

Private Sector Involvement in Sponsoring Sunday Bus Service

ARUN CHATTERJEE AND FREDERICK J. WEGMANN

An increasing amount of deficit and lack of public funds to make up a financial shortfall forced the Knoxville Transit Authority of Knoxville, Tennessee, to eliminate the Sunday bus service operated by K-TRANS. The rationale for the elimination was that the cost-effectiveness of K-TRANS service was lowest on Sundays, in comparison with any other day of the week. Before Sunday service was discontinued, K-TRANS was accommodating ~750 trips (boardings) on an average Sunday, whereas the number of trips on an average weekday was ~15,000. After the decision to discontinue Sunday bus service was made public, the management of two regional shopping centers contacted K-TRANS and expressed their interest in sponsoring Sunday bus service to each mall for 12 Sundays during and after the November-December holiday season. Both routes were designed as loops to serve several housing complexes for low-income families and the elderly and several student housing units, as well as the respective malls and downtown area. The two distinct issues addressed are the effectiveness of providing privately funded transit service targeted for a selected market in an environment where transit ridership generally has been low and the effectiveness of a targeted service focusing on a few major generators in replacing an existing transit service with areawide coverage. The latter issue is of particular interest to planners.

On October 23, 1986, an increasing amount of deficit and lack of public funds to make up a financial shortfall forced the Knoxville Transit Authority (KTA) of Knoxville, Tennessee, to eliminate the Sunday bus service operated by K-TRANS. The rationale behind the elimination of Sunday service was that the cost-effectiveness of K-TRANS service, which is reflected by such indicators as passengers carried for each dollar spent and passengers per vehicle-mile of service, was lowest on Sundays, in comparison with any other day of the week. Before the Sunday service was discontinued, K-TRANS accommodated ~750 trips (boardings) on an average Sunday. In contrast, the number of trips on an average weekday was ~15,000 and on an average Saturday, ~6,000. The last day of regular Sunday service financed by public funds was November 1, 1986.

The Sunday service was discontinued in spite of a highly charged emotional protest from a citizen's group that voiced concern about the mobility needs of riders who had come to rely on transit service on Sundays. After the public learned of the decision to discontinue Sunday bus service, the management of East Towne Mall shopping center contacted K-TRANS and expressed their interest in sponsoring Sunday bus service to the mall for 12 Sundays during and after the

November-December holiday season, with the cost of the service paid by East Towne Mall. Soon after learning of the proposed Sunday bus service to East Towne Mall, the management of West Town Mall approached K-TRANS with a similar proposal for supporting a route on the west side of town. Both routes were designed as loops to serve several housing complexes for low-income families and the elderly and several student housing units, as well as the respective malls and the downtown area.

OBJECTIVE

One of the issues addressed by this case study is the effectiveness of providing privately funded transit service targeted for a selected market in an environment where transit ridership generally has been low. The other issue, which is of interest to planners, is the effectiveness of a targeted service focusing on a few major generators in replacing an existing transit service with areawide coverage.

SERVICE OPERATION AND ROUTES

The schedules and service operation patterns were identical on both routes. Two buses were assigned to each route of the Shopper's Express service so that a total of four buses operated in Sunday service. On each route, one bus left downtown at 11:00 a.m. while the other left the shopping center at the same time. These two buses operated in opposite directions on the loop-shaped route, one clockwise and the other counterclockwise. The travel time from one end of the route to the other (mall to downtown) was 30 minutes. Buses therefore left each terminal of a route every 30 minutes. The last bus left a shopping center at 5:00 p.m., and that bus went to the garage after arriving downtown at 5:30 p.m. Before the service discontinuation, K-TRANS operated 12 buses on hourly headways between 8:00 a.m. and 4:30 p.m. The new Shopper's Express service duplicated ~36 percent of the regular Sunday route service.

Service on both routes began November 9, 1986, and operated for 12 consecutive Sundays. The fare was \$0.50 per ride for all passengers, and free transfer was permitted between the two routes. In comparison, the fares for regular Sunday service were \$0.75 for adults, \$0.35 for the elderly and handicapped, and \$0.20 for transfers.

