

LESSONS LEARNED

The specific findings of the SEPTA management study cannot be generalized. SEPTA's improvement areas are unique to SEPTA; another transit system may perform well in a functional area of great concern to SEPTA but need improvement in an area of strong performance by SEPTA.

There are, however, some attitudes and procedures apparent from the SEPTA study that should have general applicability.

Funding governments can expect transit agencies, particularly those serving the larger cities, to have at least a few serious problems. Running a transit agency is an extremely difficult enterprise.

Modest cost increases lead to substantial deficit increases if revenues do not grow. Change is hard to effect, given strong unionization and the habits of transit riders. Public financial assistance results in red tape and pressures to undertake projects that exacerbate deficits. As a service well used by the young and the poor, transit is prone to security problems. In this environment, it would be highly unusual for a big-city transit system to be problem free. In order for a transit management study to be properly evaluated, funding governments must have an appreciation of these inherent difficulties.

Management studies are more effective if transit agencies recognize problem areas and enlist study efforts to develop solutions. These studies run contrary to human nature. People who work in an organization may be apprehensive during the course of a management study and defensive in review of study findings. These reactions are normal and should not reflect on either the employee or the study effort. Such responses can be attenuated by the transit agency's definition of its own problems, by placing the study team in a problem-solving capacity. However, the problems defined must go beyond general types, such as needing more money, to specific difficulties that can be improved through management action.

Diagnostic tools of themselves are not strong enough to support definitive conclusions. Peer-group analysis is a particularly controversial diagnostic tool. Peer-group statistics alone should never be the sole basis for a study finding. What the analysis can do, however, if carefully applied, is to focus detailed study efforts on critical areas. Other diagnostic tools, such as interviews, flowcharting, and environmental analyses, are similarly unreliable as the sole basis for conclusions.

In-depth research is needed for each suspected problem area and often requires independent data collection. After diagnostics are used to form hypotheses, in-depth

research tasks should be specially designed to test these hypotheses. There is no cookbook approach to this phase of a management study; the work must be tailored to fit the situation. One possibility that cannot be overlooked is that management is making the wrong decisions based on erroneous data. In these cases, independent data collection can provide a new perspective for management.

The improvement program resulting from a management study must be digestible in terms of both feasibility and phasing of improvement objectives. A management study that concludes with 118 shotgun recommendations is generally not very useful. Recommendations should be focused, prioritized, and phased into an implementable improvement program. This is not to say that each activity will be easy to accomplish or that all activities will be completed on schedule, but only that, as a program, it appears to be within the limits of management's capabilities.

REFERENCES

1. National Committee on Urban Transportation. Recommended Standards, Warrants and Objectives for Transit Services and Facilities. Public Administration Service, Chicago, 1958.
2. Peat, Marwick and Mitchell. Transit Operators Performance Audit Guide. Comprehensive Planning Organization of the San Diego Region, July 1976.
3. Financing and Evaluating Public Transit Systems in California: Report of the Office of the Auditor General to the Joint Legislative Audit Committee. California Office of the Auditor General, Sacramento, 1977.
4. American Public Transit Association. Policy Statement: Transit Performance Indicators. Oct. 13, 1977.
5. D. H. Goss. System Performance Indicators—The Need for Action Is Now! Presented at American Public Transit Association Mid-Year Meeting, Houston, May 18, 1978.
6. W. C. Underwood. Performance Indicators—A Necessary Management Tool? Presented at American Public Transit Association Mid-Year Meeting, Houston, May 18, 1978.
7. C. H. Graves. A Preliminary Proposal to Improve the Review of Short-Range Planning Activities. UMTA Memorandum, Dec. 14, 1977.

Publication of this paper sponsored by Committee on Public Transportation Planning and Development.

Impact of the 1977 Transit Strike in Knoxville

Frederick J. Wegmann and Arun Chatterjee, Department of Civil Engineering, University of Tennessee, Knoxville
 Samuel Parnell, Knoxville Department of Traffic Engineering
 G. Lindstrom Welch, Metropolitan Atlanta Rapid Transit Authority

The six-week strike from February 14 to March 28, 1977, of the Knoxville Transit Corporation (KTC) stranded 7000-8000 daily riders of regu-

lar bus routes and 600 daily riders of the express bus service. It also provided an opportunity to assess the impact of a temporary interruption of

public transportation service on a city of 200 000 people. Small sample surveys performed during and after the strike focused on those groups expected to be most severely affected. The study revealed that, although many discretionary trips of elderly and economically disadvantaged transit users were not taken, few cases of severe hardship were reported. Most individuals were able to satisfy their needs with the help of relatives, friends, and social service agencies. Many of the downtown merchants lost substantial business, and some were forced to temporarily lay off sales personnel. The transit system itself felt the most adverse and continuing impact from the strike. The decline in ridership on the regular routes was estimated to range from 7.2 to 16 percent; for express buses the ridership dropped by approximately 15 percent. The adverse impact on downtown parking was noticeable, but general traffic was not affected appreciably. Overall, everyone involved with public transportation—the city, labor union, transit users, and downtown merchants—would have been better off by averting the strike.

