TRANSIT PRICING MANUAL

Prepared for

OFFICE OF THE SECRETARY
U.S. DEPARTMENT OF TRANSPORTATION

DECEMBER 1976

Prepared by

PMM&Co PEAT, MARWICK, MITCHELL & CO.

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This Transit Pricing Manual is prepared for transit managers and the members of their management/policy boards who are directly responsible for designing and establishing transit pricing strategies. The manual provides guidance for designing new transit pricing strategies to most effectively result in increased ridership and reduced operating deficits. It contains descriptions of how to delineate transit markets (i.e., market segmentation), what fare levels and fare structure to use, how to measure the impact of fare levels and structure on current and potential transit riders, and what fare collection techniques to employ.

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PREFACE

The Transit Pricing Manual was prepared as a result of a study performed under contract to the Office of the Secretary of Transportation (OST) and the Urban Mass Transportation Administration (UMTA), of the U.S. Department of Transportation (DOT). The study contract was performed by Peat, Marwick, Mitchell & Co. (PMM&Co.).

The Manual and the material herein are based on the research undertaken on the subject of transit fare policy. This research is fully described in a companion report entitled "Study of Public Transportation Fare Policy," December 1976.

The authors wish to express their appreciation to the American Public Transit Association and its many members in transit systems around the country who provided valuable information. The authors also thank Edward Weiner, OST, and Carol Passen, UMTA, for their comments and helpful assistance to PMM&Co. in preparing this Manual. Others who contributed through their comments were Robert Prowda and Nicholas Bade.

CHAPTER I

INTRODUCTION

PURPOSE OF THE MANUAL

This Transit Pricing Manual is prepared for transit managers and members of their management/policy boards who are directly responsible for designing and establishing transit pricing strategies. The manual provides guidance for designing new transit pricing strategies to most effectively result in increased ridership and reduced operating deficits. It contains descriptions of how to delineate transit markets (i.e., market segmentation), what fare levels and structure to use, how to measure the impact of fare levels and structure on current and potential transit riders, and what fare collection techniques to employ.

This manual is a useful and valuable addition to other manuals prepared by the Urban Mass Transportation Administration and is included in the Transit Marketing Management Handbook. The central argument in this manual is that pricing should be considered a vital function of transit marketing. It should be closely integrated with the identification, design, and promotion of transit services to ensure a continuing trend towards increased transit ridership. The ridership would then be willing to pay for the value of the services received. Pricing and transit operating deficits are clearly interrelated. It is expected that through new pricing strategies, operating deficits can be stabilized and probably reduced in specific instances.

Four chapters compose this manual. The remainder of Chapter 1 discusses the motivation of the manual and includes background on the trends of fares and deficits, and the role of marketing.

Chapter 2 discusses the relationship of transit pricing to the transit marketing management process. It highlights procedures for delineating demand for transit services, understanding transit market characteristics, and establishing the role of pricing in transit service development.

Chapter 3 outlines the history of fare patterns, trends, and techniques. It presents a summary of fare levels and structures, definitions and useful examples of transit price elasticity, types of fares, and fare collection techniques.

Chapter 4 reviews the development of pricing policies and strategies. Different transit pricing rationales are suggested; the influence of participating groups on the fare policy is discussed; guidelines for determining fare levels, structure, and fare collection techniques are presented; and implementation guidelines including current and future constraints are outlined.

MOTIVATION OF THE MANUAL

Background

Pricing is an effective tool that, when properly used, can achieve the desired goals of increasing ridership and stabilizing and/or selectively reducing operating deficits. This approach represents a significant change to the historical pattern of transit pricing followed by transit systems. To understand this change, the history of transit pricing is traced. In the late 1800s, transit systems not only provided public transportation services but also financial returns for the investors. At the turn of the century, it was evident that transit systems were in financial trouble. At that time, the U.S. Bureau of the Census, in a document, Special Reports--Street and Electric Railways, 1902, warned of impending problems caused by high construction costs, long rides at low fares, traffic peaking, and expected shifts of population to suburban areas. At that time the policy of low fares was a problem. In fact, after the publication of that report, average transit fare remained relatively constant at 7 cents between 1924 and 1940.

Between 1940 and 1972, the average fares increased from 7 cents to 32 cents. Between 1972 and 1975, fares stabilized and generally were not increased and, in several cities, were reduced. Since 1975 some cities have started to increase fares again. Overall the trend appears to be to continue stabilizing fares at present levels.