The routes were designed by the staff of K-TRANS in consultation with the sponsors. An attempt was made to maximize coverage and integrate as many sources of potential

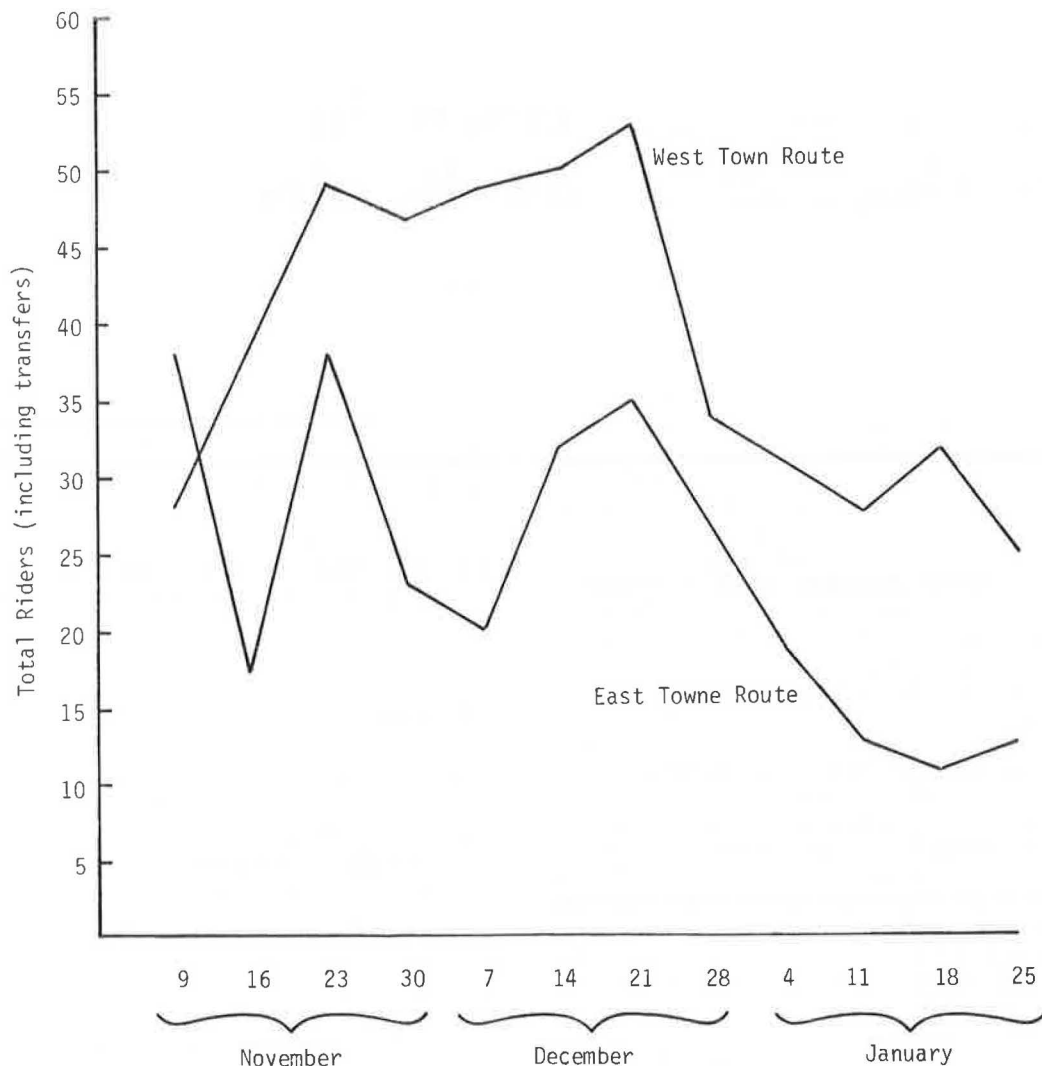


FIGURE 1 Ridership trends.

customers as was feasible within the constraint of the available number of buses and the desired maximum headway. Although portions of these routes were similar to those of some of the regular K-TRANS routes that had operated on Sundays, the new routes did not duplicate any of the previous routes entirely. Although the Shopper's Express service was sponsored by private funds—the management of the two shopping malls—passengers were not restricted from using the service to and from any location along the routes, and they did not have to visit the malls.

The time between the agreements with the mall management and the beginning of the Shopper's Express service was too short for an elaborate marketing campaign. In addition to reports about the service that were published in local newspapers, the primary promotional effort was the distribution of flyers (or announcements) on the regular buses and at selected sources of potential riders, such as the housing complexes mentioned previously.