One question confronting many small and medium-sized cities today is what role public transportation ought to play in meeting the mobility needs of individual citizens. While transit operating costs continue to rise but fare revenue usually covers less than 50 percent of total costs, public decision makers are raising questions about the nature and extent of community benefits derived from public transit.

It is difficult to directly measure the benefits of public transit. However, an indirect approach is to examine the consequences of an interruption of service. Several hypothetical questions can be raised: How do citizens respond if transit service is no longer available, even on a temporary basis? What impact does this have on individual mobility? What is the impact on the total transportation system?

The six-week strike (February 14 to March 28, 1977) of the Knoxville Transit Corporation (KTC) stranded 7000-8000 daily fixed-route bus riders and 600 daily express riders (1). It provided an interesting and realistic opportunity to assess the impact of a temporary interruption of transit service on a medium-sized city.

Although transit service in Knoxville carries less than 3 percent of the total daily trips made, a recent transit planning study, the Transit Development Program, concluded that 84 percent of the riders on the fixed-route system could be classified as transit dependent. These individuals either possess no driver's license (60 percent of riders), own no automobile in the household (47 percent of riders), or have no automobile available at the time of a transit trip (61 percent of riders). It is also noteworthy that 22 percent of the riders are elderly, and 31 percent of the riders have annual household incomes (in 1976) of less than \$3000. It was feared that the loss of transit service might cause severe hardships to those individuals least able to make adjustments.

The impact of a transit strike also could spread to the business community. Employers might lose workers unable to commute and merchants might lose customers. Other institutions might have their operations hampered because of inability of users to gain access to their services. Activities in the central business district (CBD) might be adversely affected because more than 20 percent of daily transit trips were identified as ending in the CBD.

Express bus users, most of whom are riders by choice, might create a different situation. All express buses converge on the CBD at 7:45 a.m. and 4:45 p.m. each day. If riders shifted from the 13 KTC express buses, they could bring 300-500 additional automobiles into the already congested downtown area. All-day storage of these vehicles might further aggravate the downtown parking situation.

The object of this study was to identify the impact of the six-week transit strike on

1. Travel behavior and modal choice decisions of individuals representing major transit user groups,
2. Ridership and revenues of KTC,
3. Other suppliers of transportation services,
4. Traffic volumes and the use of downtown parking, and
5. Selected businesses, institutions, and employers.

The impact study was initiated when the transit strike began. Therefore, descriptions and data concerning prior conditions were based on secondary sources. Some impact data could not be obtained in precise and quantifiable form. For instance, because specific records either were not available or were proprietary in nature, effects on the business community were described in terms of general estimates.

Telephone surveys were used to collect as much information as possible from former transit users throughout the strike, but many transit dependents had no telephone access. Therefore, sampling procedures could not be used. Major emphasis was placed on interviewing individuals residing in housing clusters where large numbers of transit riders were known to reside.

It must be remembered that this research dealt with a temporary interruption in transit service, so impacts may not reflect long-term effects in many cases.

SURVEY AND DATA-COLLECTION PROCEDURES

In order to obtain current information, surveys were conducted during and immediately after the strike. The basic strategy was to identify and focus on users and institutions most likely to be affected.

Transit Users

Information on the strike's impact on transit-user households was obtained through telephone interviews and mailed questionnaire surveys during and after the strike. A transit-user household was defined as one having at least one individual who usually made at least one transit trip per week. The following segments were targets for the surveys:

1. Elderly (age 65 and over) living in public and private senior-citizen complexes,
2. Economically disadvantaged transit users living in public housing,
3. Regular transit users selected at random from individuals residing in areas of known high transit ridership, and
4. Express bus commuters working in the CBD area (largely middle-income, choice transit riders).

The survey was designed to gather information from each household on (a) use of KTC service before and after the strike for trip purposes; (b) changes, if any, in travel characteristics during and after the strike; (c) transportation modes used as substitutes during the strike; (d) reasons for continuing to use other modes after the strike and the likelihood that such changes would continue; (e) difficulties, inconveniences, and hardships caused by the strike; and (f) basic demographic characteristics of the selected group.

The surveys for the elderly, poor, and regular transit riders were conducted by telephone, and the sample sizes for these groups were 101, 100, and 50, respectively. After the strike 50 percent of the same households were contacted again. The express bus commuters of the Tennessee Valley Authority (TVA) were contacted by mail questionnaires.

