Including Administration	\$267	\$288	\$277

¹ Although the cost of fuel was included in KCP's lease structure, an allowance was also provided, based on commuting mileage and the average cost of fuel (6¢ per mile). Thus, in actuality, KCP did not pay for nor receive revenue for the cost of fuel used by operating vans.

handled all other aspects of the operation (e.g., record keeping, interaction with drivers, assisting in vanpool formation).

The indicated operating profit of \$2,333 does not reflect the cost of administration, which essentially amounted to a subsidization of seed vanpoolers by government. If one were to allocate these costs over the total of 959 van-months of operation which occurred during the evaluation period, it would amount to \$63 per operating van per month. If this cost were passed along to operators (and thereby to riders), it would result in a 22% increase in fares for the average trip.

In examining the cost of operation and the loss of "profitability" as the demonstration progressed, the major factor was clearly the rising cost of van maintenance. During the UT period, much of KCP's fleet was still under warranty, and maintenance averaged only \$14 per month per operating van. However, during the City period, as the fleet aged and more and more vans came out of warranty service, costs rose dramatically. Figure 8-1, which indicates maintenance cost per quarter¹ per van over the entire demonstration, demonstrates this rapid rise; although the cost per van per month averaged \$77 during the City period, it escalated sharply over these twelve months, reaching close to twice that figure by June, 1978. While some of the rise reflected substantial expenditures required to repair seed vehicles prior to their sale² (which may have pushed delayable expenditures into earlier periods), it is clear that maintenance costs near the end of the demonstration were higher than the \$54 average per van per

1 To smooth out month-to-month variability.

2 Particularly, the extraordinary amounts during the final six months of the demonstration.

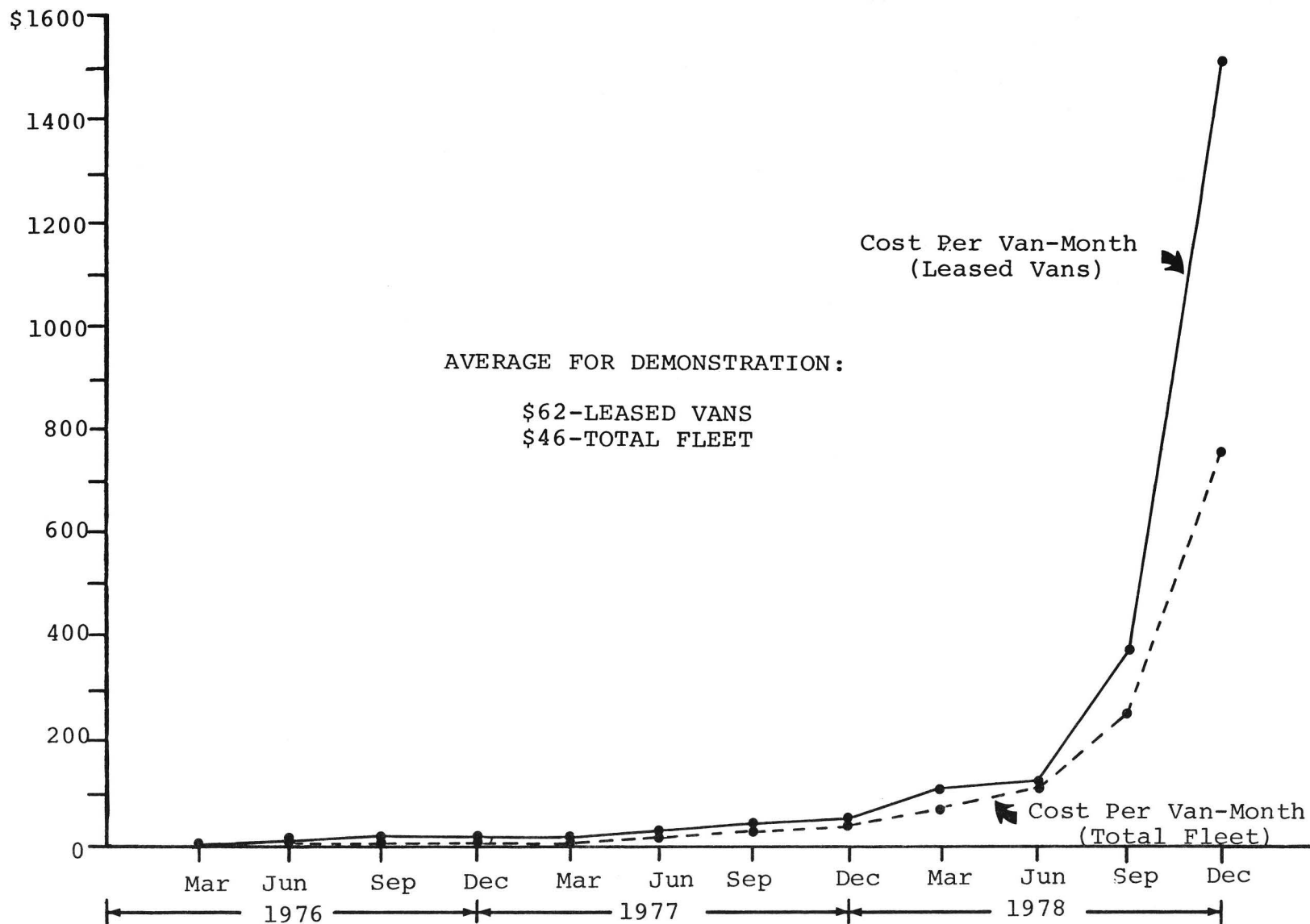


FIGURE 8-1. MAINTENANCE COST PER VAN-MONTH AVERAGED OVER QUARTER

month embodied in the lease costing format (see Figure 4-8).¹ The result is that fares were in fact too low to cover the full cost of maintenance as the fleet aged. Unfortunately, one cannot tell how high these fares should really have been, since they should have been designed to cover average maintenance costs over the assumed four-year life of the vehicles, and it is unclear whether costs would have stabilized, continued to rise, or even decreased in later years. However, if one assumes that City period maintenance costs were representative of the three years following warranty expiration, the average maintenance cost would have been 3.7¢/mile instead of the 3.3¢/mile embodied in KCP's final fare schedule.²

The rise in maintenance costs was the primary reason for increases in both operating and total costs per van-mile over the course of the evaluation period.³ Operating cost per vehicle-mile rose 49% from \$0.074 to \$0.110 for the UT and City periods, respectively; total cost per van-mile rose from \$0.190 to \$0.205.

8.3.2 Vehicle Utilization

As with costs, there were noticeable differences between the UT and City periods with respect to vehicle utilization. For example, although part of the rise in maintenance costs between periods was attributable to the termination of warranty service, it apparently also reflected a higher incidence of mechanical problems as the fleet aged. This is demonstrated by the sharp rise in the number of days of use lost to maintenance per 10,000 miles. During the UT period, this figure was only

1 The costing format was designed to accrue a maintenance reserve account in the early years of each vehicle's life which would be drawn upon as the van aged and costs rose.

2 The original schedule was based on a 2.3¢/mile accrual.

3 Costs stated here exclude administrative expenses but include the gasoline allowance KCP provided for driver/operators.

3.7, but it climbed 173% to 10.1 during the City period. Since the average round-trip mileage during the City period was sixty-six per day, this implies that the average vehicle was out of service 1.4 days each month during the City period. This would represent quite an inconvenience to poolers, were it not for the availability of KCP's backup vehicles;¹ however, a private operator would be forced to pay for backup use (or resort to carpools with an attendant loss of revenue and goodwill), and this cost was not reflected in KCP's fare schedule.

Average round-trip commuting distances rose from fifty-six miles per day in the UT period to sixty-six under city management. One possible hypothesis for this 18% rise is that, over time, vans with the longest commutes tend to be most stable and that the short distance pools may therefore have had a higher failure rate. There is insufficient data available to either confirm or disprove this theory.

Personal use of leased vans tended to be relatively constant over the course of the demonstration, averaging twelve percent of total miles in the UT period and ten percent thereafter.

Occupancy per van (including drivers) rose slightly during the demonstration, from 10.0 during the UT period to 11.0 for the City period, yielding a change in average load factor from 0.81 to 0.89.² This indicates a measurable improvement by KCP in filling its vans. However, perhaps the most important significance of the occupancy figures lies in their implications for the profitability of privately owned vanpools. The increased cost of maintenance and the revenue lost from vehicle downtime imply that instead of KCP's "eight paying passenger" requirement for breakeven operation, the

1 KCP found that three to four vans were needed to back up its forty-seven to forty-eight leased vehicle fleet.

2 Average capacity was 12.3 seats per van.

figure for private operation was actually between nine and ten paying passengers, depending on distance.¹ Thus, if private operators duplicated the occupancy figures observed by KCP during the City period, approximately 25% would have lost money, 22% would have broken even, and 53% would have been profitable.

¹ The increased cost of interest for private vanpoolers just about equals the reduced cost of insurance; therefore, these two factors have been excluded from the discussion.

9. IMPACTS OF AND ATTITUDES TOWARD BROKERAGE OPERATIONS

9.1 INTRODUCTION

The Knoxville Commuter Pool's primary impacts were clearly on those commuters whom it surveyed and in some cases induced to rideshare; these were discussed in detail in Chapters 5 and 6. However, by its very nature, a transportation brokerage has effects on, and is affected by, a variety of other institutions and actors. The purpose of this chapter is to address KCP's interactions with various groups (specifically local employers, social service agencies, service providers, other governmental entities, mass transit labor, the general public, and other locales). The focus of the chapter is not on procedural relationships,¹ but rather on the impacts KCP had on each group and/or the attitudes of that group toward KCP and its operations. In many cases these attitudes and impacts are crucial aspects of the broker's success or failure, since the level of coordination which true transportation brokerage implies requires the cooperation of (and perceived benefits to) many of these institutions.

9.2 EMPLOYERS

KCP's primary access to commuters was through their employers. Sections 4.4.2, 5.3.1, and 6.2 described the process of surveying commuters at their worksites, KCP's aggregate (numerical) success in obtaining employer participation in this process, and the commuter response to the process in terms of survey completions, respectively. This section addresses employer attitudes towards ridesharing and KCP, their level of participation in the program, and the impacts of the program on them.

¹ Wherever pertinent these aspects have already been discussed.

The data upon which this section is based was compiled from KCP records and from interviews conducted by the evaluation contractor. A total of seven employers was selected in an attempt to yield a representative (albeit small) sample, ranging from those with a high degree of participation to those who rejected KCP's efforts. Six of the seven were participants; together they accounted for 43% of the commuters listed in KCP's master file.

9.2.1 Factors Affecting Employer Participation

From KCP's perspective, employer participation in its program was clearly a necessity. However, from the employer's viewpoint, the case for participation was not so compelling. As Womack(80) points out, most employer costs of participation are internal, while the benefits are external. Therefore KCP attempted to "sell" employers on the idea of participation not only as an aid for employees and as a good deed for the community, but as a potential benefit for them as well. Specifically, ridesharing was promoted as a means of reducing tardiness, absenteeism, and the cost of supplying parking. Recent research(21) suggests that employer interest in establishing an extensive rideshare program is most often directly related to the employer's perception of parking problems, and the interviews in Knoxville indicated that parking problems and/or costs were a significant factor in at least some employers' participation with KCP. Three of the four companies interviewed which had parking problems were the most active in supporting the ridesharing program.

In addition to parking, several other concerns emerged from the interviews as key factors in employer participation. One company had recently relocated and many of its employees still resided near the old plant; another believed that a lack of adequate transportation was causing several employees to quit each week. Ridesharing promotion (through participation with KCP) was viewed by these employers as a good means of addressing both of these difficulties. Several of the firms also believed

that participation in the program was critical to the company's image, both among employees and the general public. This was considered so important by one company that it decided to participate despite a belief that no impact on travel behavior would result.

While all of the interviewed employers were impressed by KCP's presentations and stated a positive view of ridesharing in general and KCP's program to increase it, several questioned its value to their workforce, and these were the least interested in participating. The major factors cited for low expectations were 1) variable or unusual work schedules, 2) the absence of specific transportation problems (such as a parking shortage), and 3) perceived saturation of the commuter ridesharing market.¹ Although some of the interviewed employers chose not to participate because they expected negligible impact, none expressed concern that KCP's program might prove harmful. For example, none raised the possibility of increased liability under workman's compensation (i.e., that employer-sponsored travel arrangements might be viewed as part of the workday, resulting in higher insurance premiums for the employer). None expressed concern over the possibility of ridesharing benefits becoming an issue in collective bargaining.² Finally, no one voiced the opinion that an extensive ridesharing program would reduce company flexibility in scheduling overtime; instead they expected that those employees who regularly worked overtime would be unlikely to join a pool.

9.2.2 Factors Affecting the Level of Employer Participation

Among employers who chose to participate in KCP's survey process, the level of participation varied greatly from somewhat

1 Saturation could have resulted from participation in a company-sponsored program, the effects of the 1974 UT ride-sharing program, or unaided carpooling among interested commuters.

2 Employers generally saw program participation as a positive step in labor-management relations.

passive to highly active. The minimum response was to post KCP's promotional material and make the survey forms available to interested commuters. At the opposite extreme, some employers administered the rideshare surveys on company time and subsequently acted as a "broker" for their employees; this role (which was carried out without on-going assistance from KCP) included such activities as updating the master file records whenever an employee's situation changed, and manually generating new matchlists when requested.

Although it was not evident from the limited set of interviews conducted, KCP staff members firmly believe that the level of employer participation was very closely correlated with each employer's initial attitudes toward ridesharing and the anticipated effects of the program. Since KCP's records suggest that an employer's level of participation had a marked effect on its survey completion rate, this may have been a self-fulfilling prophecy; the employers who did not expect a large employee response did not actively promote the program and consequently did not get a good response. (Of course, a high survey response rate did not ensure a commensurate impact on commuting patterns.)

Although KCP attempted to convince employers of their value, ridesharing incentives were not generally implemented by participating companies. Of those interviewed, one offered preferential parking for its four vanpools; a second had designated a special parking area for carpools as part of an earlier rideshare matching effort, but found that without policing, the area was used by non-carpoolers and thus rendered ineffective. An opinion expressed by several of those interviewed was that financial incentives were unlikely to significantly increase ridesharing, and thus the company would simply be making payments to those who would rideshare anyway, with no benefit to the employer.

9.2.3 Impacts on Employers

Impacts on employers fall into two categories:

- 1) those attributable to the act of participation
- 2) those resulting from employee mode shifts

An employer's decision to participate in the program incurred some cost. This included the staff time associated with promotion, with interaction with KCP, with distribution and collection of surveys and with matchlist distribution. Furthermore there was the possible cost of productive time lost among employees who filled out surveys, discussed ridesharing, etc. during working hours. Obviously the exact amount of time varied widely among participants. The interviews indicated that the more active companies invested from one-to-two person days in implementing the program. Continuing participation required very little additional effort.