Between 1940 and 1972 revenue passengers declined from over 19 million to 5.2 million and increased slightly to 5.6 million by 1975. Operating profits in 1940 turned into significant annual losses of $400 million in 1972 and grew to $1.5 billion in 1975. They show every sign of escalating in future years, unless present fare policies change and ridership trends significantly reverse.

By the end of World War I, the automobile became an established mode of transportation. Between 1925 and 1974 automobile registrations increased almost six times. It became the dominant mode of transportation. Public transportation lost its market to the automobile

and found it could not compete with the automobile in providing service to dispersed employment centers in the suburbs (a shift caused by the truck and the increased efficiency in the intra-city movement of goods). In becoming the dominant mode, the automobile and its usage became underpriced. This underpricing occurs particularly during peak periods when the highway user is not being charged for using congested urban roads, creating more congestion, and causing high levels of air pollution that results from high levels of auto usage. At present, there are no congestion-based charges for urban highway use. The automobile user frequently perceives that the auto costs less than transit services, is certainly more convenient, and offers a shorter trip time.

Between 1972 and 1976, the transit manager attempted to price transit so as to better compete with the automobile. The result has been stabilized fares and selected fare reductions in several cities. Fare structures have also been simplified and include a more extensive use of flat fares. Overall, the results in terms of increased ridership have not produced the desired results. The small increase in transit ridership is more directly attributable to the introduction of new equipment and improved service rather than the policy of stabilized and reduced fares. The analysis of ridership trends in several U.S. cities has confirmed the importance of improved service over pricing reductions as an effective means of increasing ridership. This analysis is discussed in Chapter 2.

Role of Marketing

Public transportation faces major competition from the automobile, the mode which the public perceives as more convenient, speedier, and generally less costly. Urban areas faced with many problems relating to over-reliance on automobiles (e.g., pollution, fuel shortage, congestion, etc.) chose to ease these problems by significantly increasing transit use. To accomplish the goal of increased transit use, the transit manager can adopt marketing strategies to increase ridership that include better service, improvements in the general image of the transit system, and good communications with the general public. An Introduction to Transit Marketing, prepared by the Office of Transit Management under the sponsorship of the U.S. Department of Transportation states that marketing is an invaluable tool to the managerial decisionmaker.

> Marketing makes good business sense. It provides transit decisionmakers with a rational basis on which to allocate resources. More specifically, it helps

rationalize the development of a service package, and, in turn, the allocation of capital and human resources.

In this sense, marketing is a "low capital" intensive way of improving transit. And because marketing analysis can be translated into specific performance measures, marketing strategy can provide a basis for evaluating system performance.

New pricing strategies that will recover the costs of producing services at values acceptable by the public should be combined with improved product delivery or service. For the transit industry, a marketing strategy should include the five major components discussed below.

Market Research

This component of the marketing strategy involves determining the needs, travel behavior, attitudes, and transit system awareness of present and potential transit riders. Market research includes determining which groups of persons currently and potentially seek public transit services; what the service and informational requirements of those groups are; and how those requirements may be met by the transit firm and its manager through service design as well as through the informational, communications, and promotional programs.

Service Planning and Development

Once the segments of the transit market have been defined, the next component of a transit marketing strategy entails service planning and development (i.e., designing transit services to meet the needs of these market segments). An understanding of market characteristics and desires, a knowledge of the service area, and an awareness of the system's capability are necessary. The availability of these inputs allows the transit system to develop the planned transit service package that must include the main components of (1) type of service, (2) route to be traveled, and (3) time the service is to be provided.

Pricing

A complete marketing strategy must contain a pricing strategy that charges each market segment (identified through market research) the prices reflecting both the willingness of the user to pay for services needed and the costs of producing services with those

characteristics. The fare structure and level should relate to the specific service development package. The fare collection procedure used should simplify operator administrative practices, and not inconvenience the transit rider. Both pricing and fare collection can be effective promotional tools for attracting new riders and retaining current users to public transportation.

User Information

This component of the marketing strategy addresses the transit system's need to advise present and potential patrons how to use the services. The production and distribution of precise and accurate information aids tailored to the needs of the broadest possible range of potential and current transit riders becomes part of this component. Typically, such a program uses signs on equipment, telephone information centers, pocket schedules, system maps, door-to-door distribution of informational pieces, etc. One should set up a telephone inquiry response center to improve customer and community relations. Information and sales centers for transit passes and/or tokens should also be organized and set up throughout the urban area.