SERVICE USE

The new Shopper's Express service was provided for 12 consecutive Sundays. The daily ridership patterns of both routes

are depicted in Figure 1. The highest number of boardings on the West Town route occurred on December 21, 1986, which was the Sunday preceding Christmas Day, and the lowest number of boardings occurred on January 25, 1987, which was the last day of service. The pattern of variation of ridership on the East Towne route was slightly different. The highest number of boardings on the East Towne route occurred during the first day of service and again on the third day, both of which were in November. The number of boardings on the Sunday preceding Christmas was slightly lower than those of the highest days in November. The day with the lowest number of boardings on the East Towne route occurred just before the last day. Overall, the West Town route carried 1.6 times as many passengers as the East Towne route.

Monthly ridership records indicated that the total ridership for November was nearly equal that of December. During these 2 months, the West Town Mall route carried an average of 44 riders each Sunday, while the East Towne Mall route carried an average of 29 riders. During January, ridership decreased, and the West Town route carried an average of 29 riders each day, while the East Towne route carried an average of 14 riders each day. By comparison, the average system ridership was 750 boardings per Sunday before the regular service was discontinued.

TABLE 1 SERVICE EFFECTIVENESS MEASURES

Month	West Town Route		East Towne Route	
	Passengers per VMT	Passengers per Round Trip	Passengers per VMT	Passengers per Round Trip
November 1986	0.16	3.3	0.12	2.3
December 1986	0.18	3.8	0.12	2.3
January 1987	0.11	2.3	0.06	1.1
Average	0.15	3.1	0.10	1.9

The 12-Sunday service provided by K-TRANS for the malls operated between 11:00 a.m. and 5:00 p.m. About 33 percent of regular Sunday ridership occurred before 11:00 a.m., which is consistent with 35 percent of service delivered before 11:00 a.m.

The effectiveness of a transit service is usually measured in terms of passengers carried, and in this respect the West Town route was more effective than the East Towne route. Nevertheless, the ridership on both routes was low. Together, the two buses on the West Town route provided 12.5 round trips per day, generating 258 vehicle-miles of travel (VMT). The East Towne route also had 12.5 round trips per day, but its VMT was 240 per day.

It can be noted in Table 1 that even during December, when the ridership was highest, the number of passengers carried (boardings) per VMT on the West Towne route was only 0.18. The value of the indicator "passengers carried per trip" during December was 3.8 passengers per round trip. In other words, there were ~2 passengers per one-way bus trip on the West Town route. On the East Towne route, on the average, there was only 1 passenger per one-way bus trip during November and December 1986.

If an average of 750 boardings per Sunday is used, it can be estimated that 503 boardings would have been served by the regular Sunday service during the time the mall service was operated. Given that the November–January period reflects average ridership on the K-TRANS system, it is clear that the contract service, with an average of 63 boarding per Sunday, served only a small percent of the previous ridership market. On a systemwide level for an average Sunday, K-TRANS previously served 0.61 passengers per vehicle-mile, or 0.46 full-fare paying passengers per vehicle mile, or 7.1 passengers per round trip. These statistics represent a level of use more than twice that experienced by the new service.

A general review of Sunday ridership characteristics indicates that the contract service to the two malls provided service to only a portion of the Sunday bus market. Operating during 6 of the previous 8 hours of service and providing 38 percent coverage of the previous 1,382 vehicle-miles of service, the replacement service was not able to capture a proportionate fraction of the ridership. The new service, which focused on the two malls, basically served the mobility needs of Sunday shoppers. This aspect is discussed in the next section.

CHARACTERISTICS OF RIDERS AND THEIR TRAVEL

On-Board Bus Survey

Information on the characteristics of riders and their trips was gathered from an on-board survey that was performed on

three Sundays during the 3-month operation of the bus service. During the survey, 117 people were contacted while they were riding the buses on the West Town and East Towne routes. Among these 117, 77 individuals responded to all the questions. Of these, 40 were found to have been previously interviewed that day. They were asked only about their purchases at the mall and suggestions for improving the service.

During January and February 1986 (that is, earlier that same year), an on-board ridership survey of K-TRANS regular service had been done as part of a transit improvement study performed jointly by K-TRANS, the Metropolitan Planning Commission, and consultants. This earlier survey, which included Sunday service, provided the opportunity for a comparison of the regular and replacement services through the findings of the two surveys.

Age and Sex

Information on the demographic characteristics of the riders of the replacement Sunday service (Shopper's Express) is presented in Table 2, which also includes information on the regular Sunday service. The age group that included the largest proportion of riders of the replacement service is 31 to 39 years (41 percent). In contrast, people 15 to 30 years of age made up the largest proportion (50 percent) of the regular Sunday service. Senior citizens (i.e., people 65 years of age or more) made up nearly the same proportion among both groups of riders: 14 percent for replacement service and 12 percent for regular service.