While this evaluation has determined that KCP-induced mode shifts among employees were generally minimal, employer perceptions of the success rate varied. One of the companies interviewed estimated that 15% of its 1700 employees had switched to ridesharing modes, resulting in significantly reduced parking requirements, absenteeism and tardiness. However, another company, which was an extremely active participant, felt that because a large percentage of its workforce was already ridesharing, KCP's impact on mode choice was minor; however KCP was viewed by this employer as a very useful "facilitator" of ridesharing arrangements--helping those desiring to pool to do so quickly and easily.

9.3 SOCIAL SERVICE AGENCIES

From the outset of the demonstration, Knoxville area social service agencies were expected to be important clients of KCP; by the end of the evaluation period, transportation service had been implemented (or modified) at three agencies. Several others had had extensive contact with KCP, but no new or modified service had resulted. Section 4.5 described the process by which KCP approached agency transportation problems and

several case studies were presented in Chapter 7. This section discusses KCP's impact on local agencies, and the agencies' attitudes toward both the brokerage operation and the services implemented (where relevant).¹

There are many ways in which KCP's program could potentially have impacted social service agencies. When KCP first conducted interviews with agencies in 1976 (as described in Section 4.5), it became apparent that many agencies lacked the vehicles and/or drivers needed to meet their clients' transportation needs, especially if the needs occurred during peak travel hours. Frequently agencies did not have the financial capability to purchase and/or maintain vehicles, and staff personnel were not properly insured to drive their own vehicles for this purpose. In addition, when staff did provide transportation it detracted from their primary responsibilities. When agencies relied on volunteer drivers, family, and/or friends of clients, they often found service unreliable, and the clients themselves did not generally feel comfortable accepting "favors."

KCP's program for social service agencies had the potential to address many of these problems. However, the extent of KCP's impact varied greatly at the three affected agencies, primarily reflecting significant differences in the nature of their needs.

At KECDC, the implemented service addressed several specific problem areas. Of most importance was the agency's cost savings of approximately \$1000 per year, which enabled it to reallocate funds. A second major impact was the elimination of maintenance problems, which had proven a burden with their TVA maxi-wagon. Previously, when the maxiwagon broke down, agency personnel were forced to use their personal cars to transport the children, resulting in both a poor utilization of staff time and a significant insurance risk. If KECDC's regular driver was unavailable, the agency had to spend valuable time locating a replacement.

¹ The information presented here was obtained through personal interviews with representatives of each of the social service agencies involved.

Under the new service arrangement, if the regular van broke down, Loy Bus Lines simply provided service with an alternate van; if the regular driver was unable to work, Loy would provide an alternate driver. Consequently, KECDC believes it benefited significantly from the new service and is very satisfied with the assistance it received from KCP.

Arrangements with the Arnstein Jewish Community Center (AJCC) led to a less satisfactory conclusion. The Center's primary transportation problem was a reliance on volunteer drivers to transport members between the Center and their homes, which was considered unsatisfactory for several reasons. Since members could not be certain that a volunteer driver would be available, they were either unable to commit themselves to a weekly activity program or found themselves frequently missing sessions (because no driver was available). In addition, many of the members felt uncomfortable about the volunteer drivers because they disliked accepting favors. Finally, the volunteer drivers incurred a significant risk by driving with inadequate insurance.¹ The positive impacts of the service implemented through KCP were that Center members were able to pay for their own transportation (eliminating any reliance on and risk to family and friends). However, the primary issue--reliability--was not effectively solved by the new service. In fact, AJCC considered the new service to be less reliable than their use of volunteers, primarily due to problems in communicating requests for service. As a result of this and other problems,² service was terminated, precluding any lasting impact.

The third and final agency to have transportation service implemented through KCP during the demonstration was the downtown YMCA, which was seeking a van-type vehicle to pick up and deliver children one afternoon each week. Although KCP did not

¹ AJCC was unaware of the VIS program discussed in Section 4.5.

² Primarily deadheading costs.

directly arrange service for the YMCA, it did provide the Association with information which resulted in the establishment of service at a cost of \$8 per day less than the same service provider had earlier quoted. Most importantly, the service would have been economically infeasible at the originally quoted price.

All of the agencies with which KCP had contact (including those for which no transportation service was provided) acknowledged the need for a transportation expert to assist them in serving their clients, and believed that the concept of a central broker for social service agency transportation was useful. While some were disappointed that KCP had been unable to fulfill their particular needs, there was general agreement about the value of KCP's approach and the potential for benefits both to the agencies and their clients.

In summary, KCP's impacts on social service agencies in Knoxville were quite limited due to the small number of agencies involved. Market penetration was minimized by the lack of staff to pursue this function (i.e., to interact with agencies and to try to foster new suppliers) and by the extended period apparently required to arrange and implement a new service. (Agencies sometimes deliberated for several months before responding to KCP's suggestions.) Although in absolute terms the impact was minor, KCP's efforts demonstrated the feasibility of the broker's role in this area.

9.4 COMMON CARRIERS

As a transportation broker seeking to identify new markets for mass transportation and to promote new transportation supply, KCP was expected to have significant interactions with and impacts on common carriers. In fact, one of the eventual benefits of the program was expected to be its help in controlling the rise in the city's transit deficit through increased ridership and the substitution of services where appropriate.

As demonstration plans were more clearly defined and the substitution concept became a sharp political issue, the oppor-

tunities for major interaction between KCP and Knoxville Transit dwindled. However the city's decision to propose a new Service and Fare Demonstration Program, aimed at the downtown and strongly involving KT, was a major factor in this reduction in activity. Some of the ideas envisioned in the original brokerage program, as well as several new ones, were deliberately shifted to the new demonstration.¹ One of these, the KASH free fare zone, was implemented in 1977. However, by and large, there was little substantive interaction with or impact on KT as a result of the brokerage project.

The new ordinance developed by DPTS to improve Knoxville's taxicab services apparently had significant impacts on this industry. While the stiffer inspection standards drove some marginal operators out of business, the increase in maximum allowable fares attracted new companies and the total number is currently about the same as before the law's implementation. The upgrading of equipment required to meet the standard apparently reduced operating costs, as did the introduction of shared riding as a management tool. Over the course of the demonstration, total ridership rose 20% to 6000 passengers per day and goods movement and contract services prospered. Consequently, the industry has been considerably strengthened since the ordinance was introduced.

KCP's major interaction with a common carrier resulted from its decision to contract for social service agency transportation. In each case the lone bidder, Loy Bus Lines, located about eight miles northwest of downtown Knoxville, was awarded the contract. Loy's principal business was the operation of twelve subscription school bus routes carrying about 800 children daily and the provision of charter services (which averaged about 800 passenger trips per week). The company's fleet consisted of twenty full-sized buses and four fifteen-passenger maxivans.

¹ See Section 4.1.2 for details of the original project scope.

By the start of the demonstration, Loy had already provided service to the YMCA and AJCC. However, both agencies came to KCP for assistance because Loy's rates were too high; as a result of KCP's involvement, new service arrangements (at reduced charges) were implemented. The KCP-designed service for KECDC represented a totally new client for Loy. All three services were highly profitable ventures. Revenues per week averaged about \$200, \$60, and \$19 from KECDC, AJCC, and the YMCA, respectively, while costs ran approximately half these amounts.¹ No expansion of Loy's vehicle fleet was required for any of the new services. Loy claims that KCP's program did not have a significant impact on its operations, but is anxious to provide additional contract service if demand is identified.

One last common carrier affected by KCP's commuter services was Continental Trailways, which used KCP's ability to place its riders into car and/or vanpools in its successful request to the Public Service Commission to drop a very unprofitable route serving Oak Ridge. (See Section 6.5.) This saved the company approximately \$35,000 annually.

9.5 GOVERNMENTAL ORGANIZATIONS

9.5.1 City of Knoxville

From the outset, a major objective of the brokerage was the efficient provision of transportation services; i.e., matching the right modes to the public's needs. To the City of Knoxville the ultimate manifestation of that principal would be controlling the transit deficit by:

- 1) replacing expensive fixed route services with less costly and more effective paratransit services such as taxi (or other) feeders, vanpools, carpools, jitneys, etc. in areas where the demand for service is insufficient to support conventional service

¹ In the case of the YMCA, where the minimum charge was applied, profits were even higher.

- 2) attracting ridership to routes which are relatively viable through improved and expanded services and the use of promotional techniques

Evaluation results indicate that progress in these areas over the first thirty-two months of the demonstration was exceedingly difficult to achieve. Public reaction (at least among the vocal segment of the population) to every proposed modification of an existing transit route (regardless of how low its utilization) was so strongly negative that none of the specific route changes were implemented. In the face of these political problems, little progress toward controlling the rapidly rising transit deficit through route restructuring was possible. Furthermore, KCP's efforts to divert solo drivers to transit had minimal success. The only notable relief of the deficit problem came from fare increases imposed on an essentially captive market.

While it is apparent that KCP did not substantially contribute to the city's attempts to control the transit deficit, it must be recognized that this was a very difficult goal to achieve, especially over such a short period of time. This is particularly true since much of KCP's effort was not directed at CBD-destined trips, which constitute the majority of KT tripmaking. The new downtown program focuses directly on the problems of the Knoxville CBD and its transportation services. Clearly any evaluation of the impact of the brokerage on the fight to control the rise in transit deficits should await the results of that demonstration.

9.5.2 Knoxville Transit Authority

Although there was little direct involvement by KCP in transit operations, there was significant political interaction between the brokerage and KTA (culminating after the end of the evaluation period in the expansion of the Authority's powers to include all forms of public transportation). These events are detailed in Sections 3.3.1 and 4.2.2.

9.5.3 Public Service Commission (PSC)

Although some members of the Public Service Commission strongly opposed KCP's efforts at institutional reform during the state legislative sessions of 1976 and 1977, there was little other interaction between the two groups. Over the course of the demonstration PSC did not receive any complaints against KCP seed vanpools from common carriers, as it had suspected might happen. Furthermore, although the 1976 legislation which essentially deregulated vanpools from PSC control had provided for the establishment of specific insurance limits for this mode, the Commission failed to act on this issue before complete deregulation occurred the following year.

9.5.4 Metropolitan Planning Commission (MPC)

As the local comprehensive planning agency for Knoxville at the start of the demonstration, and later as the staff support for the Metropolitan Planning Organization (MPO) created by the Governor in May 1977, the MPC had significant day to day interaction with KCP (and DPTS). Communication between the two organizations was good throughout the demonstration, and joint efforts were apparently well integrated.

9.6 MASS TRANSPORTATION LABOR

It is apparent that, by the end of the demonstration period, mass transportation labor had not been materially impacted by the broker's activities. Modal diversion to (or from) mass transit had certainly not proven significant enough to affect the number of union jobs.

Part of the lack of impact was by design, since the city's seed van fleet was precluded from competing directly with bus operations as a result of the 13(c) agreement. While it is documented that no KCP seed vanpool operated with both its origin and destination within city limits, union members have expressed the belief that some vans traveling within the city did compete by carrying some passengers on only a portion of

their trip (i.e., the intra-CBD portion). However no one claimed that more than a handful of such instances occurred and thus the union never sought 13(c) protections over the issue. The more likely potential source of competition was from carpooling and non-seed vanpooling assisted by KCP. However union officials (correctly) believed that no significant diversion to these modes from transit occurred.

On the positive side, the maintenance of seed vans (as specified in the 13(c) agreements) brought some additional work to union membership, and the "telephone marketing" approach initiated in mid-1978 appears to have been more effective than simple matchlist distribution at inducing commuters into riding the bus. Finally, the implementation of the KASH zone increased intra-CBD ridership significantly and the eventual impact of this element and the remainder of the downtown program may prove beneficial to labor.

However, the attitude of union members toward KCP seems primarily to have reflected fears about what the brokerage might eventually do, rather than what it had already done. The city's strong stand on the transit deficit (and thereby on wage rates) in 1977 at the same time that it was promoting potentially competing ridesharing modes through KCP and proposing to reorganize KTA led to strong suspicions (and highly charged emotions) about the administration's eventual objectives concerning pooling and transit. To compound the problem, some union members (as well as many among the general public) did not realize that the SMD grant which supported the brokerage demonstration could not be used instead to expand or maintain conventional bus services threatened by the policy of deficit limitation. Thus the brokerage was viewed by some as an alternative, rather than complementary, approach to public transportation provision, and therefore detrimental to labor's interests.

9.7 IMPACTS ON AND ATTITUDES OF THE GENERAL PUBLIC

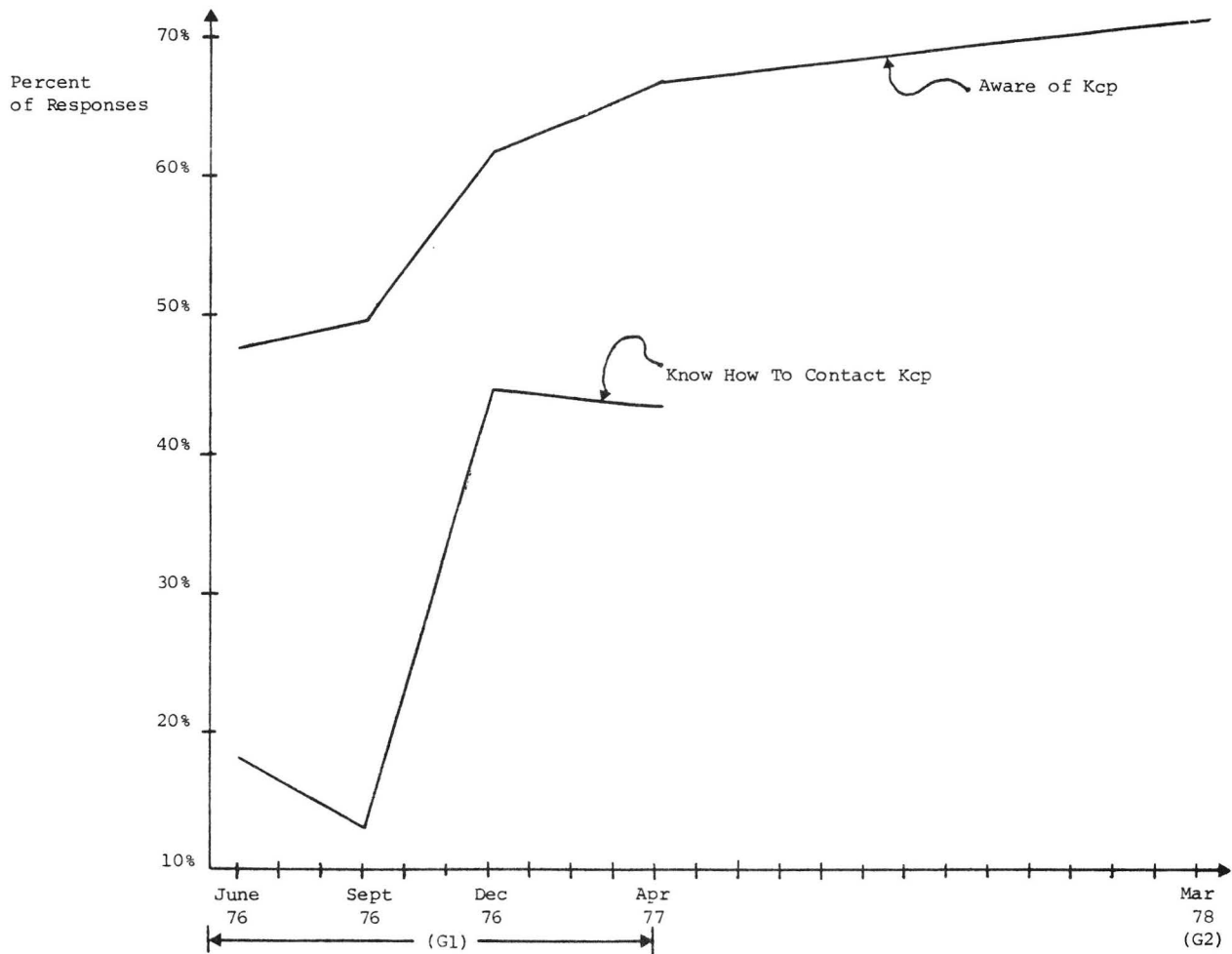
As indicated in Chapter 6, the direct impacts of the demonstration on the general public (i.e., non-users) were minimal. Clearly, the small reduction in the number of automobiles using Knoxville area streets and highways as a result of the demonstration could hardly have effected changes in congestion perceptible to the typical commuter.