Merchants, Employers, and Institutions

During and after the strike personal interviews were conducted with owners or managers of establishments whose employees and clients relied on public transit as a primary mode. The main focus was on those establishments in the CBD expected to be most severely affected. Larger manufacturers outside the CBD also were surveyed.

Automobile Users

Secondary data sources, such as volume counts, vehicle occupancy counts, parking lot inventories, and pedestrian counts, were used to ascertain the degree to which former transit riders switched to automobile transportation and how this change affected traffic congestion and parking availability. The study focused on traffic arteries leading into the CBD and on use of parking space in the CBD and fringe areas.

Transportation Operators

Personal interviews were conducted with transportation suppliers, such as private bus companies, taxi companies, social service agencies, and the Knoxville Transportation Brokerage Service, to obtain information on transit use. In addition, detailed data were compiled on KTC ridership and revenue for several weeks before and after the strike.

SURVEY RESULTS

The purpose of the telephone survey was to determine the impact of the transit strike on the four categories already mentioned. Although these categories may be expected to have different socioeconomic characteristics, an analysis of their demographic profiles revealed that, except for express bus riders, characteristics were similar in many respects.

Category 1: Elderly Living in Senior Citizen Housing

The elderly group consisted of 101 households comprising 121 people. More than 85 percent of those interviewed were women. All who answered the income question had an annual income of less than \$5000; 80 percent of the households had one member, and the remaining 20 percent were two-member households. More than 90 of the households had no operating automobiles, and 81 percent had no member with a driver's license.

Impact on Travel

Before the strike, the elderly group averaged 2.11 trips per household per week by transit or 1.76 trips per person per week. The main uses of transit were for shopping, medical reasons, and personal business. Other uses were visits to friends and relatives, religious-purpose trips, travel to work, and trips for leisure and recreation.

More than 32 percent of their normal trips were cancelled during the strike. The trips most frequently cancelled included those for religious purposes, visits to friends and relatives, leisure and recreational trips, and personal business trips.

Nondiscretionary travel still was made for shopping, medical, and work purposes. The alternative modes of travel used most frequently were either riding with

family and friends or traveling by taxi. Notably, almost 18 percent of the trips made by the elderly households were by social service vehicles. A portion of the sample group indicated that pride and a sense of dignity kept them from calling on friends and relatives for transportation unless it became a necessity.

Post-Strike Travel Behavior

When asked during the strike if they would return to using the bus when the strike was settled, 100 percent indicated that they would. Yet five weeks after the strike was settled, six individuals, or 12 percent of the 50 households contacted again after the strike, had not returned to using the bus as frequently as before.

Economically Disadvantaged Households Living in Public Housing

A total of 100 economically disadvantaged households with at least one regular transit rider were contacted by telephone. More than 90 percent of the respondents were females, but all respondents spoke on behalf of the entire household. The ages of these individuals interviewed were 45 years or older. Of those reporting income, 90 percent had family incomes of less than \$5000 per year.

Forty-four percent of the economically disadvantaged individuals interviewed lived alone, 24 percent lived in two-member households, and the remaining 32 percent lived in households varying in size from three to eight members. Only 28 percent of the households had members commuting to work regularly.

Impact on Travel

The economically disadvantaged group indicated that before the strike they had averaged 3.27 trips per household per week by transit, or 1.60 trips per person per week. The most frequently mentioned trip purpose (75 percent of the households) was shopping. Forty-three percent of the sample reported using the bus to conduct personal business and 11 percent to commute to work. Other transit trips were for medical purposes, school, visiting friends and relatives, leisure and recreation, and religious purposes.

The economically disadvantaged group did not make 11 percent of their usual trips when transit service was not available. The trips most frequently eliminated were those for religious purposes, visits to friends and relatives, and leisure and recreation. Thus, a larger segment of the economically disadvantaged group than of the elderly group maintained their usual mobility. The trips that were made most frequently, in spite of the loss of public transportation service, included shopping, work, medical, personal business, and school and were made with a friend or relative. About 15 percent of the trips were made by taxi; another 8 percent were made by social service vehicles.

Post-Strike Travel Behavior

When interviewed during the strike, 99 percent of the households indicated that they would return to using the KTC buses when service resumed. Four weeks after the bus service was reinstated 84 percent of the 50 households contacted again had returned to pre-strike bus use.

General Transit Users

A telephone interview survey of 50 randomly selected

households in residential areas near bus routes was performed to determine the impact on general transit users, that is, users out of choice, not captive riders. However, a large proportion of this group also was found to be transit dependent; 86 percent had an annual family income of less than \$5000.

Thirty-five percent of the households contacted in this sample were single-member households, 47 percent were two-member households, and the remaining 18 percent were three-member households. Forty-one percent of the households reported having regular commuters.