Communication

Communication involves the public relations, advertising, and promotional components of marketing. Communication results from establishing the public's awareness of the major characteristics of transit services. Better transit services enhance the public's perceptions and attitudes and create an awareness of the special benefits that public transportation gives to the individual, community, and the nation. To be effective, communication must be more than public relations. Communication must change the public's view of the transit system when negative attitudes exist and establish how the transit system will serve the public's needs.

In the past, transit marketing strategy emphasized communication and customer relations and largely ignored the other marketing strategy components. In particular, the transit industry did not consider pricing to be a function of marketing. Therefore, the primary goal of this Transit Pricing Manual is to show how to combine the identification, design, and promotion of transit services with pricing. One will then be able to account for different service characteristics associated with various market segments and determine the appropriate pricing strategy.

CHAPTER II

THE RELATION OF PRICING POLICY TO THE MARKETING PROCESS

In order to understand how to set pricing strategies, there has to be a careful determination of market segments and transit service characteristics. Once a determination is made of significant market segments (i.e., work trips, shopping trips, students, and the elderly and handicapped) that comprise the major portion of the transit industry, then one can match service packages to the market. Finally, one can determine the appropriate pricing strategies according to the cost of the service and the market's willingness to pay.

MARKET CHARACTERISTICS

Transit ridership has been viewed historically as a single, homogeneous market. There have been only limited attempts to design special services for specific groups or segments of the transit market. Some experiences, however, such as the commuter bus services, indicate that passengers will pay a premium price for relatively high-quality service. The problem, as with all marketing efforts, is one of identifying the characteristics of current and potential markets and designing the product or service to meet the demands of that market.

Market research, accordingly, involves dividing the total actual and potential transit market into separate market segments. These segments would include riders, or potential riders, with similar socioeconomic characteristics, who travel for the same purpose and who would be expected to have similar demands for particular kinds of transit services.

The purpose of the trip (i.e., work, shopping, school) is a significant determining factor for market segmentation. Next, socioeconomic status (high, medium, and low income) and age of the traveler are important segmentation factors. Geographical location of residence, orientation of travel (i.e., to central business district, non-CBD, etc.), and time-of-day of travel (peak versus off-peak) are also important factors in market segmentation. Other factors might also be considered--for example, car ownership, income, sex, ethnic origin, and special interests.

Experience shows that six major market segments account for most of the transit ridership. These markets are as follows:

1. work trips from high-income households;

2. work trips from medium-income households;

3. work trips from low-income households;

4. school trips;

5. shopping trips; and

6. elderly and handicapped trips where the ability to use transit is constrained due to lack of an automobile and probable handicapped status.

There should be further stratification of these market segments by location of household, time-of-day of travel, and orientation of trip as shown in Table 1. This additional segmentation would yield approximately 26 market segments that would be worth analyzing. The worker market may be further divided to identify specific origin and destination pairs where special peak period commuter services could be provided on a subscription basis. Table 1 does not identify all markets. Other services for special origins and/or destinations, such as sports events and recreational areas, can be considered as additional markets. In the case of shopping trips, further segmentation might be made for grocery shopping versus non-grocery shopping, and shopping by special ethnic groups at stores owned by people of the same ethnic background versus shopping at the local shopping center. The 26 markets are not an exhaustive listing of all possible markets but certainly represent the significant portion of the system ridership.

Although these market segments do not describe traveler preferences for transit service characteristics, they do imply an underlying set of preferences which can be determined by market research. It is expected that preferences for transit service characteristics will be more consistent within market segments than they are between segments. Once the major market segments have been identified for a transit service area, and the preferences for transit characteristics have been determined, appropriate services can be designed.

It is evident that the first step in developing a transit fare policy is, in effect, the same as the first step in devising a marketing strategy;

TABLE 1

MARKET SEGMENTATION

MARKET SEGMENT	LOCATION OF RESIDENCE		ORIENTATION OF TRIP (Destination)		TIME-OF-DAY	
	Central City	Suburban	CBD	Non-CBD	Peak	Off-Peak
High-Income Worker (2 market segments) i.e., 1 x 2 x 1 = 2 markets[1]	NA	x	x	x	x	NA
Medium-Income Worker (8 market segments) i.e., 2 x 2 x 2 = 8 markets	x	x	x	x	x	x
Low-Income Worker (4 market segments) i.e., 1 x 2 x 2 = 4 markets	x	NA	x	x	x	x
Student (4 market segments) i.e., 2 x 2 x 1 = 4 markets	x	x	x	x	NA	x
Shopper (4 market segments) i.e., 2 x 2 x 1 = 4 markets	x	x	x	x	NA	x
Elderly and Handicapped (4 market segments) i.e., 2 x 2 x 1 = 4 markets	x	x	x	x	NA	x