In spite of this, however, the public's awareness of KCP was reasonably high. Figure 9-1 indicates the rise over time in the percentage of the public stating they had heard of the organization.¹ The sharp rise between September and December, 1976 is apparently a reflection of the effectiveness of the public service television advertising conducted during the period. (However, the apparent rise between April 1977 and March 1978 may reflect the change in sample population and/or any actual increase in awareness.) By March 1978 more than 70% of commuters to KCP's primary service area had heard of the brokerage. Figure 9-1 also indicates the percentage of respondents who stated that they knew how to contact KCP; note that this more discriminating indicator of awareness also rose sharply between September and December 1976.

In view of the emotional political debates which engulfed DPTS over proposed fixed-route service reductions and the (unfounded) accusations that money which might have gone to keep buses in service was supporting KCP instead, one might have expected some public backlash against KCP. General population surveys conducted before and immediately after the transit strike indicated that only between 1 and 2% of the respondents felt that KCP should not be continued. (See Figure 9-2.) In the single survey administered after the political issues had been well aired,² the possible responses to the question were

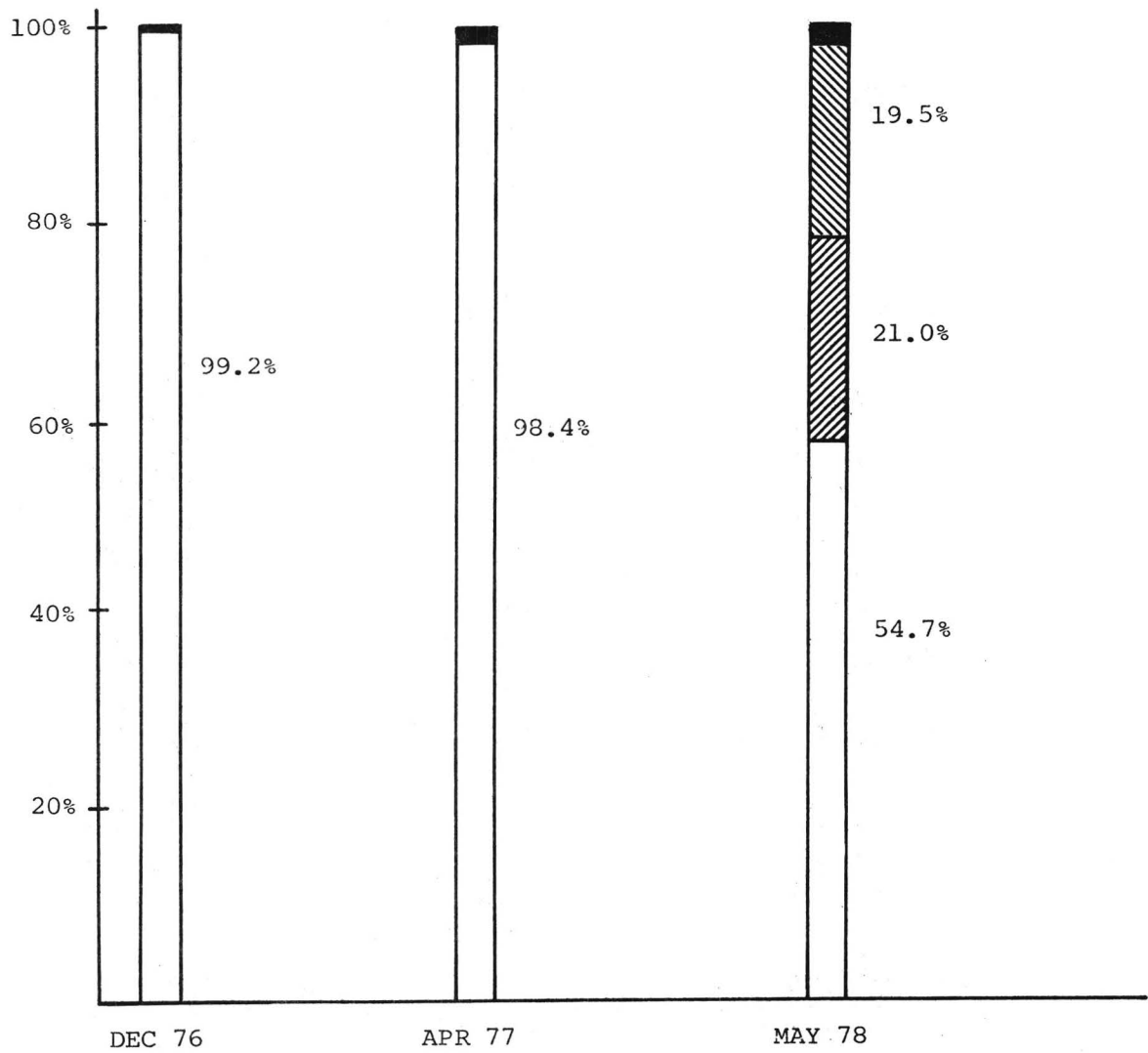
¹ From Surveys G1 and G2, Appendix B.

² Survey G2, which included only commuters, in contrast to the previous surveys.



NOTE: The G1 population was limited to residents of Knoxville, Maryville, Manardville and Oak Ridge and may include some non-commuters.
 The G2 sample was of commuters living in ETDD and working in Anderson, Blount, Knox or Union counties or Oak Ridge.

FIGURE 9-1. PERCENT OF POPULATION AWARE OF KCP AND KNOWING HOW TO CONTACT IT



- Yes
- No
- For others only
- Not sure

FIGURE 9-2. SURVEY RESPONSES TO
"SHOULD KCP BE CONTINUED?"

broadened, and approximately the same percentage (2.1%) opposed continuation; however 19.5% indicated they were "not sure." It is impossible to determine from these results whether any support had actually eroded. An interesting aspect of the support for continuation was that more than one in four favoring continuation felt that KCP should be retained for the benefit of others, rather than themselves.

A further measure of public support is whether or not individuals would be willing to pay for the services KCP provided. A May 1978 survey of commuters indicated that about one quarter of the respondents would have been willing to pay a fee for these services;¹ the most frequently mentioned amount (at 25.4%) was \$5.00, but less than 12% were willing to pay more than this. The average value was \$3.95.

9.8 OTHER LOCALES

As the first implementation of an areawide transportation brokerage, the Knoxville demonstration attracted considerable attention from, and had considerable impact on, other locales. These impacts fell into two basic categories: information dissemination and institutional changes.

Over the first thirty-two months of operation, KCP received inquiries and/or visits from representatives of more than eighty organizations, about half of which were governmental; the remainder came from the academic, corporate and consulting communities. Although about a quarter of the organizations were primarily interested in vanpooling, the large majority was concerned with the brokerage concept and its range of ridesharing alternatives. Over the course of the demonstration, KCP leaders also spoke on the subjects of brokerage and vanpooling at many conferences around the country, including one they sponsored in Knoxville in April 1976. Dr. Frank Davis, who managed the project for the University of Tennessee, testified on vanpooling

¹ Again Survey G2.

before the Transportation and Government Operations Committee of the U.S. House of Representatives.

While it is difficult to quantify how much influence KCP's operation and information dissemination had on the implementation of vanpooling and/or brokerage operations in other areas, Knoxville staff met or talked extensively with representatives of most of the nation's related programs, including those of: Norfolk, VA;¹ Hampton, VA; Golden Gate, CA;¹ Seattle, WA; Offutt Air Force Base, NE; Lansing, MI; United Auto Workers, NJ; Chamber of Commerce in Louisville, KY; Jackson, MS; Albuquerque, NM; Minneapolis, MN;¹ and Chicago Transit Authority, IL.¹ Consequently, these and future programs will have had the benefit of KCP's experience in vanpool marketing, third party leasing programs, private vanpooling promotions and related activities.

In a more tangible way, KCP's institutional activities greatly influenced the availability and cost of ridesharing options in Tennessee and throughout the nation. The residents of Tennessee have benefited from changes in insurance laws, regulations affecting certification and flexibility of public carriers, the availability of financing and abort insurance for vanpool operators, and the complete deregulation (by the PSC) of pooling activities involving fifteen or fewer commuters.

On the national front, vanpooling operations and their clients throughout the country have reaped the benefits of KCP's successful efforts to obtain a specific ISO rating classification scheme for vanpools, which resulted not only in a lowering of rates in many locales, but a significant increase in the availability of such insurance. These changes, which were by-products of KCP's efforts to achieve its own objectives, will hopefully make the implementation in other locales of operations similar to KCP's considerably easier to achieve.

¹ The indicated programs are other Service and Methods demonstrations with which KCP had particularly close and continuing contact.

A final area of note is KCP's role as a joint designer of and a testbed for UMTA's microcomputer system for ridesharing matching and related activities. This system, when perfected, will offer other programs around the country a low-cost, self-contained, and easy to implement means of providing ridesharing information to large numbers of commuters.

10. ASSESSMENT AND CONCLUSIONS REGARDING KCP'S ACTIVITIES

10.1 INTRODUCTION

As the first implementation of the transportation brokerage concept on a metropolitan basis, the Knoxville demonstration has provided a wealth of information for prospective brokerage operators. Over its thirty-eight months of operation it was a test bed for a variety of approaches to specific brokerage functions and helped to identify which of these appear to hold promise and which apparently do not. This chapter is intended to summarize major conclusions about the effectiveness of KCP's organization and activities, and to examine the implications of these findings for future brokerages.

10.2 DEMONSTRATION SCOPE AND STAFFING

By any standard, the original scope of this demonstration was extraordinarily ambitious. Implementation of the brokerage required significant organizational coordination, staff selection and training, institutional/regulatory research and action, development of operating procedures and software, promotion, and a host of other activities. All this was originally to be accomplished and tested in only twenty months. It was not long before the infeasibility of the original scope (within the time and monetary constraints of the demonstration) became apparent to project leadership and some paring of activities was begun (e.g., dropping the idea of coordinating goods movement with other brokered services). However, for a number of reasons, the effects of the ambitious original scope were to last throughout the demonstration.

The infeasibility of the demonstration's scope was manifested in two interrelated ways: 1) there was insufficient time to adequately plan, organize, and implement each function or activity, and 2) there was a persistent shortage of staff (most notably during the City period). For example, in the first three months of the project, KCP attempted to break down the institutional barriers to vanpooling, purchase its fleet,

obtain insurance, survey a significant number of employees, match the employees, and get vanpools out on the road; at the same time, other staff members were addressing social service agency transportation needs, the conventional transit system, etc. Although the magnitudes of the challenges decreased in later months (as major problems were overcome and more was learned about how to approach the brokerage's functions), this constant pressure to perform quickly took its toll. Staff members and project emphasis shifted from one activity to the next as priorities changed, resulting in some functions being accomplished only at some expense to others.

The most apparent example of this problem was the early emphasis on vanpooling. Project leaders recognized that this was an important aspect of the demonstration plagued by several unanticipated barriers to implementation; they responded by pouring much of their energy into solving the problems (quite successfully), but the efforts became so one-sided, at least in many people's minds, that the project was identified as a "vanpooling demonstration," and KCP's credibility as an equal supporter of all ridesharing modes was harmed.

There were many other examples of the impact of understaffing on operations, but the most significant were probably in the area of matchlist processing and employee resurveying. Computer problems plagued the project from its early months, precluding the timely delivery of matchlists. Since all of KCP's data processing and software development was the responsibility of a single individual, there was a constant conflict between meeting the short term demands of matchlist processing and addressing these same problems on a long term basis through software and system development; the obvious result was relatively consistent delays in both tasks. There is little question that a doubling of staff for this function would have been productive, at least until the role reached the point of on-going production processing with well debugged software.

Similarly, the resurveying of employment sites was intended to be an on-going process, covering the entire service area once

every twelve to fifteen months. However, this proved infeasible, primarily due to staffing constraints.¹ Aside from the resurveyed CBD, area worksites were virtually all surveyed in 1976, and very few of them were involved in comprehensive updating.² Consequently, data for some individuals was almost three years old by the end of the demonstration. Without periodic updating, the effectiveness of the matching process is continuously reduced; therefore, resurveying/updating of some kind is absolutely essential to continued operations. Despite its understanding of this problem even before the project began, KCP was unable to implement a viable solution.

It is impossible to say precisely what problems might have been avoided if the project had been originally scheduled for thirty-eight months (its actual duration) instead of twenty, and if the first six or nine months had been dedicated to very detailed planning rather than immediate implementation. However, such an approach would certainly have identified better the magnitude of the tasks confronting KCP and allowed for a more reasonable staffing plan and implementation schedule. Whether or not the impacts of the demonstration would have been decidedly different is problematic, but one would at least have a better vantage point from which to judge the effectiveness of many of the Knoxville broker's functions.