Car ownership for this group was higher than that for elderly and economically disadvantaged groups: 26 percent had one operating car and 8 percent had two operating cars.

Impact on Travel

The general transit-user group indicated that before the strike they averaged 3.01 transit trips per household per week, or 1.62 trips per person per week. Transit trip purposes mentioned most frequently were shopping and work. This group contained a greater proportion of commuters than did the elderly and economically disadvantaged groups. Other transit trips included personal business, medical, school, and visits to friends and relatives.

The general transit-user group cancelled 10 percent of their normal trips, primarily those for shopping, work, and personal business. The most frequent alternative means was traveling with a relative or a friend. Eight percent of the households traveled alone in their own cars for trips that would have been made by bus. No use of social service vehicles was mentioned by this group, and a shift to travel by taxi was not reported.

Post-Strike Travel Behavior

When asked during the strike if they would return to using the bus when the strike was settled, 100 percent of the respondents indicated that they would. Yet five weeks after the strike was settled, 40 percent of the households that were contacted again were not using transit service as frequently as before the strike.

Commuter Travel by Tennessee Valley Authority Employees

During the transit strike, 259 out of an estimated 600 TVA employees using the KTC's express bus service completed a mail questionnaire about their travel modes to work. TVA personnel could be characterized as highly mobile and choice transit riders.

The analysis of these questionnaires revealed that 35 percent had formed carpools of three or more members, 28 percent were driving with one other individual, and 29 percent were driving alone. Five percent of the sample were able to use one of the private express buses that operated during the strike. It is interesting to note that the 600 TVA employees denied their usual bus service only caused an increase of about 300 vehicle trips. Unlike the other groups of transit users discussed earlier, TVA employees used carpooling as the predominant substitute for KTC express bus service.

Regardless of the substitute travel mode selected, the main complaint was the added travel expense. Problems frequently mentioned were that the new travel arrangements caused parking problems, were inconvenient, or were more time consuming. More than 90 percent said they would return to the bus when

service resumed; 5 percent were uncertain; and 4 percent expressed full satisfaction with their substitute modes of transportation.

Summary of the Experience of Transit Users

During the transit strike, the elderly living in senior-citizen complexes cancelled 32 percent of the trips they normally would have made. The economically disadvantaged and the general transit-user groups had to cancel only 11 and 10 percent of their normal weekly trips. The main alternative mode of transportation for these three groups was driving with relatives or friends.

The elderly group used taxi service for more trips (18 percent) than either of the other two groups. The elderly and economically disadvantaged relied on social service vans for transportation during the strike to the extent of 9 percent of all elderly group trips and 7 percent of all economically disadvantaged group trips.

Most of the nondiscretionary trips such as shopping, medical, personal business, school, and work trips were completed during the strike by all three groups. However, the elderly and the economically disadvantaged did not make many of their normal religious-purpose, social, and leisure and recreational trips.

Few cases of severe hardship were found among these three groups. Those finding the greatest difficulties were school children and domestic workers who normally used the bus to travel to and from school and work. Of all the households belonging to the three groups contacted after the strike, 8 percent indicated that they had found new modes of travel more convenient than the bus.

TVA express bus riders compensated for the loss of bus service by using other ride-sharing modes (carpools, private bus lines, etc.). Only 29 percent elected to drive alone in their own vehicles.

IMPACT ON REGULAR AND EXPRESS OPERATIONS

Two major impacts of a transit strike are on transit patronage levels and on the financial condition of the transit operation. Because of the different characteristics of the regular and express bus programs, these two services were analyzed separately.

Effect on Revenue of KTC Regular Routes

Ridership headcounts taken by bus drivers after the strike on regular KTC routes were found inaccurate and could not be used for analysis. The impact of the strike on patronage of regular bus routes could therefore be analyzed only in terms of revenue. The comparison of weekly revenues just before and after the strike was not sufficient because of possible seasonal fluctuations within a year. To identify seasonal variations, the weekly revenue data for the previous year (1976) were examined. Two additional sources of variations had to be taken into account: Service hours were reduced when the transit service resumed, and the fare was increased two weeks later.

Reliable information about the impact of the fare increase on ridership was not available. In the revenue analysis performed as a part of the Transit Development Program, a price elasticity value of -0.3 was used. This means that the 33 percent overall increase in fare on regular routes reduced ridership by 10 percent. However, telephone interviews with transit

users indicated that the fare increase had minimal impact, which makes a 10 percent decrease seem high.

To avoid any bias, a second estimate of the impact on revenues was derived. As the conservative estimate, the effect of the 33 percent fare increase was assumed to cause a 10 percent drop in ridership (an overall 20 percent increase in revenue). For this estimate the post-strike weekly revenues for the weeks after the fare increase, therefore, were reduced by dividing by the factor 1.2. For the second estimate, it was assumed that the fare increase had no effect on ridership and the post-strike weekly revenues after the fare increase were reduced by dividing by the factor 1.33.