The male-female ratios among the bus riders were similar for both Sunday services. The proportion of females was 58 percent for the replacement Sunday service and 55 percent for the regular Sunday service.

TABLE 2 SUNDAY USER CHARACTERISTICS

Characteristics	Proportion of Users (%)	
	Replacement Service	Regular Service
Age (years)		
14 and younger	1	5
15–30	28	50
31–59	41	30
60–64	16	3
65 or older	14	12
Sex		
Male	42	45
Female	58	55
Race		
White	73	53
Black	27	43
Other	0	4

TABLE 3 TRANSIT DEPENDENCY OF SUNDAY SERVICE RIDERS

Characteristics	Proportion of Users (%)	
	Replacement Service	Regular Service
Vehicle Ownership		
No car	81	66
One car	16	23
Two or more cars	3	11
Driver's License		
Have	48	43
Do not have	52	57

TABLE 4 ALTERNATIVE MODES OF TRAVEL ON SUNDAY

Alternative	Proportion of Respondents (%)
None (could not make the trip this day)	72
Ride with someone	9
Drive own vehicle	0
Taxi	13
Walk	6
Other	0

Transit Dependency

Several of the survey questions were intended to determine how dependent the passengers were on public transportation. Three of these questions focused on the availability of alternative modes of travel and on driving ability. The first of these three concerned automobile ownership. As presented in Table 3, 81 percent of the replacement service riders did not have a vehicle in operating condition. The next question, directed to the remaining 19 percent (who had vehicles), asked whether they could have used a vehicle for the trip that they were making on the bus. In their replies, 79 percent of the car owners said that they could not have used their vehicles. Thus, on the basis of responses to these two questions combined, 96 percent of the riders could not have used a private vehicle for their travel and may be considered "captive" riders.

The corresponding information about the users of the regular Sunday service is also presented in Table 3. It can be observed that these riders had more mobility, given that the proportion of riders without automobiles was 66 percent. The proportion of captive riders among the users of regular Sunday service, on the basis of both vehicle ownership and vehicle availability, was 85 percent.

The third transit dependency question determined whether the riders possessed a currently valid driver's license or not. As Table 3 indicates, 52 percent of the users of the replacement service did not have a valid driver's license. In this respect, the users of the regular Sunday service were not significantly different.

The riders were also asked how they could have made the trip for which they were using the bus if the service had not been provided (Table 4). It was found that 72 percent of the respondents would not have made the trip. Among the alternative modes of travel that could have been used by some of the riders, taking a taxi and "riding with someone" were mentioned most frequently. Those who would not have made the trip were further asked if they would have made the trip

on some other day instead of Sunday, and 75 percent of them answered "yes." By combining the responses of these two questions, it may be concluded that ~18 percent of the respondents would not have made their trips without the replacement bus service.

Trip Purpose

One question sought information on why the riders were using the replacement bus service on Sundays. The results are presented in Table 5, which also includes comparable statistics for the regular Sunday service.

Although the replacement service was sponsored by the shopping malls, the riders were not restricted from traveling to other locations along the routes. Furthermore, although the sponsors were primarily interested in attracting shoppers, the service could have served other purposes as well. The results indicate that 68 percent of the trips/rides were for shopping. It is interesting to note, however, that 32 percent of the trips made on Shopper's Express service served other purposes. Work trips, for example, constituted 16 percent of the total. In addition, not all shopping trips were to the malls; 10 percent of all trips were for shopping at other locations. The analysis of boardings and alightings at different bus stops also confirmed that a substantial proportion of trips were not aimed at the malls.

It should be noted that, as might have been expected, the replacement Sunday bus service did not serve many trips made for religious purposes. In fact, only one trip was reported to have a religious purpose. Although no such information was available from the regular Sunday bus service survey, a separate survey performed in 1985 by the Knoxville Commuter Pool indicated that nearly a third of the Sunday bus trips were related to church. The starting time of the Shopper's Express service was 11:00 a.m., and the routes were not designed to serve churches.