10.3 ORGANIZATIONAL ISSUES

Looking back over the history of the demonstration, it is apparent that the earliest decisions about an organizational home for KCP played an extremely important role in the direction and impact of the project. KCP's initial location at the University of Tennessee proved to have both positive and negative

1 Resulting from KCP's inability to hire the desired Field Representatives during the City period, coupled with the political problems which began in early 1977 and continued throughout the demonstration.

2 Although some individual's records were updated through the use of U.S. Postal Service address corrections and the postcard survey results.

implications, but one major attribute (recognizable in hindsight) was that it shielded the brokerage from the political problems it was to face during its eighteen months at City Hall.

In many ways, the newly created Department of Public Transportation Services was the ideal location for a brokerage operation, since DPTS had responsibility for all forms of public transportation¹ and was therefore in a position to coordinate activities to provide a comprehensive and integrated system of services. However, the brokerage and the Department were virtually synonymous in the public's mind, and this resulted in an indelible connection between KCP and the Department's controversial efforts to modify fixed route services to control the city's transit deficit. The major disadvantage of the impression was that it made the broker appear to be favoring carpooling and (particularly) vanpooling at the expense of conventional transit service. While KCP's early emphasis was on these modes,² the organization eventually became an evenhanded advocate of all shared-ride options; its policy was to promote the most efficient mode for each travel market. It is truly unfortunate that the formation and merger of the brokerage and the Department took place at a time when the city faced an essentially inevitable confrontation with its transit union and certain citizen's groups. If DPTS and KCP had had more time to publicly establish their objectives before these emotional issues came to a head, events might have taken a decidedly different turn. As it was, however, a great deal of very valuable and much needed KCP staff time was devoted toward defending policies rather than implementing them. This proved to be a severe drain on an already overtaxed staff.

An approach to brokerage organization which would have precluded many of these problems would have been the implementation

1 Although actual control over Knoxville Transit was vested in the transit authority rather than DPTS.

2 Which was justifiable on the basis that the bus system did not and probably should not have served the rural areas where KCP concentrated its early efforts.

of the operation by a more regionally oriented organization than the City of Knoxville. The most obvious candidates for the role would have been the East Tennessee Development District or the TVA's Tributary Area Development District. KCP was always intended to be a regional brokerage service, and its establishment by the city raised inevitable problems, the most pressing of which became how to pay for the service after federal demonstration funds were exhausted. (Knoxvillians could hardly be expected to pay the entire bill for a service provided to residents of the sixteen-county ETDD). As the demonstration period drew to a close, KCP actively sought to solve this problem by moving from the city to a more regionally oriented base. In January, 1979, KCP was re-established as a department within the University of Tennessee's Transportation Center, with funding provided by the state's Energy Authority and Department of Transportation, and by the City of Knoxville. However, its new charter was substantially reduced from that of the original demonstration brokerage, focusing primarily on continued ride-share matching and promotion and the design and implementation of statewide programs supporting shared riding.

10.4 INSTITUTIONAL ACTIVITY

There should be no question that KCP's accomplishments in the field of institutional changes facilitating ridesharing rank as a major (if not the major) success of the demonstration. In a relatively short time, KCP achieved significant changes in state regulatory legislation and in the availability of adequate vanpool insurance (on a national level), paving the way for the growth of vanpooling and the provision of other progressive solutions to, the area's transportation problems. Specifically, the broker's accomplishments included:

- statewide deregulation of commuter car and vanpools, providing exemption from existing requirements for common carrier certification and the need to file a certificate of insurance
- authorization for the Public Service Commission to designate certain counties as "citizen transporta-

tion areas" (thus allowing the use of church and/or privately owned vehicles for passenger service) and to allow motor carriers to drop unprofitable routes (under certain circumstances)

- passage of legislation allowing motor carrier experimentation with new routes for up to six months without specific certification
- amendment of the state's insurance statutes to extend "underinsured motorist" coverage to provide better protection for those in high occupancy vehicles
- a major role in obtaining the adoption by the insurance industry of a new nationwide policy favorably affecting the private and fleet vanpool rates
- development of a new taxi ordinance for Knoxville, setting new, stricter standards for the licensing, inspection, and operation of vehicles and modernizing the fare structure

It is noteworthy that institutional work was an area toward which KCP consistently directed ample staff (due to the high priority of these activities). It is also a good example of how the help of UT's staff and graduates proved invaluable; it is clear that UT's political connections in the legislature were an important factor in the campaign's success. The importance of carefully planned and skillfully implemented institutional efforts in achieving brokerage goals should not be underestimated, particularly by prospective brokerage operators.

10.5 COMMUTER RIDESHARING ACTIVITIES

In terms of the commitment of both staffing and funding, as well as the potential for large scale impacts, commuter ridesharing activities were the centerpiece of Knoxville's brokerage demonstration.¹ The results of these efforts were clearly mixed.

¹ Over 90% of KCP operating funds were used to address commuter ridesharing problems in one way or another.

In terms of its impact on ridesharing mode utilization, vehicle occupancy, roadway congestion, and pollution, there can be little doubt that the demonstration's effect was far below expectations. Approximately 1% of core area commuters were induced by KCP's efforts to change modes; however, this figure includes those who did so only temporarily and those who switched between ridesharing modes.

One obvious question is whether the ridesharing market was essentially saturated before KCP started operations. Available data on mode shares do not indicate that the Knoxville area was exceptional, but comparisons among areas are not necessarily conclusive.

Certainly some of the opportunity for pool formation had already been seized by the time KCP came on the scene. The most significant example was the Tennessee Valley Authority, the downtown's largest employer, whose own program had already had startling success. Other area employers had also instituted programs before KCP's formation (e.g., the Oak Ridge National Laboratory and the Environmental Research and Development Administration).¹ Finally, the University of Tennessee's 1974 Carpooling Program may also have had some influence. Nevertheless, the vast majority of employers in the service area had not been influenced by an organized ridesharing program prior to the demonstration's implementation.

Perhaps the best indication that the market was not saturated comes from surveys of matchlist recipients which indicated that 15% of them had changed modes between receiving their matchlist and being surveyed (although the shift was presumably unrelated to KCP's activities). Surprisingly, there were virtually the same number of changes to ridesharing modes as from them. This constant flux indicates an apparent opportunity to significantly increase ridesharing's mode share. As Wagner has proposed, perhaps the best approach to accomplishing this

¹ Although most had become inactive.

objective is to focus on the process of pool deformation, rather than simply addressing the formation process, as have most ride-sharing programs to date--including Knoxville's.¹

KCP's basic approach to encouraging commuter ridesharing (i.e., employee surveying, matching and mass media promotion) differed little from the great majority of carpool demonstration projects which preceded it (most of which were sponsored by the FHWA);² not surprisingly, the results of KCP's efforts were reasonably similar.³ Although KCP's emphasis on market penetration resulted in an unusually high percentage of the population at participating employers on the master file, the percentage of KCP's matchlist recipients influenced into new ridesharing arrangements was unusually low; the result was that for both KCP and for the typical FHWA carpooling program, somewhat less than 1% of the total service area commuting population were directly influenced. However, in terms of the total percentage of the population influenced (i.e., regardless of whether or not matchlists were involved), KCP's influence (0.8% ± 0.7%) was on the low side (versus an average of 2.8% for the six FHWA-sponsored programs for which data is available).⁴ At 28¢ per capita per year,⁵ KCP's costs (of surveying, matching, promotion, and vanpool program administration) were in the same range as the average for FHWA projects in similarly populated areas (i.e., 21¢).

1 Telephone conversation with Frederick A. Wagner, June 1978.

2 It should be noted that KCP began its operations not long after these projects, and very little information was available at the time about the efficacy of the various approach's which had already been and were still being tried.

3 Results of FHWA carpool demonstration projects are from Wagner (77).

4 KCP feels that a relevant factor in this regard was that it faced a public less concerned with fuel conservation than those programs which were implemented in the wake of the "oil crisis" of 1974.

5 Based on the core SMSA population.

While the statistics available from the Knoxville demonstration are insufficient to support an accurate analysis, indications generally are that such ridesharing programs, in spite of their small percentage impact, are relatively cost-effective, in that the total savings from reduced vehicle operating costs and energy consumption exceed project cost. However, as with any benefit-cost or cost-effectiveness analysis, the numbers do not directly indicate who pays the costs and who receives the benefits. In essence, ridesharing programs represent a public subsidy of ridesharing modes. Whether or not the public benefit of this cost is justified by the results is a matter of policy.

Based on the observed overall impact of this demonstration and of those sponsored by the FHWA, it seems reasonable to conclude that, at least under existing economic conditions and incentives, KCP's basic approach of matchlist distribution without active follow-up was destined to have limited effect. The hypothesis that a lack of knowledge about possible pool-mates was the main barrier to increased pooling simply is not supported by the data. Apparently most of those people who wished to pool found a way to do so on their own, and those who did not already have a desire to pool were not swayed enough to act by simply receiving a matchlist or literature extolling the economic and/or societal benefits of shared riding.¹ Indications are that KCP's telephone marketing campaign was substantially more effective than matchlist distribution alone, but the evidence as of the end of the demonstration was incomplete.

¹ However, it should be noted that in the short time since the demonstration ended, energy costs have risen sharply, and future fuel availability is now considerably more uncertain than it was at any time during the project. If these trends continue, procedures such as those implemented by KCP may eventually be markedly more effective in achieving brokerage goals.

It is interesting to note the parallel between the telephoning campaign and the way in which KCP initially marketed the vanpool concept. In sharp contrast to its laissez-faire approach toward carpool formation, KCP called all potential vanpoolers to try to sell them on the program and to help "break the ice;" this job later became the responsibility of prospective driver/operators, but the personalized approach to marketing the mode was retained, and was felt to be very effective.

In fact many aspects of the vanpooling program were successful. KCP introduced a relatively new mode to the area's commuter market and eventually attracted enough demand to lease its entire fleet and develop a waiting list of prospective operators. When the time came to sell the fleet, this too was successfully accomplished. However, the original (and most important) objective of the seed van program was to spur the widespread individual ownership and operation of vanpools--and there is no real evidence that this was achieved, at least as of the end of the demonstration. At that time only six non-seed private vans were specifically known to be operating, the same number that had been identified early in 1976. Part of this problem reflected the fact that while KCP had been very successful in eliminating or overcoming the institutional barriers to its own seed program by mid-1976, it was still working hard two years later to ease the way for privately owned operations through such programs as vanpool abort insurance and 100% financing. In addition, staffing limitations precluded using a "personal approach" to promote private vans. However, another factor was that by making its own van fares as low as possible (to attract ridership), KCP essentially undermined the incentive for private ownership. It is clear that if a private operator had tried to match KCP's fares, he or she would have been less profitable than a lessee, if profitable at all. Given this fact, plus the risk associated with buying rather than leasing, KCP's fare structure may have kept demand for seed vans high at

the expense of private fleet growth. With the sale of KCP's van fleet by the end of the demonstration, this conflict was removed.

Since an accurate demand analysis of vanpooling is beyond the present state-of-art, there is no quantitative estimate of the potential for the mode in Knoxville. While KCP had no real difficulty continuously leasing forty-eight vans, there is no way to determine whether it might have been able to lease, perhaps, one hundred, if its fleet had been that large. What is apparent is that the demand for vanpooling during the demonstration was not sufficient to attract really significant numbers of individuals into private operation, as had been hoped.

10.6 SOCIAL SERVICE AGENCY ACTIVITIES

While KCP's approach to social service agency transportation was well conceived, it too suffered from the severe staff shortage which plagued much of the broker's operation. The primary manifestation of this shortage was KCP's inability to aggressively pursue all of the opportunities identified by its general survey of area agencies and to respond quickly to agencies with which it was working.

KCP's approach to brokering these services (i.e., contracting with both the supplier and the agency, allowing KCP to serve as coordinator and monitor) was time consuming, but represented a well considered way to achieve "optimal" matching of suppliers and users once many agencies were involved. It also provided KCP with continuing (although limited) income to help offset the effort's administrative expense. However, because so few services were implemented, the approach did not reap the intended benefits. Instead, KCP staff spent considerable time interacting with the agencies, while no real advantages of this coordination were observed. It is important to recognize that these results reflect the small scale of the operations, and that the approach may prove effective when enough agency services are involved. Nonetheless, as implemented in this demonstration, the costs of the effort far outweighed the cost savings to the participating agencies.

10.7 CONCLUDING REMARKS

The Knoxville demonstration represented a bold and barrier-breaking first attempt at the areawide implementation of the brokerage approach to solving transportation problems. As with any complex and innovative undertaking, it was a mixture of both successes and failures.

The brokerage had its share of political problems. To a certain extent these may have been a reflection of the specific environment in which the demonstration took place, rather than a reaction to the "brokerage concept" per se. However, the merging of a multimodal brokerage approach with the existing conventional transit-oriented infrastructure apparently was threatening to certain groups--specifically the transit union and those bus riders facing a possible curtailment of service. This is a problem which may face (and hinder) future brokerage implementations in other locales.

The broker's major area of success was the achievement of significant institutional changes facilitating the expansion of ridesharing in virtually all its forms; these extended well beyond those needed to implement the demonstration, and had statewide and even national impacts. However, efforts to effect major shifts in commuting modes and to become a central coordinator for social service transportation fell significantly short of KCP's initial, self-proclaimed expectations. Perhaps the demonstration's greatest lesson is a reaffirmation of the complexity of the urban transportation marketplace and the danger of overselling a project before it begins.

For future brokerage implementations, Knoxville's experiences should provide a valuable lesson. Brokerage is a complex undertaking, and the value of adequate pre-planning cannot be overemphasized. Prospective brokers must match the scope of their undertakings to the resources available, and this is virtually impossible without reliable information about the problems which must be overcome and an accurate appraisal of the time, staffing and funding required to do so. In general, these problems are surmountable, but not without considerable work; significant changes rarely occur very quickly.

The Knoxville project reflected, more than anything else, a new attitudinal approach to the design and provision of urban transportation services on the part of the responsible public agencies. Although it apparently did little to alter the pre-existing modal balance, one should not lose sight of the fact that it was, truly, an experiment. At a minimum, the approach stimulated a new flexibility and, perhaps, a new understanding of the potential of alternative modes of urban transport.

In evaluating the brokerage concept, one must recognize that in the absence of a broker, people can and do manage to pool and to ride the bus, and institutional reforms do take place (albeit often quite slowly). The basic issue is which applications of the brokerage concept (if any) provide sufficient additional public benefits to justify their costs. While the benefits of the Knoxville demonstration were more limited than had been hoped, it was clearly a pioneering effort and involved only a small fraction of the possible range of brokerage functions, techniques, organizational interrelationships, etc. At the very least, the brokerage concept, through the creation of a mechanism for testing new types of coordinated activities in a multitude of areas, offers the flexibility to keep searching for better solutions to our transportation problems, rather than simply accepting the status quo.