The effect of reduced service hours was ignored for two reasons: First, pre-strike ridership during the period from 9 p. m. to midnight was extremely low, and, second, the post-strike telephone interviews found few cases in which frequency of transit use actually decreased with service reduction.

To identify the strike's effect, the average of the adjusted weekly revenues for a seven-week period after the strike was compared with the average for a six-week period before the strike. The post-strike period selected began three weeks after the strike was settled. The three-week period immediately after the strike was considered an adjustment period for transit users. Average weekly weekday revenues for the post-strike period were found to be 11.3 percent and 19.9 percent lower than the corresponding values for the pre-strike period according to the conservative and maximum estimates, respectively. However, an adjustment was made to reflect probable seasonal variations because the revenue comparison with 1976 revealed a difference of 3.9 percent. Considering this variation, the net decreases in revenue for weekdays due to the strike were 7.4 percent and 16.0 percent, respectively, according to conservative and maximum estimates. Similar calculations were completed for the weekend revenues. Considering the weekend increase in revenue of 4.0 percent during 1976, the net decreases in revenues for weekdays due to the strike were found to be 5.3 percent and 15.0 percent, respectively. Based on the combined figures of weekday and weekend revenues, the net reduction of revenue from KTC's regular service attributable to the strike was estimated to be in the 7.2-16.0 percent range.

Effect on KTC Express Bus Ridership

Unlike the case of regular KTC routes, accurate headcounts were available for the express bus routes. Therefore, no adjustments were made to the actual ridership for the increase in express bus fare from 50 to 60 cents per ride. Based on trip purpose and the income characteristics of the express bus riders, demand was considered to be highly inelastic with respect to fare. Also, it was assumed that the express bus riders did not go through an adjustment period immediately after service was resumed.

The average weekly ridership for 10 weeks after the strike was compared with that for 6 weeks before the strike. The post-strike ridership was found to be 22.1 percent lower than the average pre-strike ridership. A comparison of the ridership for the same two time periods during 1976 shows that average weekly ridership for the 10-week period from week 13 through week 22 of 1976 was 7.2 percent less than that for the first 6-week period. If this difference can be attributed to seasonal fluctuation in transit use, the net decrease due to the strike is 22.1 - 7.2, or 14.9 percent.

Overall Impact on KTC Revenue and Ridership

The analysis just presented indicates the adverse impact of the transit strike on the revenue generated by the regular and express KTC routes. Although the analysis was carried out for a relatively short time, (10 weeks after resumed service), the decline in revenue attributable to the strike appeared to continue and to vary in magnitude from week to week.

If the decline in ridership is indeed permanent, the long-range loss in revenue could be large, depending on the time allowed for analysis. However, future events are inherently uncertain, so it is difficult to ascertain how long the loss of revenue will continue. To the extent that the lost riders do not return, there will be a latent permanent loss, even if new riders appear.

In addition to the potential loss, revenue during the 6 weeks of the strike was lost totally. This loss, estimated to be \$158 000, was accompanied by savings in operating costs estimated to be \$228 000. This gives a net savings in operating costs of approximately \$70 000 during the strike, but such savings will be offset by the estimated permanent loss in revenue. However, the ridership trends and characteristics of users in terms of the return of lost riders must be monitored if definite conclusions are to be drawn.

IMPACT ON OTHER TRANSPORTATION SUPPLIERS, PARKING, AND TRAFFIC VOLUMES

The transit strike meant that more than 7000 daily KTC riders had to find alternate modes. Such a large and sudden shift in travel modes could easily have surpassed the capabilities of private bus and paratransit operators and could have increased automobile traffic and parking problems.

Transportation Suppliers

Interviews were conducted with 5 private bus operators, 13 taxicab companies, and several social service agencies to determine the impact on their operations of the 6-week KTC strike.

In general taxi operators and bus operators did not encounter any significant increase in business from the strike. The larger taxi firms did receive some additional business, but it was far below their expectations. Smaller firms did not benefit from the strike, which can be attributed partly to their limited operations and inaccessibility by telephone.

A number of private and publicly supported social service agencies provide transportation for special needs. The strike caused a significant increase in demand that in certain cases far exceeded agency resources. These situations were usually handled by maintaining or tightening eligibility requirements for services and by making other informal arrangements.

Parking and Traffic Volumes

One consequence of a transit strike that can be expected is an increase in automobile use and parking demand. Most public-transit routes in Knoxville are oriented to the CBD, where parking supply relative to demand is lower than that in other areas. Therefore, it was expected that any impact on parking would be felt in the CBD. Surveys were conducted during and after the strike to identify any increase in parking de-

mand in the CBD area that might be attributable to the strike.