TABLE 5 SUNDAY TRIP PURPOSE

Trip Purpose	Replacement Service (%)	Regular Service (%)
Work	16	29
Shop	68	38
At mall	58	
At other stores	10	
Medical	0	2
Social/recreation	8	7
Other	8	29
Religious	1	
Miscellaneous	7	

Other Related Travel Modes

The use of a fixed-route, fixed-schedule bus service often requires the use of other modes of transportation to and from transit stops. Other methods of travel are also sometimes needed to complete a portion of a trip circuit, such as the "return" or "beginning" portion of a round trip. Most of the replacement service riders (91 percent of the interviewees) walked to their bus stops. Also, as might have been expected, most of the replacement service riders (78 percent) used the bus service for both the beginning and return legs of their round trips. For the replacement service, this proportion was much higher than that for the regular Sunday service (58 percent). It is interesting to note that several people (16 percent for the replacement service and 31 percent for the regular service) used private automobiles and taxis for one of the legs of their round trips.

Previous Use of Sunday Bus Service

The survey revealed that 79 percent of the replacement service users had used the regular Sunday bus service before it was discontinued. From responses to inquiries about the frequency of regular Sunday service use, it was determined that, on the average, previous users had used the bus on three Sundays during October 1986 (the last month of regular service). This clearly indicated that the majority of the replacement service users were regular users of the discontinued service.

COST-EFFECTIVENESS ANALYSIS

The actual cost of operating the Shopper's Express service by K-TRANS on Sundays was about \$20 per bus-hour of service. This unit cost included driver's wage; fuel, oil, and other supply costs; and some maintenance expenses. The drivers who worked the Sunday service were extra board operators, and they were paid at regular ("straight time") rates.

On each Sunday the four buses used for the Shopper's Express provided 24 bus-hours of service, for which the K-TRANS costs were ~\$480. The shopping centers' management paid a fee of \$30 per bus-hour, which generated K-TRANS a revenue of \$720 for each Sunday. K-TRANS thus earned a profit of \$240 per Sunday for the new service. Before its discontinuation, the regular K-TRANS Sunday bus service cost ~\$3,000 per day and generated a revenue of only

\$300 per day. Thus K-TRANS previously lost ~\$2,700 each Sunday.

Because of the nature of the arrangement with the two shopping centers, K-TRANS' revenue did not depend on the level of ridership. The revenue generated by the riders, however, did help offset the costs incurred by the management of the two malls. Each management had made an advance commitment to pay K-TRANS a fixed fee of \$360 for each day's service, and it was agreed that the farebox revenues from each route would be credited to the respective mall managements.

During December 1986, the West Town route carried an average of 41 revenue passengers and 6 transfers per day, for a total of 47 riders per day. The revenue generated was thus only \$20.50 per day, and the net cost was \$339.50 per day. The West Town Mall management thus had to pay \$7.22 for each rider coming to the mall. These cost data are presented in Table 6, along with similar data for November 1986 and January 1987.

Ridership on the East Towne route was lower than that on the West Town route, and the net cost per day incurred by the East Towne management in December was \$348 per day. This cost corresponds to \$12 per rider coming to the mall. The ridership was lowest during January 1987, so the cost per rider was \$25.32—the largest cost recorded.

The assessment of the cost-effectiveness of the Sunday service from the standpoint of the management of the shopping centers would require information not only on the net costs but also on the dollar amount of purchases that the riders made at the stores. To obtain this information, the on-board survey included a direct question about the purchases and expenditures that riders made in the malls. On the basis of the answers, it was determined that, on the average, Sunday bus riders to the West Town Mall spent \$34.50 per person for food and nonfood purchases. On the average, riders to East Towne Mall indicated that they spent \$24.00 per person for food and nonfood purchases. Whether this expenditure level would justify the cost of providing the service depends on other factors, such as the type of purchase and the associated profit margin.

On the basis of information provided by the management of East Towne Mall, all shoppers on the average spend \$38.79 on nonfood purchases and \$4.50 on food items per visit to the mall, for a total of \$43.29. The shoppers in this average include those who do not spend any money at all. When these purchase amounts are compared with those reported by the replacement service riders (Table 7), it is evident that the transit patrons spent less than the average shopper.

TABLE 6 COSTS INCURRED BY MALL MANAGERMENTS

Month	Farebox Revenue per Day (\$)	Net Cost per Day (\$)	Net Cost per Rider (\$) ^a
West Town Route			
November 1986	19.00	341.00	8.32
December 1986	20.50	339.50	7.22
January 1987	13.00	347.00	11.79
East Towne Route			
November 1986	13.50	346.50	11.95
December 1986	12.00	348.00	12.00
January 1987	5.50	354.50	25.32

^aIncluding transfer.