CHAPTER 11. APPENDICES

APPENDIX A. GLOSSARY OF TERMS

1. Common Carrier: A transportation operator providing service to any passenger or shipper according to a predetermined rate schedule.
2. Core Area: The Knoxville SMSA, consisting of Anderson, Blount, Knox and Union Counties and the Oak Ridge area of Roane County; this was the focus of KCP's activities.
3. Dual Use Arrangement: One in which the same vehicle can be utilized by more than one person or group of persons at different times of day; in this evaluation, it refers to the use of a commuter van by social service agencies during non-commuting hours.
4. Fair Share: A vanpool fare schedule developed by KCP in which all anticipated costs of van ownership and commuting operation are defrayed by the first eight paying passengers (with the driver riding free).
5. Field Representative: A staff position within KCP (unfilled during the City period) with responsibility for handling all contacts involving area employers.
6. KASH (Knoxville Area Short Hop): The name of the fare-free bus service for trips occurring entirely within Knoxville's downtown.
7. KAVA (Knox Area Vanpool Association): A KCP-established organization which assists existing and potential vanpoolers in the development and operation of successful pools.
8. Master File: KCP's computerized data base of all individuals who completed a rideshare information form (see below).
9. Match: An individual, bus, or operating vanpool with which one might ride to and from work.
10. Matchlist: A computer-produced listing of all of an individual's potential rideshare matches, based on information contained in KCP's master file.
11. Mode Split/Mode Share: The distribution of mode choice (i.e., the percentage of individuals traveling by each mode).
12. Primary Match: A match (see above) between individuals residing within the same map grid; grids are one mile square in Knoxville and three miles square in surrounding rural areas.

13. Rideshare Coordinator: The individual at an employer responsible for handling all interaction with KCP and the administration of KCP's rideshare information survey.
14. Rideshare Information Form (Survey): The KCP form on which an employee indicated all information necessary to obtain a matchlist (see above); the information was subsequently placed on KCP's master file (see above).
15. Ridesharing Modes: All modes involving multi-occupant vehicles (e.g., carpool, vanpool, and bus).
16. Secondary Match: A match (see above) between individuals residing in adjacent "grids." (See also "Primary Match.")
17. Section 13(c): The section of the 1974 Urban Mass Transportation Act which provides for protection of labor rights in situations where federal (UMTA) assistance funds are used.
18. Seed Van: One of KCP's fifty-one vans leased to an individual vanpool operator to demonstrate the feasibility and financial viability of vanpooling and to thereby encourage private vanpool operation.
19. Shared Driving Pool: A carpool in which members take turns driving their cars to and from work.
20. Shared Expense Pool: A car or vanpool in which there are one or more drivers and one or more paying passengers; the nature of the financial arrangements may vary significantly among pools.
21. Shared Ride Taxi: Taxi service in which more than one passenger (or group of passengers traveling together) are transported simultaneously, at the discretion of the taxicab operator, to improve vehicle efficiency.
22. Telephone Inquiry Service: KCP's program for aiding individuals who telephoned the broker for ridesharing assistance.
23. Transportation Audit: A type of study undertaken by KCP to determine the transportation needs of a social service agency and an approach to fulfilling those needs.
24. Transportation Brokerage: An organization designed to effectively match transportation demand with existing and/or potential supply; its functions may include advocacy of institutional reforms promotion of various modes and the planning, implementation and coordination of new services.
25. Vanpool Abort Insurance: A state-sponsored KCP-designed program to protect individual private vanpool operators from major capital losses if their pool fails.

26. Volunteers Insurance Service: A national non-profit organization whose activities involve a wide range of services associated with insurance for volunteers.
27. Work Location: A group of employment sites in close proximity such that its employees could potentially pool with one another (provided they also lived near one another).

APPENDIX B. SURVEY FORMS, PROCEDURES, AND RESULTS

Much of the data contained in this report was derived from six surveys conducted during the demonstration by the City of Knoxville or its contractors. This appendix contains a copy of each of these surveys and a description of each detailing its principal purpose, the population surveyed, the sample selection procedure, the method of administration, and the distribution of responses.

Survey K1 - Knoxville Commuter Pool Telephone Follow-up Survey

The purpose of this 1977 telephone survey was to obtain information about the use of matchlist forms. The survey was designed to collect information concerning:

- the receipt and use of matchlist forms
- the perceived quality of the information on the forms
- matchlist induced mode shifts
- characteristics of commuters and their work trips
- attitudes toward pooling and KCP

The survey population was drawn from among those commuters placed on the KCP master file between June 1976 and December 1976. A sample of 1500 names was systematically drawn from the entire file and a total of 466 interviews were completed on weekday evenings during February and March, 1977. Interviewers were instructed to ask for the individuals by name; when a busy signal, no answer, or a disconnected phone was encountered, no additional attempt was made to reach that individual.

KNOXVILLE COMMUTER POOL TELEPHONE FOLLOWUP SURVEY

Hello. This is (interviewer's name) of the Knoxville Commuter Pool. May I please speak to _____.
Some time ago we provided you with a list of potential carpools and now we would like to ask you some questions about it.

A1. Did you receive the computerized list of people who might be able to carpool with you?

297* Yes

168 No We're sorry, perhaps it was lost in delivery. If you are interested we'll be happy to send you a copy.

137 No 35 Yes

A2. How many names were on your list? 29 None 47 1-2
94 Not sure 46 3-6 79 7 or more

A3. Did you contact anyone on the list about forming or joining a carpool?

244 No Yes
Is there a reason why you chose not to contact anyone? 40 Yes

Inconvenient match 39 Have not acted yet 3
Needed car at work 5 No intention to carpool 75
Already in carpool 37 Insufficient info on form 3
I moved 1 Changed mind about pooling 10
I changed jobs 4 Other 60

A4. Did anyone contact you because your name appeared on a list?
 No 239 Yes 41

IF "No" ON BOTH A3 AND A4 SKIP TO A7

A5. As a result of this contact was ridesharing arranged with someone on the match list?
Yes 10
58 No Why didn't it work out? How many of those on the match list did you arrange to ride with?
32 Schedule differences
6 Destination differences
3 No one willing to drive
8 We lived too far apart
15 Other 63 (avg) number

IF "No" SKIP TO A7

A6. Were you (both/all) employed by the same company?
5 No How many different companies were involved? 21 Yes
1.28 (avg) number

A7. How did you get to work before receiving the match list?
92 Carpool - With how many others 1.75 (avg)
1 Vanpool
2 Other
Drove alone 189
Regular bus 14
Express bus

SKIP TO B1

A8. Would you have begun car/vanpooling if you had not received the match list or been exposed to the Knoxville Commuter Pool Advertisements?
7 No 46 Yes

GO TO B1

IF MATCH LIST WAS NOT RECEIVED SKIP TO B1

B1. How do you get to work now?

Drive alone 284
Regular bus 9
Express bus 1
Other 4

Carpool 140
Vanpool 4
With how many others? 2.83 (avg)

CURRENT RIDESHARERS

B4. How long have you been ridesharing?
Months
30.8 (avg)

IF A5 NOT MARKED "Yes," THEN NEVER RIDESHARER: SKIP TO D1

IF MARKED "Yes," THEN FORMER RIDESHARER

B2. How long did you rideshare before stopping?
1 Days
1 Weeks (circle one)
1 Months

B5. In your car/van pool do you only drive, only ride or do you share driving?
36 Only drive
69 Only ride
34 Share driving

B3. Why didn't it work out?
2 Schedule differences
0 Personality conflict
0 Too expensive
0 Uncomfortable ride
0 Lack of privacy
0 Need car at work
0 Couldn't work overtime
0 Distances were inconvenient
0 Other

With how many others 1.41 (avg) number

CARPOOLERS SKIP TO D1

B6. Are you the operator or manager of a vanpool?
228 No 2 Yes

IF "No" SKIP TO D1

CONTINUE WITH C1

SKIP TO D1

*Numbers typed directly to the left or right of each answer option indicate the number of responses.

VANPOOL OPERATORS-MANAGERS

- C1. Do you own your van, lease it, or what? 2 Own van. Did you buy it to form a vanpool? 1 Lease van. From whom do you lease it?
 Other _____ 1 No Yes 1 KCP Dealer
- C2. How many miles do you put on your van in an average month? 1 Miles. How many of these miles are for commuting to work, and how many for personal use?
1 Commuting miles 1 Personal miles
- C3. How often does your van need your personal attention or maintenance? Daily 2-3 times/week Weekly 1 Less often
- C4. How often does the van need professional service? Monthly 2-3 months 2 More than 6 months
- C5. Have you had any accidents while operating your van for commuting purposes? (number) Over how long a period of time? _____ months/years (1 person responding had 2 accidents)
- C6. What was the major reason that you became a van operator? 0 Make a profit 0 Share expenses 1 Personal use of van
 Others 1 _____

EVERYONE ANSWERS

- D1. How many miles to you currently travel to work one-way? Miles (17.4 avg.)
- D2. How many vehicles are there in your household? Vehicles 3.6 (avg.)
- D3. Is a household vehicle regularly available for you to ride or drive to work? 48 No 416 Yes
- D4. Are you a licensed driver? 39 No 417 Yes
- D5. What features do you like most about car or vanpooling? **PROBE**
 Cost savings 227 Dependability 15 9 Leaves my vehicle available for someone else
 Time savings 6 Eliminates buying another car 3
 Relief from driving 84 Solves parking problems 28
 Companionship 51 Conserves energy and resources 91 Other 133
- D6. What features do you like least about car or vanpooling? **PROBE**
171 Schedule inconvenience 1 Increased expense 57 Harder to work overtime
23 Distance inconvenience 138 Reduced independence and mobility 5 Disagreements with other members
27 Increased travel time 58 Can't use vehicle during day
23 Reduced privacy 17 Reduced comfort Other 110
- D7. Do you feel that the Knoxville Commuter Pool Project is worth continuing? 30 No 384 Yes
- D8. To which age group do you belong? Are you 18 under 20; 263 20-44; 172 45-64; 7 or 65 and over?
- D9. What is the last grade or year of regular school you attended? 0 no formal schooling 163 high school degree
44 grade school 23 technical training
67 some high school 87 some college
75 college degree or higher
- D10. INTERVIEWER: MARK RESPONDENT'S SEX. IF NOT CERTAIN, ASK: "Are you 206 male or 249 female?"
- D11. Are you employed? 16 No Are you a 5 Student? 61 House spouse? 441 Yes Describe briefly the kind of work you do
4 Retired 11 Other
- D12. Which of the following categories includes the combined annual income of all members of your household? Is it...
17 less than \$5,000 103 \$15,000-24,999
110 \$5,000-\$9,999 36 \$25,000 and over
105 \$10,000-\$14,999
- D13. The following information is currently in our ridesharing file. Please let me know if any corrections should be made.
 Name _____
 Home address _____
 Work hours _____
 Work Location _____
 Phone _____
 Ride/drive preference _____

Survey K2 - Survey of Matchlist Recipients

This 1978 telephone survey was designed to obtain information about the use of matchlists by commuters employed in downtown Knoxville. (This was the only major geographic area surveyed and matched by KCP after Survey K1 was performed in 1977.) The survey was designed to collect information about:

- the receipt and use of matchlist forms
- the perceived quality of the information on the forms
- matchlist induced mode shifts
- characteristics of commuters and their work trips
- attitudes toward pooling and KCP

The survey population included individuals listed in the KCP master file and working in downtown Knoxville. This group consisted of approximately 1500 people who were placed on the master file in 1976 and resurveyed in the fall of 1977 and 800 who were added to the master file during resurveying of the downtown during 1977.

A sample of 1575 names was systematically selected from among CBD workers listed in the master file and a total of 245 interviews were completed. Original specifications had called for 120 surveys of those on file in 1976 (all of whom should have received a matchlist in that year and again in 1978) and 120 of those added to the file in 1977. Five additional surveys of the latter group were later completed to increase the geographic representativeness of the survey sample.

The surveys were administered in May and June 1978. Interviews were conducted during weekday evening hours and interviewers were instructed to ask for the respondent by name; up to three attempts were made to reach selected respondents.

FILL IN ID #

FILL IN:

Hello, this is _____. May I please speak to _____? I'm calling for the Knoxville Commuter Pool regarding the ridesharing information we sent you a couple of months ago. May I have a few minutes of your time to ask you some questions?

ID# _____ (1-4)

Card # 1 (5)

1. Did you receive a computerized form from us in the past few months regarding a list of people who might be able to rideshare with you and/or some bus information?

Q1. _____ (6)

Yes (1)

No (2)

→ 1a. Did you receive any earlier list?

Q1a. _____ (7)

171*

69

No (1)

Yes (2)

1b. Did you make any use of that list?

Q1b. _____ (8)

36

33

No (1)

Yes (2)

Please explain: _____

Q1c. _____ (9)

1c. Was that the first form of this type that you have received from the Knoxville Commuter Pool?

SKIP TO 6

Yes (1)

No (2)

104

67

1d. Did you make any use of any earlier form?

Q1d. _____ (10)

No (1)

Yes (2)

Please explain: _____

READ: "Now I'd like to ask you about the form you recently received."

2. Did the form contain information on bus routes in your area?

Q2. _____ (11)

60 No (2)

Yes (1)

2a. Did you begin riding the bus as a result of receiving this information?

Q2a. _____ (12)

53 Not Sure (3)

58

57 No (1)

Yes (2)

2b. How did you usually get to work before you began riding the bus?

Q2b. _____ (13-14)

Drove alone (01) 0

Different bus (02) 0

Drove or rode only with household member (03) 0

Carpool (04) 1

Vanpool (05) 0

Other (specify): 0 _____

*Numbers typed directly to the left or right of each option indicate the number of responses.

CONTINUE AT 3.

3. Did your computerized form contain a list of names?

9 No (2) 162 Yes (1)

SKIP TO (6)

a. How many names were on your list?

1 0 17 1-2 40 3-6 32 7-10 20 11-15
 (1) (2) (3) (4) (5)

7 16-20 7 21 or more 38 Not Sure
 (6) (7) (9)

Q3. _____
(15)

Q3a. _____
(16)

4. Did you contact anyone on your list about forming or joining a carpool or vanpool?

13 Yes (1)

149 No (2)

a. How many? _____

Contacted

1 - 5
 2 - 4
 3 - 2
 4 - 2
 13

b. Is there a reason you chose not to contact anyone?

- Contacted by others first (01)
- Have not acted yet (02)
- No intention to pool (03)
- Changed mind about pooling (04)
- Insufficient info on form (05)
- Inconvenient match (06)
- Need car for work (07)
- Already in pool (08)
- Moved (09)
- Changed jobs (10)
- Other (specify): _____

Q4. _____
(17)

Q4a. _____
(18-19)

Q4b. _____
(20-21)

5. Were you contacted by anyone about forming or joining a pool because your name appeared on their list?

13 No (2) 0 Yes (1)

(6) Were you contacted by anyone about forming or joining a pool because your name appeared on their list?