These surveys identified certain impacts that can be related to the transit strike. One noticeable change was increased use of downtown parking spaces, most of which were long-term parking lots near the TVA complex. TVA is the major employer in downtown Knoxville.

Pedestrian counts suggested an increased use of free curb parking in the Fort Sanders residential area adjacent to downtown. Revenues from on-street parking meters also increased, because long-term parkers used fringe metered areas and because short-term parkers were squeezed out of off-street parking lots by commuters. A number of merchants indicated that their patrons complained about the difficulty of finding parking spaces during the strike. Surprisingly, the Coliseum parking complex, a large low-cost parking garage located a kilometer (0.5 mile) from the CBD and about 1.5 km (1 mile) from the TVA office, showed no noticeable increased use.

No noticeable increases in vehicle traffic volume were identified. However, increased vehicle occupancies were observed during the peak periods on major roadways. The parking and traffic volume study suggested that the strike did add to the burden of an already overtaxed downtown parking supply.

IMPACT ON KNOXVILLE'S BUSINESS COMMUNITY AND OTHER INSTITUTIONS

The business community in Knoxville experienced a wide diversity of impacts on sales and general business activities during the KTC transit strike. Some establishments with primarily transit-dependent clientele suffered as much as a 75 percent decline in retail sales. In other instances, sales were better than expected compared to the same period in 1976. Most of the major employers in the Knoxville area did not experience any significant difficulties with their employees getting to and from work, but a few small employers did face problems with employee transportation.

More than 100 merchants in the Knoxville CBD were interviewed to obtain information on their sales and business activity during the strike and on sales and business recovery after it. Because of the sensitive nature of the questions asked in the survey, not all of the merchants and others interviewed gave specific or quantifiable answers. The results can be presented by groupings of retail establishments.

Specialty Shops, Jewelers, Florists

Thirty-three establishments in this category were surveyed. Most of them sell small, low-priced goods that can be purchased quickly. Transit patrons often buy these items while waiting for buses. Of all businesses, these were affected most severely by the strike.

Of the 33 businesses, 28 reported a sales decrease. About one-half of the group experienced a loss in sales of more than 25 percent. Five reported a 50 percent or more reduction in sales during the strike. Only five businesses—a pawnshop, a watch repair and jeweler, a bookstore, a clothing shop, and a florist—indicated that they had experienced no sales decline. Four of these added that their clientele are primarily people who rarely use the KTC system. No business reported an increase in sales during the strike period.

After the strike was settled, the majority of merchants indicated that their sales had or had almost

returned to normal pre-strike levels. Of the 33 businesses, 19 had reestablished their normal sales levels within a month after the strike and another six were nearly normal.

Department, Furniture, and Major Appliance Stores

The second group of businesses surveyed included eight establishments including Miller's (a large department store in the Knoxville area), the Boston Store, J.C. Penney, Rolen Furniture, Fielden's Furniture, Sterchi Brothers, Fowler's, and Woodruff's. The lack of transit service during the strike did not affect Miller's significantly. Minor problems in getting to work for a few employees were solved fairly easily. Despite the fact that this department store is served directly by five of KTC's eight regular routes, retail sales during the strike exceeded those of the previous year. Woodruff's, a furniture store, also enjoyed sales increases during the strike. It is reasonable to assume there that the strike itself was not a major reason for the sales increases and that these two businesses did not depend on transit-riding customers.

Two of the four furniture stores reported sales declines of more than 70 percent. When managers were interviewed approximately a month after the settlement, both stores had continuing sales drops of 20-25 percent. Not surprisingly, both merchants believed that the strike had permanently damaged their businesses. The other two furniture stores experienced no change, but did report complaints from their customers who had difficulties finding parking spaces.

The two remaining stores in the group, the Boston Store and J.C. Penney, experienced sales slumps of 20-25 percent and 10-15 percent, respectively. The manager of J.C. Penney added that he was not sure if all his sales decline was attributable to the strike, because inclement weather also affected sales. Both of these stores' sales improved soon after the strike, but there seemed to be a continuing lag.

This group of eight stores revealed a wide diversity of impacts. Despite some similarities in location and product lines, the consequences of the strike for these stores were influenced to a large extent by the mode of access and affluence of their customers.

Package Store, Bars, Taverns

Six establishments were surveyed in this group. Five of these can be considered bars or taverns; the sixth is a package store. During the strike, four of these, including the package store, reported sales slumps of at least 40 percent. The other two bars hardly were affected and did not consider themselves dependent on bus riders.

Within one month after the strike was settled, two of these businesses with lower sales had returned to previous sales levels. Sales were still lower by 10 percent and 25 percent at the remaining two operations, and the managers believed that permanent damage had been done by the transit strike.