TABLE 7 PURCHASES AT MALLS

Amount of purchase (\$)	West Town Mall	East Towne Mall
1-10 (Avg. 5)	11	10
11-25 (Avg. 17.50)	6	6
26-50 (Avg. 37.50)	8	2
51-100 (Avg. 75)	4	4
101-300 (Avg. 200)	1	0
	29	22
Average purchase per rider	\$34.50	\$24.00

As noted earlier, not all the Shopper's Express riders went to the malls. Even among those who did, some went for reasons other than shopping. In fact, only 68 percent of the replacement service riders went to the malls primarily to shop. In addition, as reported earlier, some of the Sunday service riders would have made their trips on a weekday if the replacement service had not been provided.

When the factors described in this section are considered, especially the small number of shoppers using the replacement service and the lower than average expenditures made by the riders, it is understandable that the tenants of the malls themselves were not willing to participate financially in this management-sponsored venture.

CONCLUSIONS

The Sunday replacement bus service in Knoxville was initiated as a public service by two private organizations: the managements of East Towne and West Town malls. The two managements contracted K-TRANS to provide this service for 12 Sundays during the November-December holiday season. The service was intended to serve two major purposes: to respond to an emotional public issue involving a community need and to stimulate business at the malls. It was not expected that the service would be financially profitable, but it was hoped that the service might "break even" financially. The magnitude of the actual losses was not expected, however, and the low rate of use was a disappointment to the mall sponsors, K-TRANS, and community leaders.

A possible explanation for the lack of rider response may be that the service was not a true replacement for the discontinued Sunday K-TRANS service. The mall-sponsored service was a Shopper's Express, operated to coincide with mall business hours, and the routes were structured to serve major housing complexes and the two malls.

The replacement service carried an average of 62.5 boardings per day and 750 boardings during its entire tenure of 12 days, whereas the regular K-TRANS Sunday service carried ~750 boardings per day. Some of these riders were previous Sunday bus users who used the service to reach destinations other than the mall. Although the two mall routes represented 38 percent of the previous Sunday route coverage and attempted to serve major transit-dependent housing units, the destinations of many of these Sunday riders were not accessible with the new service. Systemwide VMT per day decreased by 64 percent, from 1,382 to 498 vehicle-miles per day. The ridership decreased by 78 percent, so that the average decline in use was from 0.61 to 0.13 boardings per vehicle-mile.

In addition to the obvious differences in coverage and service hours, the replacement service was hampered by

- A route structure and fare schedule not familiar to former users;
- Inadequate time for a vigorous marketing effort in addition to the distribution of flyers;
- Lack of follow-up promotions by mall merchants; and
- Lack of a commitment to extend the service beyond the end of January.

The on-board surveys indicated that the privately sponsored Sunday service attracted transit dependents: 96 percent of the riders could be so classified. The major purpose of travel, as expected, was shopping (68 percent of trips). A large proportion of the riders were elderly; 30 percent of riders were more than 60 years old. Those who were not attracted by the replacement service include the young (55 percent of previous K-TRANS riders were 30 years or younger) and people traveling for work or religious purposes.

It is notable that 82 percent of the riders said that they could have made the trip at another time, no doubt because most of them were going shopping. Shopping trips are dif-

ferent in this regard from travel for work or appointments, in which postponement of activities and travel to other days is not usually an option.

Basically, the privately sponsored Sunday Shopper's Express service did not attract new Sunday riders. Even at the peak of the holiday season, the bus served primarily previous Sunday riders. Because of its limited route structure, however, the replacement service was only able to serve a portion of Sunday mobility needs. It also attracted segments of the market, such as elderly shoppers, who have flexibility in selecting alternative times of travel. In summary, the privately sponsored service never provided an effective replacement for regular Sunday K-TRANS service and was not able to attract its own clientele.

The managements of both East Towne and West Town Malls must be praised for their concern for the community and support of public transit. The public-private partnership

molded by this experiment may serve as a model for future efforts. Given declining public financial support for transit and the inability of transit management to easily alter routings and schedules to reflect changing land uses and transit demands, it is important to attract private support and resources. Public-private partnership opportunities should be explored for extending public transit services to special traffic generators that have developed beyond the existing transit routes.

The Sunday Shopper's Express experiment in Knoxville highlights the difficulty of achieving efficient use of resources in attempts to serve a stratified transit market during periods of low ridership. The concept of a system with access to an array of destinations is important in meeting the mobility needs of a diverse group of riders.

Publication of this paper sponsored by Committee on Bus Transit Systems.