17 Yes (1)

210 No (2)

a. By how many? _____

a. By how many? _____

SKIP TO (8)

Contacting

1 - 16
 3 - 1
 17

CONTINUE AT 7

Q5. _____
(22)

Q5a. _____
(23-24)

Q6. _____
(25)

Q6a. _____
(26-27)

7. As a result of this contact, did you make a new pooling arrangement?

25 No (2)

3 Yes (1)

SKIP TO (8)

a. How did you usually get to work before making this pooling arrangement?

1 Carpool (04)

0 Vanpool (05)

1 Drove or rode only with household members (02) 0

1 Drove alone (01) Regular Bus (06)

0 Walked (03) 0 Express Bus (07)

0 Did not make trip (09) 0 Other (specify): _____

b. How many others, besides you, were in your old pool? response - 2

c. How many others, besides you were in your new pool? _____ response - 11

d. How many members of your new pool joined as a result of Knoxville Commuter Pool activities? response - 4

e. Does everyone in your new pool work for your employer?

0 Yes (1)

1 No (2)

e1. How many companies are represented? response - 4

f. Would you have begun your new pooling arrangement if you had not received your form, been contacted, or seen the Knoxville Commuter Pool's ads?

0 Yes (1) 2 No (2)

g. How many others, besides you, were in your pool? _____ $\frac{1}{6} - \frac{1}{2}$

h. Does everyone in your new pool work for your employer? _____

0 Yes (1) 2 No (2)

3 responses

Apparent error here:

2 - 3

4 - 1

5 - 1

h1. How many companies are represented? _____

i. Did your new pool arrangement allow you to change your plans about buying or selling a household vehicle?

3 No (2)

1 Yes (1)

(ASK RESPONDENT TO EXPLAIN.) _____

Q7. _____ (28)

Q7a. _____ (29-30)

Q7b. _____ (31-32)

Q7c. _____ (33-34)

Q7d. _____ (35-36)

Q7e. _____ (37)

Q7e1. _____ (38-39)

Q7f. _____ (40)

Q7g. _____ (41-42)

Q7h. _____ (43)

Q7h1. _____ (44-45)

Q7i. _____ (46)

(8) How many days per week do you generally travel to work?

$\frac{1}{1}$ 1

$\frac{1}{2}$ 2

$\frac{1}{3}$ 3

$\frac{1}{4}$ 4

$\frac{22}{5}$ 5

$\frac{11}{6}$ 6

$\frac{1}{7}$ 7

$\frac{3}{8}$ 8

Not employed/do not travel to work (9)

SKIP TO 15

Q8. _____ (47)

CONTINUE at 9

9. Are you a licensed driver? ²²⁷ Yes (1) No (2) ¹⁰

10. Is a household vehicle regularly available for you to drive or ride to work? Yes (1) No (2)
217 20

Code "2" in both Q10 and Q11

SKIP TO 12

11. Is the use of this vehicle necessary for your job? Yes (1) No (2)
70 166

12 How do you presently travel to work?

PROBE

INTERVIEWER: IF MORE THAN ONE MODE IS SPECIFIED, ASK HOW MANY DAYS PER WEEK EACH MODE IS USED. RECORD THE NUMBER OF DAYS FOR EACH AND FOLLOW THE INSTRUCTIONS FOR THE RESPONSE MARKED HIGHEST ON THIS PAGE. IF ONLY ONE IS SPECIFIED, RECORD THE NUMBER OF DAYS FROM QUESTION 8 ABOVE.

TO FROM

28 28 Carpool

7 7 Vanpool

26 26 Regular Bus

19 19 Express Bus

131 132 Drive alone

32 29 Ride or drive only with household member(s)

3 4 Other (specify):

38 responding: range 1-13

12a. With how many others? _____

12b. Do you only ride (1) 18

only drive (2) 6

share driving (3) 14

CONTINUE AT 12c

12c. Did you begin using [mode(s)] because of the Knoxville Commuter Pool's activities?

79 No (1) 3 Yes (2) Please explain.

DAYS

Q9. _____
(48)

Q10. _____
(49)

Q11. _____
(50)

Q12. CP _____
(51) (52)

VP _____
(53) (54)

RB _____
(55) (56)

EB _____
(57) (58)

DA _____
(59) (60)

DW _____
(61) (62)

OT _____
(63) (64)

OT _____
(65) (66)

OT _____
(67) (68)

Q12a. _____
(69-70)

Q12b. _____
(71)

Q12c. _____
(72)

Q13. _____
(73-75)

Q14. _____
(76-78)

ID# _____
(1-4)

Card # 2
(5)

Q15. 1) _____
(6-7)

2) _____
(8-9)

3) _____

CONTINUE AT 13.

13. Approximately how many miles do you currently travel to work, one way? _____ Don't Know (-09) 21

14. Approximately how many minutes does this trip take, one way? _____ Don't Know (-09) 226 responding; range 1-60

15. What features do you personally like most about carpooling or vanpooling?

PROBE FOR UP TO THREE (3) ANSWERS.

101 Cost savings (01)

45 Relief from driving (02)

4 Makes car available to others (03)

11 Delays buying another car (04)

29 Solves parking problems (05)

Companionship (06) 23

Time savings (07) 10

Energy Conservation (08) 37

Other (specify): 23

None (99) 97

CONTINUE AT 16.

16. What features do you personally dislike about carpooling or vanpooling?

PROBE FOR UP TO THREE (3) ANSWERS

- 109 Schedule inconvenience (01)
- 2 Distance inconvenience (02)
- 5 Increased travel time (03)
- 9 Reduced privacy (04)
- 1 Increased expense (05)
- 80 Reduced independence and mobility (06)
- 32 Cannot use vehicle during day (07)
- 5 Reduced comfort (08)
- 15 Harder to work overtime (09)
- 14 Personality conflicts (10)
- 13 Other (specify): _____
- 97 None (99)

Q16. _____
 1) _____
 (12-13)
 2) _____
 (14-15)
 3) _____
 (16-17)

17. Do you feel the Knoxville Commuter Pool is worth continuing?

- 156 Yes (1)
- 34 For others only (2)
- 7 No (3)
- 43 Not Sure (4)

Q17. _____
(18)

18. Would you be willing to pay a small fee for the kind of ridesharing information that the Knoxville Commuter Pool provides, for example, a list of people with whom you might carpool?

PROBE FOR SIZE OF FEE. 68 Yes (1) 172 No (2)

Comments: 32 responding to "fee size"

range 100 to 1500

Q18. _____
(19)

Q18a. _____
(20-23)

19. What kind of work do you do? GET JOB TITLE

Coding Categories:

- 58 01 Professional, technical and kindred workers
- 35 02 Managers and administrators, except farm
- 16 03 Sales workers
- 73 04 Clerical and kindred workers
- 32 05 Craftsmen, foremen and kindred workers
- 9 06 Operatives, except transport
- 1 07 Transport equipment operators
- 5 08 Laborers, except farm
- 0 09 Farmers and farm managers
- 0 10 Farm laborers and farm foremen
- 5 11 Service workers, except private household
- 3 12 Private household workers

Q19. _____
(24-25)

20. To which of the following age groups do you belong? Under 20 (1);

- 20 to 44 (2); 151
- 45 to 64 (3); 83
- 65 or over (4); 5
- No answer (9) 0

Q20. _____
(26)

21. How many vehicles are there in your household? 240 responding; range 0-6

Q21. _____
(27)

22. What is the last grade or year of school you completed? PROBE

- 0 No formal schooling (1)
- 1 Grade school (2)
- 9 Some high school (3)
- 80 High school diploma (4)
- 28 Technical training (5)
- 49 Some college (6)
- 71 College degree or higher (7)
- 2 Refused to answer (9)

Q22. _____
(28)

23. INTERVIEWER: MARK RESPONDENT'S SEX. IF NOT CERTAIN, ASK:

Are you male (1) or female (2) ?

112

128

Q23. _____
(29)

CONTINUE AT 24

24. In what county do you live?

- | | | |
|---|---|---|
| 3 <input type="checkbox"/> Anderson (01) | <input type="checkbox"/> Campbell (06) | 2 <input type="checkbox"/> Louden (12) |
| 7 <input type="checkbox"/> Blount (02) | <input type="checkbox"/> Claiborne (07) | <input type="checkbox"/> Monroe (13) |
| 220 <input type="checkbox"/> Knox (03) | <input type="checkbox"/> Cocke (08) | <input type="checkbox"/> Morgan (14) |
| <input type="checkbox"/> Union (04) | 1 <input type="checkbox"/> Grainger (09) | <input type="checkbox"/> Roane/not Oak Ridge (15) |
| <input type="checkbox"/> Roane/Oak Ridge (05) | 1 <input type="checkbox"/> Hamblen (10) | <input type="checkbox"/> Scott (16) |
| | 3 <input type="checkbox"/> Jefferson (11) | 3 <input type="checkbox"/> Sevier (17) |

Q24. _____
(30-31)

25. Which of the following categories includes the combined annual income of all members of your household?

- | | |
|--|--|
| 4 <input type="checkbox"/> Less than \$5,000 (1) | 67 <input type="checkbox"/> \$15,000 to \$24,999 (4) |
| 16 <input type="checkbox"/> \$5,000 to \$9,999 (2) | 52 <input type="checkbox"/> \$25,000 or over (5) |
| 40 <input type="checkbox"/> \$10,000 to \$14,999 (3) | 61 <input type="checkbox"/> Refused to answer (9) |

Q25. _____
(32)

THANK YOU FOR YOUR COOPERATION.

Home Location: _____ Work Location: _____

Matches: _____ Primary; _____ Secondary; _____ Van; _____ Regular Bus;
_____ Express Bus

Sum of Primary and Secondary Matches: _____

Sum of Regular and Express Buses: _____

Comments: _____

INTERVIEWER: DID YOU ENCOUNTER ANY PROBLEMS IN DETERMINING HOW TO INDICATE ANY OF THE RESPONSES?

- | | |
|------------------------------------|---------------------------------------|
| 2 <input type="checkbox"/> Yes (1) | • <input type="checkbox"/> No (2) 238 |
|------------------------------------|---------------------------------------|

Please explain.

I. _____
(33)

KCP Survey of Matchlist Use

As part of its telephone marketing campaign in 1978, KCP surveyed matchlist recipients employed in the Knoxville CBD to determine if:

- these individuals had used their matchlist
- they wished to be deleted from the master file
- they would like KCP's direct aid in arranging a pooling arrangement

The survey population included all CBD employees listed in the master file except those reached by Survey K2. As of June 30, 1978, calls had been made to 2091 people, resulting in 1169 contacts. This surveying continued beyond the end of the evaluation period (June 30, 1978).

The content of the interview was similar to Survey K2, except that individuals who indicated that they had not used their matchlists to arrange ridesharing were exposed to the telephone marketing campaign rather than the remaining questions. Twenty-three individuals were asked the full set of Survey K2 questions and their responses have been pooled where appropriate in the analysis of Survey K2 results.

Survey G1 - Publicity Telephone Survey

The primary purpose of this survey was to determine the extent to which the general population was aware of KCP and its activities. It was initially designed by UT to collect information on:

- whether the respondent knew about KCP
- how the respondent first learned about KCP
- what forms of ridesharing the respondent associated with KCP
- whether the respondent knew how to contact KCP
- general information about household members' commuting trips

For SMD evaluation purposes, it was later expanded to include standard demographic data on the respondents.¹

The survey population included individuals living in Knoxville, Oak Ridge, Maryville-Alcoa and Maynardville. Respondents were selected by random digit dialing of non-business telephone exchanges serving these areas, and in proportion to the area populations.

The survey was administered four times, as indicated below:

<u>Date</u>	<u>Sample Size</u>
June 1976	150
September 1976	153
December 1976	183
April 1977	170

Modifications were made after each administration; the version depicted here was administered in April 1977.

¹ However, due to an error in administration, the demographic data proved not be be usable.

PUBLICITY TELEPHONE SURVEY

I.D.#

1. _____ Hello, my name is _____ with The University of Tennessee. I am conducting a survey about a community project that was recently initiated by The University and the City of Knoxville. Could I have a few minutes of your time to ask you some questions? Q1. Yes = 114
No = 55*
2. _____
3. _____ 1. Have you seen or heard anything about the Knoxville Commuter Pool?
4. _____ Yes _____ No _____ (If "no," proceed to Question 4 and skip 8.)
5. _____ 2a. How did you learn about the Commuter Pool? _____ Q2. (0) (5)-1
(1) 32 (6)-10
(2) 8 (7)-9
(3) 37 (8)
(4) 11 (9)
- Choices:
- | | |
|-----------------------------|----------------------|
| 0. Unknown | 6. Radio |
| 1. At place of employment | 7. Saw van. |
| 2. Friends in the community | 8. Other |
| 3. Television | 9. Refused to answer |
| 4. Newspaper | |
| 5. Posters/Billboards | |
6. _____ 2b. If other, what? _____
7. _____ 3a. What forms of commuter pooling do you associate with the program? _____ Q3a. (0) (3) 1
(1) 17 (4) 1
(2) 18
- Choices:
- | |
|--------------------------|
| 0. Unknown |
| 1. Car |
| 2. Van |
| 3. Express Bus |
| 4. Other (Specify) _____ |
8. _____ 3b. If other, what? _____
9. _____ 4. How many vehicles are there in your household? Number _____ Q4. (0) 7 (4) 5
(1) 41 (6) 1
(2) 82 (UK) 3
(3) 31
10. _____ 5a. Which members of your household currently commute to work?
- | | | | |
|--------------------------|-------|------|--|
| 11. _____ Husband _____ | Y=115 | N=9 | Choices:
0. Unknown
1. Does Commute
2. Does Not Commute
9. Refused to Answer |
| 12. _____ Wife _____ | Y=68 | N=37 | |
| 13. _____ Other #1 _____ | Y=33 | N=4 | |
| Other #2 _____ | Y=9 | N=0 | |
- Q5a. (See left)
14. _____ 5b. Respondent is: Q5b. (1) 54 (3) 33
(2) 66 (4) 3
- Choices:
- | | |
|------------|----------------------|
| 0. Unknown | 3. Other #1 |
| 1. Husband | 4. Other #2 |
| 2. Wife | 9. Refused to Answer |

*Numbers typed directly to the right of each question indicate the number of responses.