Banks, Savings and Loan, Consumer Finance, Bail Bonding, Public Utility

The fourth group of businesses in the survey consisted of the financial institutions (banks, savings and loan associations, consumer finance companies), one bail bonding company and the business office of the Knoxville Utilities Board (KUB). The various types of institutions

in this group were affected by the strike in distinctly different ways, but the consumer finance companies were the most impaired.

Most banks were not significantly hurt financially during the strike. They did, however, experience noticeable decreases in pedestrian traffic in their lobbies, especially in early March after social security checks had been received by bank customers.

Four of the consumer finance companies had noticeable declines of up to 20 percent in new business, but all except one said that their greatest problem was customers not being able to make loan payments. This problem was attributed almost entirely to the lack of transportation.

Beauty School, Hair Styling Salons

The smallest of all the groupings was two hair styling salons and one beauty school. According to the managers of the hair styling salons, the strike did not cause any problems other than parking inconveniences for some customers.

Supermarket, Health Foods, Meats, Variety, Drugstore, Dime Store

A total of nine businesses in this category were surveyed. In general, these businesses were seriously affected by loss of customers. Except for one health-food store, which had a 5 percent increase in sales, all suffered sales slumps of at least 10 percent, and four exceeded 40 percent. Two meat markets and a drug and variety store reported sales declines of at least 50 percent. Of the other four establishments, three experienced losses of business in the 10-15 percent range, while the fourth lost 30 percent.

After the strike was settled, three of these nine businesses reported complete recoveries and five others indicated that they had almost recovered. The business that suffered the heaviest loss had returned to about 90 percent of its normal sales after the buses had been running again for four weeks.

Eating Places

Of 10 establishments surveyed, all except 1 lost sales during the strike. Three were slightly affected; 3 others had declines of 20 to 33 percent of their sales; and the remaining 3 had at least a 40 percent drop. One experienced a 75-80 percent loss.

When interviewed one month after the strike had been settled, 5 of these 10 businesses had returned to pre-strike sales levels, and another 2 had almost recovered. The coffee shop's sales, which had dropped by 75-80 percent during the strike, were still off 40 percent, and another business was still off 20 percent.

Women's Clothing, Men's Clothing, Tailor, Shoes

Nineteen establishments formed this group. During the strike period sales ranged from an increase of 6 percent to a decrease of 70-80 percent. Five businesses indicated that their sales did not change during the strike, although one manager felt that sales in his store would have improved somewhat over the previous year if the strike had not occurred. Five other businesses experienced sales drops of 15-25 percent, four businesses experienced losses of 50-60 percent, and another four reported losses exceeding 70 percent.

Recovery from the lower sales losses was generally very good compared to most of the other business

groups. Twelve businesses reported that normal sales had been reached, and 3 others had returned to at least 90 percent of their normal sales within a month after the end of the strike. Two businesses, which had dropped at least 70 percent during the strike, were still about 20 percent off when interviewed. The only business that enjoyed a sales increase during the strike lost a small amount of business when the strike was settled.

Miscellaneous Business

The survey's final groupings of businesses contained seven establishments, none of which was greatly affected by the strike. Included are three wholesale businesses, a charitable organization, a print shop, a hotel, and an intercity bus terminal. The wholesalers were involved in beauty supplies, food service equipment, and optical supplies. Of these, only the food service equipment wholesalers experienced a slight downturn in business.

Impact on Employment

The same survey used to gain information from CBD retail merchants about the effect of the strike on sales and business was used to collect data on the strike's effects on employment in downtown Knoxville. Compared with retail sales, employment in the CBD during the strike was a lesser issue. However, 34 of the 107 businesses surveyed made some employee adjustments during the strike. Most of these changes were minor, such as rearranging work schedules, slight cutbacks in employee hours, and promoting informal carpooling among employees. About 75 employees were laid off due to the strike; however, most of them were rehired after the strike was settled.

Surveys were also conducted at selected institutions, hospitals, and manufacturing plants outside the CBD to determine the impact of the strike on personnel. Few difficulties in getting to work were reported by employees.

Reports from a sample of social service agencies indicate that, based on commonly accepted measures such as unemployment levels and the demand for public assistance, the transit strike caused no highly significant aggregate impact on those who depend on services from these agencies.

CONCLUSIONS

The transit-strike impact study has shown that the temporary loss of transit service for six weeks in a medium-sized city can have adverse effects on the community and its citizens. As expected, the strike most decidedly affected those segments of the population who directly rely on public transportation as their principal means of mobility. For captive transit riders, the loss of mobility resulted in a reduction in trip making, especially for trips of discretionary nature, and forced shifts in travel modes and destinations. Elderly persons living in senior-citizen complexes were most affected; these individuals had to suppress almost a third of their normal travel. To a large extent, the impact on the elderly group was more severe than on the other captive groups, because, as the elderly people contacted said, they were reluctant to impose on others for transportation assistance, except for essential trips.

As a whole, the captive group was able to find alternate arrangements for essential travel by relying on relatives and friends and to a lesser extent on taxi service. Most shopping, work, school, and medical trips continued to be made; however, discretionary trips previously made by transit, such as religious trips,

visits to friends and relatives, leisure and recreational trips, and personal business trips, were cancelled in many cases. Among the 250 people interviewed, few severe hardships caused by the strike were actually identified. Besides private arrangements, some captive riders were able to rely on social service agencies, which, however, were not able to accommodate all requests for service, because of inadequate supplies of vehicles and staff and strict eligibility requirements.

The impact of the strike on transit ridership and revenue was substantial. The net reduction of revenue from KTC regular routes attributable to the strike is estimated to be in the range of 7.2-16.0 percent. In the case of the express buses, it was estimated that the ridership dropped by 14.9 percent.

With the shift in travel patterns of transit users, downtown merchants, who cater to transit dependents, lost substantial amounts of business. A number of firms reported drops in sales of 50-80 percent, which forced reduced operating hours and layoffs of sales personnel. The downtown business establishments that were affected most seriously were specialty shops, clothing and shoe stores, restaurants, and fast food, drug, and variety stores. Interviews with store managers, however, revealed that sales returned to normal levels within two months. Many CBD merchants felt only minor repercussions that ranged from no loss to a 5 percent decline in sales during the strike. Patrons of many of these merchants were automobile oriented or commuters.

Most of the major Knoxville employers reported little difficulty for their employees in getting to work during the strike. Some special accommodations were required, but, in most cases, these were worked out easily.

No evidence suggested excessive traffic congestion. Only in the CBD area was parking a problem. The addition of an estimated 300 commuter automobiles in long-term lots or in the fringe residential areas made an already tight parking situation worse. It was more difficult for shoppers to find short-term parking spaces. Yet the Coliseum parking garage, which is located near the CBD and charges a third the rate of long-term lots in the CBD proper, recorded no significant increase in use.

The transit system itself felt the most adverse effect from the strike. Although some operating costs were deferred during the strike, the loss of revenue and the subsequent loss of ridership offset any savings. All

parties involved with the KTC strike—city officials, operating company, labor union, and consumers—would have benefited more by averting the strike or at least by attempting to shorten its duration. The loss in ridership almost nullified the gain from the fare increase that had been scheduled before the strike. Preventing the work stoppage could have kept many choice regular and express bus transit users from switching to another mode.

The six-week KTC strike showed that transit is a significant public service provided by the community. Most captive and choice riders returned to transit, which suggests that transit was judged superior in terms of cost and convenience to the alternative modes used during the strike. At the same time, the total transportation system showed capability and flexibility in responding to the crisis.

Few severe hardships, apart from minor inconveniences, were reported by former transit users. Most individuals were able to satisfy their travel needs through informal arrangements with relatives and friends. These arrangements were negotiated without the involvement or initiative of any public agency, and it is significant to note that the role and strength of such informal services usually are not recognized. However, the captive riders were less able to participate in these informal transportation arrangements and encountered more difficulty with the strike. It is not clear whether these alternative arrangements would have persisted if the strike had continued even longer.

ACKNOWLEDGMENT

We wish to acknowledge the sponsorship and cooperation of the Bureau of Mass Transit of the Tennessee Department of Transportation in performing the study reported in the paper. The opinions expressed are strictly our own and are not necessarily those of the Tennessee Department of Transportation.

REFERENCE

1. Knoxville Metropolitan Area Public Transit Study. Transportation Center, Univ. of Tennessee, June 1977.

Publication of this paper sponsored by Committee on Public Transportation Planning and Development.

Interim Analysis of the Free-Fare Transit Experiments

A. H. Studenmund, Occidental College, Los Angeles, and Transportation Systems Center, U.S. Department of Transportation
Sherrill Swan and David Connor, De Leuw, Cather and Company

This paper summarizes the early results of the two systemwide off-peak free-fare transit experiments being conducted in Trenton, New Jersey, and Denver, Colorado. These experiments, which are sponsored by the Urban Mass Transportation Administration (UMTA) under its Service and Methods Demonstration Program, are the first free-fare programs of such size and comprehensiveness. The demonstrations have already

provided a number of interesting, if still tentative, conclusions. The first major conclusion is that, while free fare induces large and sustainable ridership gains (19 percent in Trenton and 34 percent in Denver), the general aggregate behavior of the population in making their modal choices is not significantly different from what it would be with any other absolute change of an equal amount. The price elasticity of