15. _____ 6. How many miles does each commuter currently travel to work one way? Q6. (See left)

16. _____

17. _____ Husband _____ N=101 $\bar{x} = 6.26$

18. _____

19. _____ Wife _____ N=57 $\bar{x} = 3.99$

20. _____

21. _____ Other #1 _____ N=30 $\bar{x} = 11.67$

22. _____ Other #2 _____ N=8 $\bar{x} = 8.13$

7. (Ask only for commuters identified in Question 5.) How does each commuter in your household currently travel to work? Q7. "H" "W" "1" "2"

23. _____ Husband _____ Choices: (1) 86 50 26 7

24. _____ Wife _____ 0. Not applicable (2) 23 11 5 2

25. _____ Other #1 _____ 1. Drives alone (3) 1 1

26. _____ Other #2 _____ 2. Carpool (4) 3 2 1

3. Vanpool (5) 4 4

4. Rides bus

5. Other

8a. Which of the commuting household members have a drivers license? Q8a&b. (See left.)
(Check if yes)

27. _____ Husband Y = 116 N = 0 Choices:

28. _____ Wife Y = 67 N = 2 0. Unknown

29. _____ Other #1 Y = 38 N = 0 1. Has license

30. _____ Other #2 Y = 8 N = 1 2. Does not have license

9. Refused to answer

8b. For each household member that commutes is a household vehicle regularly available for him or her to travel to work?

31. _____ Husband Y = 111 N = 6 Choices:

32. _____ Wife Y = 62 N = 6 0. Unknown

33. _____ Other #1 Y = 33 N = 2 1. No _____

34. _____ Other #2 Y = 8 N = 1 2. Yes _____

9. Refused to answer

9a. (for those ridesharing) Was the pool arrangement formed because of Knoxville Commuter Pool activities? (Yes or No) Q9. Y N

Choices: "H" 1 23

0. Unknown "W" 12

1. Yes "1" 6

2. No "2" 2

9. Refused to answer

35. _____ Husband _____ If yes, how? _____

36. _____ Wife _____ If yes, how? _____

37. _____ Other #1 _____ If yes, how? _____

38. _____ Other #2 _____ If yes, how? _____

10. (for ridesharers only) How did (family member) travel to work before joining their present carpool/vanpool?

39. ___ Husband ___ Choices:
 40. ___ Wife ___ 0. Unknown
 41. ___ Other #1 ___ 1. Drive alone
 42. ___ Other #2 ___ 2. Carpool
 3. Vanpool
 4. Bus
 5. Other

Q10. "H" "W" "1"
 (1) 14 5
 (2) 1 1
 (5) 1 1 1

43. ___ 11a. Do members of your household rideshare for trips other than to work?

1. Yes 84 2. No 83

Q11. (See survey form)

44. ___ 11b. If yes to 11a, what? _____

Q11b.
 Church 2
 School 6
 Shopping 13
 Recreation 23
 Other 2
 Multiple 36

45. ___ 12. From the information you have, is it clear how you could get more information about the program?

1. Yes 70 2. No 94

46. ___ 13. Would you be interested in learning how the program would benefit you?

1. Yes 16 2. No 151

Q12.-16.
 (See left)

If yes, the address is: _____

47. ___ 14. Do you believe this project is worth continuing?

1. Yes 123 2. No 2

48. ___ 15. Age X = 37, mode = 33

49. ___ 16. Sex 96 Male 73 Female
 (1) (2)

50. ___ 17a. What level of education have you obtained?
 51. ___

- Choices:
 0. Unknown
 1. None
 2. Some grade school
 3. Grade school
 4. Some high school
 5. High school degree
 6. Some college
 7. College degree or higher
 8. Other
 9. Refused to answer

Q17. (2) 2
 (3) 8
 (4) 15
 (5) 52
 (6) 35
 (7) 48

52. ___ 17b. If other, describe _____

53. _____	18. What is the combined annual income of all members of your household? Would you say it is:	Q18.	(1) 12
			(2) 25
			(3) 34
	1. Under \$5,000 _____	4. \$15,000 to \$19,999 _____	(4) 22
	2. \$5,000 to \$9,999 _____	5. \$20,000 to \$24,999 _____	(5) 16
	3. \$10,000 to \$14,999 _____	6. \$25,000 or more _____	(6) 18
54. _____	19. What kind of job do you do? _____ (Get job title)	Q19.	(1) 47
			(2) 15
			(3) 20
55. _____	0. Unknown		(4) 16
	1. Professional, technical, and kindred workers _____		(5) 15
	2. Managers and administrators, except farms _____		(6)
	3. Sales workers _____		(7) 1
	4. Clerical and kindred workers _____		(8) 14
	5. Craftsmen, foremen, and kindred workers _____		(9)
	6. Operatives, except transport _____		(10) 1
	7. Transport equipment operators _____		(11) 12
	8. Laborers, except farms _____		(12) 1
	9. Farmers and farm managers _____		(13) 24
	10. Farm laborers and farm foremen _____		
	11. Service workers, except private household _____		
	12. Private household workers _____		
	13. Unemployed _____		

Survey G2 - General Population Transportation Survey

This May-June 1978 telephone survey was designed to provide basic data on commuter characteristics in the Knoxville area and to indicate the extent of KCP's impacts on area commuters in general (most importantly those who had not received matchlists). The survey questions sought data on:

- awareness of KCP, sources of information about it , and attitudes toward it
- commuter demographic and worktrip characteristics
- attitudes toward car and vanpooling
- the impact of KCP on travel behavior

The survey population was restricted to commuters living within the East Tennessee Development District and working in the Knoxville "core area" in which KCP's activities were concentrated; this included Anderson, Blount, Knox and Union Counties, plus the Oak Ridge area in Roane County.

Respondents were selected by random digit dialing of non-business telephone exchanges within ETDD; calls were made on weekday evenings and during the day on weekends. Since a pretest conducted in May 1978 yielded a disproportionately high percentage of female respondents (relative to the 36% estimated from Tennessee Department of Employment Security data (67)), a quota was established to limit the number of females responding. The total sample size was 480.

FILL IN: Hello, this is _____. I am conducting a survey about transportation and commuting patterns in your area. Could I have a few minutes of your time to ask you some questions?

FILL IN: ID# _____ (1-4)
Card # 1 (5)

1. Do you travel to work regularly?

- 478 Yes (1) No (2)

CONTINUE AT 2

If both "yes" and "no", code only "yes."

ASK IF THERE IS A COMMUTER IN THE HOUSE WITH WHOM YOU MAY SPEAK; IF SO, RETURN TO QUESTION 1 ON THIS FORM. OTHERWISE, TERMINATE.

Q1. _____ (6)

2. In what county do you work?

If both core and non-core, code only core.

- | CORE | | NON-CORE | |
|--|---|--|--|
| 62 <input type="checkbox"/> Anderson (01) | <input type="checkbox"/> Campbell (06) | <input type="checkbox"/> Louden (12) | |
| 54 <input type="checkbox"/> Blount (02) | <input type="checkbox"/> Claiborne (07) | <input type="checkbox"/> Monroe (13) | |
| 308 <input type="checkbox"/> Knox (03) | <input type="checkbox"/> Cocke (08) | <input type="checkbox"/> Morgan (14) | |
| 4 <input type="checkbox"/> Union (04) | <input type="checkbox"/> Grainger (09) | <input type="checkbox"/> Roane/not U.C. (15) | |
| 50 <input type="checkbox"/> Roane/ ^{employed at} Union Carbide (05) | <input type="checkbox"/> Hamblen (10) | <input type="checkbox"/> Scott (16) | |
| | <input type="checkbox"/> Jefferson (11) | <input type="checkbox"/> Sevier (17) | |
| | | <input type="checkbox"/> Other (18) | |

CONTINUE AT 3

IF RESPONDENT WORKS IN (NON-CORE) COUNTIES 06 - 18, ASK IF THERE IS ANOTHER COMMUTER IN THE HOUSE WITH WHOM YOU MAY SPEAK, IF ONE IS AVAILABLE, RETURN TO QUESTION 1 ON THIS FORM. OTHERWISE, TERMINATE.

Q2. _____ (7-8)

3. Have you heard or seen anything about the Knoxville Commuter Pool?

- 350 Yes (1) 128 No (2)

IF "NO", SKIP TO

7

Q3. _____ (9)

4. How did you learn about the Commuter Pool?

UP TO TWO (2) ANSWERS

- | | |
|---|---|
| 108 <input type="checkbox"/> At place of employment (01) | 51 <input type="checkbox"/> Radio (06) |
| 49 <input type="checkbox"/> Friends in the community (02) | 50 <input type="checkbox"/> Saw van (07) |
| 96 <input type="checkbox"/> Television (03) | 17 <input type="checkbox"/> Other (specify) _____ |
| 84 <input type="checkbox"/> Newspaper (04) | |
| 12 <input type="checkbox"/> Posters/Billboards (05) | 8 <input type="checkbox"/> No answer/Don't know/None (99) |

Q4. 1 _____ (10-11)

2) _____ (12-13)

5. What forms of commuter pooling do you associate with the program?

- | | |
|---|--|
| 41 <input type="checkbox"/> Car (01) | 24 <input type="checkbox"/> Car and Van (04) |
| 152 <input type="checkbox"/> Van (02) | 6 <input type="checkbox"/> Car and Express Bus (05) |
| 15 <input type="checkbox"/> Express Bus (03) | 13 <input type="checkbox"/> Van and Express Bus (06) |
| 21 <input type="checkbox"/> Other (specify) _____ | 10 <input type="checkbox"/> Car, Van and Express Bus (07) |
| | 68 <input type="checkbox"/> No answer/Don't know/None (99) |

Q5. _____ (14-15)

6. Have you ever received a list of people who might be able to carpool or vanpool with you and/or personalized bus information from the Knoxville Commuter Pool?

- 64 Yes (1) 278 No (2) 5 Received form containing no information (3)
3 Don't Know

Q6. _____ (16)

CONTINUE AT 7.

7

What kind of work do you do? _____

GET JOB TITLE

3 No Answer

Coding Categories:

- | | | | | | |
|-----|----|---|----|----|---|
| 117 | 01 | Professional, technical and kindred workers | 33 | 06 | Operatives, except transport |
| | | | 15 | 07 | Transport equipment operators |
| 51 | 02 | Managers and administrators, except farm | 34 | 08 | Laborers, except farm |
| | | | 1 | 09 | Farmers and farm managers |
| 36 | 03 | Sales workers | 0 | 10 | Farm laborers and farm foremen |
| 60 | 04 | Clerical and kindred workers | 64 | 11 | Service workers, except private household |
| 58 | 05 | Craftsmen, foremen and kindred workers | 6 | 12 | Private household workers |

Q7. _____
(17-18)

8. Are you a licensed driver? 462 Yes (1) 16 No (2)

Q8. _____
(19)

9. Is a household vehicle regularly available for you to drive or ride to work? Yes (1) 453 No (2) 25

Code "NO (2)" in both Q9 and Q10.

SKIP TO 11

Q9. _____
(20)

10. Is the use of this vehicle necessary for your job? Yes (1) 276 No (2) 202

Q10. _____
(21)

11 Where are you employed?

Employer's Name: _____

Employer's Location: (City) _____

Q11. _____
(22-23)

12. How many days per week do you generally travel to work?

2 1 3 2 16 3 22 4 360 5 52 6 23 7

Q12. _____
(24)

13. Approximately how many miles do you travel to work, one way?

21 Don't Know (-09) N = 457; X = 11.840 min. = 1 max. = 111

Q13. _____
(25-27)

14. How do you presently travel to work?

INTERVIEWER: IF MORE THAN ONE MODE IS SPECIFIED, ASK HOW MANY DAYS PER WEEK EACH MODE IS USED. RECORD THE NUMBER OF DAYS (IN EACH DIRECTION) FOR EACH MODE. IF CARPOOL/VANPOOL IS USED, SKIP TO QUESTION 21. IF BUS IS USED (AND CARPOOL/VANPOOL IS NOT USED), SKIP TO QUESTION 26. OTHERWISE, CONTINUE AT QUESTION 15.

IF ONLY ONE MODE IS SPECIFIED, RECORD NUMBER OF DAYS (IN EACH DIRECTION) FROM QUESTION 12 (ABOVE) AND PROCEED AS INDICATED.

Q14. DA _____
(28) (29)

DW _____
(30) (31)

W _____
(32) (33)

DAYS

TO FROM

358 Drive Alone

42 41 Drive or ride only with household members

13 12 Walk

4 4 Other (specify): _____

DAYS

TO FROM

62 63 Carpool

4 4 Vanpool

SKIP TO 21

DAYS

TO FROM

9 10 Regular Bus

5 5 Express Bus

SKIP TO 26

NOTE: Numbers indicate how many use mode at least 1 day/week.

CP _____
(34) (35)

VP _____
(36) (37)

RB _____
(38) (39)

EB _____
(40) (41)

OT _____
(42) (43)

OT _____
(44) (45)

CONTINUE AT 15

15. Approximately how many minutes does this trip take, one way? _____

Don't Know (-09) N=391; \bar{x} = 19.118 min = 1 max = 68

Q15. _____
(46-48)

16. What do you estimate is your daily commuting cost by the means you use most often for each of the following categories?

\$ _____ automobile operating expenses

READ CATEGORIES

\$ _____ parking

\$ _____ other (specify) _____

N = 279; \bar{x} = 272.423; min = 5 max \geq 999

Code Total
in Cents

Q16. _____
(49-51)

No idea/Don't know (-09)

17. Have you changed the means by which you travel to or from work since January 1976?

Yes (1)
46

No (2)
363

SKIP TO 32

Q17. _____
(52)

18. By what other means did you travel during this period? Multiple OK; ORDER

8 Drove alone (1)

6 Drove or rode only with household members (2)

3 Walked (3)

3 Other (specify) _____

24 Carpool (4)

1 Vanpool (5)

4 Regular Bus (6)

1 Express Bus (7)

SKIP TO 32

If any above go to Q19; if multiple, ask about most recent above

Q18. _____
(53)

Code most recent first

19. How long had you used [mode] before stopping?
27 responding: range from 1 to 72
_____ years _____ months

Code in Months
if > 99, code 99

Q19. _____
(55-56)

20. Why did you stop travelling by [mode]?

UP TO TWO (2) ANSWERS

10 Changed trip or job (01)

7 Schedule differences (02)

1 Needed car at work (03)

2 Interfered with overtime (04)

1 Excessive travel time or distance (05)

0 Personality conflict (06)

0 Lack of comfort (07)

1 Lack of privacy (08)

11 Other (specify) _____

Q20. 1) _____
(57-58)

2) _____
(59-60)

SKIP TO 32

ASK FOR CURRENT CARPOOL AND VANPOOL MEMBERS ONLY

66 responding
range 1 to 13

21 How many other people, besides you, are in your pool? _____ people

Q21. _____
(61-62)

22. Is everyone in your pool employed by the same company?

Q22. _____
(63)

58 Yes (1) 8 No (2)

22a. How many companies are represented? _____

Q22a. _____
(64-65)

23. In your car/vanpool, do you?

17 only ride (1)

44 share driving (3)

40 responding
range 1 to 5

Q23. _____
(66)

5 only drive (2)

23a. With how many others do you share the driving? _____

Q23a. _____
(67-68)

24. Approximately how many minutes does your car/vanpool trip take you, one way? _____
 Don't Know (-09)

Q24. _____
(69-71)

N = 64; \bar{x} = 28.047; min = 5, max = 90

25. What do you estimate is your average daily commuting cost for each of the following categories when you are pooling?

\$ _____ automobile operating expense

\$ _____ parking

\$ _____ fare

\$ _____ other (specify): _____

No idea/Don't Know/None (-09)

READ
CATEGORIES

Code Total
in Cents

Q25. _____
(72-74)

N = 44; \bar{x} = 267.477

SKIP TO 28

min = 40
max ≥ 999

ASK FOR CURRENT BUS RIDERS ONLY.

26 Approximately how many minutes does your bus trip take you, one way? _____

Q26. _____
(75-77)

Don't Know (-09) N=14; \bar{x} = 27.5; Min = 15
Max = 60

27. What is your daily commuting cost for riding the bus to and from work?

\$ _____ fares and transfers

\$ _____ other (specify): _____

No Idea/Don't Know/None (-09)

Code Total
in Cents

Q27. _____
(78-80)

CONTINUE AT 28.

N = 14; \bar{x} = 71.429
min = 40
max = 90

ASK FOR ALL CURRENT RIDESHARERS (CARPOOL, VANPOOL, OR BUS).

28

How long ago did you start ridesharing? 77 responding
range 1 to 360
median = 24
Code in Months

___ years ___ months

29. Has ridesharing allowed you to delay or cancel your plans to buy a vehicle?

13 Yes (1) 62 No (2) 1 Have to buy sooner (3)

30. Has ridesharing allowed you to sell a household vehicle?

6 Yes (1) No (2) 66

7 Did not previously have or use a vehicle (3)

30a. What use is now being made of the vehicle you previously used for commuting?

- 19 I'm still driving it (01)
- 19 vehicle remains unused at home (02)
- 3 vehicle is used for part of commuting trip (03)
- other (specify) _____

20 vehicle is used part of the week for commuting (04)

18 vehicle used by other household members (05)

Can be both

IF "used by other" IS SPECIFIED, ASK:

30b. Approximately how many miles per week is this vehicle used, during your working hours, by other household members?

12 responding;
range 10 to 490
___ miles

31. How did you get to work before your present means of ridesharing?

- 34 drove alone (01)
- 3 drove or rode only with household members (02)
- 5 walked (03)
- 2 other (specify) _____
- 13 carpool (04)
- 0 vanpool (05)
- 12 regular bus (06)
- 1 express bus (07)
- 8 didn't make trip (99)
- 1 no answer

CONTINUE AT 32

ID# _____
(1-4)

Card # 2
(5)

Q28. _____
(6-8)

Q29. _____
(9)

Q30. _____
(10)

Q30a. _____
1) _____
(11-12)

2) _____
(13-14)

Q30b. _____
(15-17)

Q31. _____
(18-19)

32 Has your means of travelling to or from work ever been influenced in any way by the activities of the Knoxville Commuter Pool?

No (2) Yes (1)
 460 ↘ 18



32a. How? _____

Q32. _____
 (20)

INTERVIEWER: PROBE RESPONDENT FOR ANSWERS TO 33 and 34.

33. What features do you personally like most about carpooling or vanpooling?
UP TO 3 ANSWERS

- | | |
|--|--|
| 234 <input type="checkbox"/> cost savings (01) | 25 <input type="checkbox"/> solves parking problems (05) |
| 97 <input type="checkbox"/> relief from driving (02) | 102 <input type="checkbox"/> companionship (06) |
| 14 <input type="checkbox"/> makes my car available (03)
to others | 18 <input type="checkbox"/> time savings (07) |
| 19 <input type="checkbox"/> delays buying another
car (04) | 86 <input type="checkbox"/> energy conservation (08) |
| 51 <input type="checkbox"/> other(s) (specify) _____ | 134 <input type="checkbox"/> none (99) |

Q33. _____
 1) _____
 (21-22)
 2) _____
 (23-24)
 3) _____
 (25-26)

34. What features do you personally like least about carpooling or vanpooling?
UP TO 3 ANSWERS

- | | |
|---|--|
| 205 <input type="checkbox"/> schedule inconvenience (01) | 12 <input type="checkbox"/> don't know |
| 18 <input type="checkbox"/> distance inconvenience (02) | 122 <input type="checkbox"/> reduced independence and
mobility (06) |
| 35 <input type="checkbox"/> increased travel time (03) | 36 <input type="checkbox"/> cannot use vehicle during
the day (07) |
| 31 <input type="checkbox"/> reduced privacy (04) | 26 <input type="checkbox"/> reduced comfort (08) |
| 8 <input type="checkbox"/> increased expense (05) | 23 <input type="checkbox"/> harder to work overtime (09) |
| 35 <input type="checkbox"/> other(s) (specify) _____
_____ | 28 <input type="checkbox"/> personality conflicts (10) |
| | 121 <input type="checkbox"/> none (99) |

Q34. _____
 1) _____
 (27-28)
 2) _____
 (29-30)
 3) _____
 (31-32)

35. Do you feel that the Knoxville Commuter Pool is worth continuing?
 275 Yes (1) 100 For others only (2) 10 No (3) 93 Not sure (4)

Q35. _____
 (33)

36. Would you be willing to pay a small fee for the kind of ridesharing information the Knoxville Commuter Pool provides, for example, a list of people with whom you might carpool?
 119 Yes (1) 351 No (2) **Comments** 67 responding
 range 8 to 2500

Q36. _____
 (34)

PROBE FOR FEE SIZE : CODE IN CENTS → $\bar{x} = 395.045$

Q36a. _____
 (35-38)

CONTINUE AT 37.

37. In what county do you live?

Q37. _____
(39-40)

- | | | |
|---|---|--|
| 66 <input type="checkbox"/> Anderson (01) | 2 <input type="checkbox"/> Campbell (06) | 12 <input type="checkbox"/> Louden (12) |
| 65 <input type="checkbox"/> Blount (02) | 0 <input type="checkbox"/> Claiborne (07) | 5 <input type="checkbox"/> Monroe (13) |
| 275 <input type="checkbox"/> Knox (03) | 1 <input type="checkbox"/> Cocke (08) | 4 <input type="checkbox"/> Morgan (14) |
| 9 <input type="checkbox"/> Union (04) | 5 <input type="checkbox"/> Grainger (09) | 10 <input type="checkbox"/> Roane/ <u>not</u> Oak Ridge (15) |
| | 2 <input type="checkbox"/> Hamblen (10) | 0 <input type="checkbox"/> Scott (16) |
| 9 <input type="checkbox"/> Roane/Oak Ridge (05) | 5 <input type="checkbox"/> Jefferson (11) | 8 <input type="checkbox"/> Sevier (17) |

38. To which age group do you belong? Are you: 20 Under 20 (1)

Q38. _____
(41)

284 20-44 (2) 164 45-64 (3) 10 65 or over (4) 0 No answer (9)

39. What is the last grade or year of school you completed?

PROBE

Q39. _____
(42)

- | | |
|--|---|
| 0 <input type="checkbox"/> No formal schooling (1) | 36 <input type="checkbox"/> Technical training (5) |
| 40 <input type="checkbox"/> Grade school (2) | 90 <input type="checkbox"/> Some college (6) |
| 60 <input type="checkbox"/> Some high school (3) | 113 <input type="checkbox"/> College degree or higher (7) |
| 137 <input type="checkbox"/> High school diploma (4) | 2 <input type="checkbox"/> Refused to answer (9) |

INTERVIEWER: MARK RESPONDENT'S SEX. IF NOT CERTAIN, ASK.

40. Are you: 302 Male (1) or 176 Female (2) ?

Q40. _____
(43)

41. Which of the following categories includes the combined annual income of all members of your household?

Q41. _____
(44)

- | | |
|---|--|
| 18 <input type="checkbox"/> Less than \$5,000 (1) | 152 <input type="checkbox"/> \$15,000 - \$24,999 (4) |
| 71 <input type="checkbox"/> \$5,000 - \$9,999 (2) | 95 <input type="checkbox"/> \$25,000 or over (5) |
| 98 <input type="checkbox"/> \$10,000 - \$14,999 (3) | 44 <input type="checkbox"/> Refused to answer (9) |

THANK YOU FOR YOUR ASSISTANCE!

Comments: _____

INTERVIEWER: DID YOU ENCOUNTER ANY PROBLEMS IN DETERMINING HOW TO INDICATE ANY OF THE RESPONSES?

- | | |
|-------------------------------------|---|
| 37 <input type="checkbox"/> Yes (1) | ••••• <input type="checkbox"/> No (2) 441 |
|-------------------------------------|---|

Please explain. _____

I. _____
(45)

Survey F - Vanpool Driver/Rider Survey

The purpose of this survey was to obtain information about individuals participating in KCP vanpools and the nature of their vanpooling trips. The survey was designed to collect information on:

- characteristics of vanpool drivers and riders and their work trips
- previous work trip modes
- attitudes toward vanpooling

The survey population included all KCP vanpool drivers and riders who had participated for at least two months between January 1, 1976 and April 30, 1977. Twelve forms were distributed to each vanpool operator with instructions to fill out one and distribute the rest among his or her riders. More than 500 forms were distributed in this manner and 297 usable completed forms were returned through the drivers to KCP.

Vanpools



KNOXVILLE COMMUTER POOL

As part of the evaluation of the Knoxville Commuter Pool program, we are attempting to learn more about the characteristics of those individuals participating in vanpools so improvements can be made in the program. Please complete this form and return it to the van driver in the attached envelope. Your cooperation in completing this form is greatly appreciated.

PLEASE DO NOT MARK IN THIS COLUMN

1 2
3 4
5 6
7 8 9 10
11 12
13 14
15 16
17 18 19
20 21 22
23 24
25
26 27
28 29 30
31 32 33 34
35 36 37 38
39 40 41 42
43 44 45 46
47 48 49 50

- HOW DO YOU MOST OFTEN GET TO THE VAN PICK-UP POINT IN THE MORNING? (Please check one)

<input type="checkbox"/> Dropped off by someone at pick-up point	<input type="checkbox"/> Picked up at my house by van
<input type="checkbox"/> Park my vehicle at pick-up point	<input type="checkbox"/> Walk
<input type="checkbox"/> Other _____ (Please specify)	
- IF YOU ARRIVE BY VEHICLE TO THE PICK-UP POINT, APPROXIMATELY HOW MANY MILES IS IT FROM YOUR HOME TO THE PICK-UP POINT? About _____ miles.
- BEFORE JOINING THE VANPOOL, HOW DID YOUR USUALLY TRAVEL TO WORK? (Please check one)

<input type="checkbox"/> Bus	<input type="checkbox"/> Drove with other members of family
<input type="checkbox"/> Drove my own vehicle alone	<input type="checkbox"/> Carpooled with 1 2 3 4 5 6 other riders
<input type="checkbox"/> Other _____ (Please specify)	
- WHAT DATE DID YOU BEGIN VAN POOLING? _____
Month Day Year
- WHAT ARE YOUR REASONS FOR RIDING IN A VAN POOL? (Check those applicable)

<input type="checkbox"/> Make your vehicle available for someone else to use during the day	<input type="checkbox"/> Avoid driving every day
<input type="checkbox"/> More dependable than regular bus service	<input type="checkbox"/> Save money
<input type="checkbox"/> Availability or cost of parking at work	<input type="checkbox"/> Do not own a car
<input type="checkbox"/> Avoid buying a second car	<input type="checkbox"/> Conserve gasoline
<input type="checkbox"/> Other _____ (Please specify)	

WHAT ARE YOUR DISLIKES ABOUT VAN POOLING? (Check those applicable)

<input type="checkbox"/> Inconvenient	<input type="checkbox"/> Uncomfortable ride
<input type="checkbox"/> Do not like personalities of other riders in the pool	<input type="checkbox"/> Too expensive
<input type="checkbox"/> Lack of privacy	<input type="checkbox"/> Travel time is too long
<input type="checkbox"/> Not able to leave work at any time	<input type="checkbox"/> Can not work overtime
<input type="checkbox"/> Other _____ (Please specify)	
- APPROXIMATELY HOW MANY MILES IS IT FROM YOUR HOME TO WORK? About _____ miles.
APPROXIMATELY HOW MANY MINUTES DOES IT TAKE? About _____ minutes.
- HOW MANY YEARS HAVE YOU BEEN MAKING THE TRIP FROM YOUR HOUSE TO YOUR PRESENT WORK PLACE? About _____ years.
- HOW MANY VEHICLES ARE AVAILABLE IN YOUR HOUSEHOLD FOR TRAVELING TO WORK? (Please check one)

<input type="checkbox"/> None	<input type="checkbox"/> 2 vehicles	<input type="checkbox"/> 4 or more vehicles
<input type="checkbox"/> 1 vehicle	<input type="checkbox"/> 3 vehicles	
- YOUR ARE:

<input type="checkbox"/> Male	<input type="checkbox"/> Female
<input type="checkbox"/> Married	<input type="checkbox"/> Single
- YOUR AGE: (Please check one)

<input type="checkbox"/> Under 21	<input type="checkbox"/> 31 - 40	<input type="checkbox"/> 51 - 60
<input type="checkbox"/> 21 - 30	<input type="checkbox"/> 41 - 50	<input type="checkbox"/> Over 60
- YOUR FAMILY INCOME IS: (Please check one)

<input type="checkbox"/> Under \$4,000	<input type="checkbox"/> \$8,000 - \$12,000	<input type="checkbox"/> \$16,000 - \$20,000
<input type="checkbox"/> \$4,000 - \$8,000	<input type="checkbox"/> \$12,000 - \$16,000	<input type="checkbox"/> Over \$20,000
- WHAT LEVEL OF EDUCATION HAVE YOU COMPLETED? (Please check one)

<input type="checkbox"/> Less than 8 years	<input type="checkbox"/> Some College or technical training
<input type="checkbox"/> Some high school	<input type="checkbox"/> College graduate
<input type="checkbox"/> High school graduate	<input type="checkbox"/> Advanced graduate degree
- WHAT IS YOUR JOB DESCRIPTION?

(Job title or description)

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APPENDIX D

Report of New Technology

A thorough review of the work performed under this contract has revealed no significant innovations, discoveries, or inventions at this time. In addition, all methodologies employed are available in the open literature. However, the findings in this document do represent new information and should prove useful throughout the United States in designing and evaluating future transportation brokerage systems.