Legend: x - applicable segmentation

NA - not applicable

[1]There are two markets as follows: (1) suburban location of residence/CBD destination of trip made in peak period and (2) suburban location of residence/non-CBD destination of trip made in peak period.

that is, to define the relevant market segments and their principal characteristics through market research. From the market research, it is possible to determine the characteristics and attitudes of persons in the existing or latent transit markets. Identifying the preferences of different groups in the population (market segments) for transit service and informational needs is also possible. A desirable consideration is to determine the additional fares that persons in different markets would be willing to pay for particular service characteristics. Surveys asking these kinds of questions have recently been conducted in Baltimore, Maryland; San Francisco, California; and Columbia, South Carolina. Some results of those surveys are discussed next to provide examples of service and pricing strategies.

ROLE OF PRICING IN TRANSIT SERVICE DEVELOPMENT

As discussed in Chapter I, under the section on Role of Marketing, a combined approach to service planning and development and pricing should follow. New service packages will be developed to increase ridership. The pricing will be set to recover the costs of providing the service and, in particular, at values the public is willing to pay.

After market research the next component of a marketing strategy is the service planning development. This involves designing the transit service characteristics to meet the needs of the various market segments outlined above. The principal transit characteristics include transit time and accessibility, service frequency, access time, wait time, arrival time variance, equipment reliability, and seat availability. The list is not exhaustive, but it does include the most important transit service characteristics. All of these characteristics are objectively measurable and do not depend on the perceptions or subjective evaluation of transit users. Amenities, such as temperature and ride quality, may also be included in the list of characteristics. Although the level for offering these characteristics is not objectively measurable, their presence or absence is objective and could be included in statistical analyses of their importance.

Pricing, another component of a market strategy, must be addressed in conjunction with service planning. Fare would be the price set to cover the costs of the service and would be based on the public's willingness to pay.

Results of the Baltimore, San Francisco, and Columbia surveys of the preferences of actual and potential transit users for specific

service and fare characteristics are reported as examples. From the San Francisco Bay Area (BART) survey, Table 2 shows, by mode, the percentage of persons choosing each of 14 characteristics as the most important reason for using the particular mode. For those riding BART, total travel time was the most important reason for their choice, with trip cost ranking second and comfort ranking third. Total trip time was also the most important reason cited by those choosing bus and auto, and the importance of total trip cost declined to fourth and fifth rank respectively.

Other survey data for the Baltimore area show the additional fares that respondents, stratified by income, indicate they would pay for more frequent service. The willingness to pay additional fare for more frequent service is highly sensitive to income, as would be expected. At even moderate incomes (in the range of $8,001 to $9,500), however, significant percentages of respondents indicated their willingness to pay as much as 20 cents more for more frequent service (see Appendix Table A.1).

Further, an analysis of this data (see Table A.2) shows the choice of low cost versus frequent service by income level. At an income level of $4,001 to $8,000 respondents were indifferent about low cost versus frequent service; but at higher income levels, frequent service was preferred to low cost. The analysis of preferences for low cost versus dependability by status, age, and income level reveals that riders predominantly choose dependability rather than low cost (see Table A.3). Similar data from a survey conducted in Columbia, South Carolina, revealed the amount (in cents) that the respondent would be willing to pay for a number of different service improvements (see Tables A.4 and A.5).

Any survey that is conducted to determine the preferences of a particular community for transit service characteristics should be designed with two points in mind. First, the survey should consider the results that can be stratified by market segment to yield some preliminary delineation of the amount that transit users in different markets would pay for particular service characteristics. Second, the survey should consider the methods of fare collection that would best satisfy market desires. The results of the survey can be used as a preliminary indication of fare levels and structures and of service characteristics that will be feasible in different markets. The

survey can also determine the market segments toward which specific fare and service alternatives can be directed. Demonstration projects, including promotional programs, can then be devised to establish the new services and to test the validity of new pricing strategies that are related to transit service characteristics.

To implement the third stage of transit marketing management--pricing--the transit manager needs to understand recent fare patterns, trends, and techniques which are discussed in Chapter III.

CHAPTER III

RECENT FARE PATTERNS, TRENDS, AND TECHNIQUES

RECENT FARE PATTERNS AND TRENDS

Using the most recent comprehensive compilation of transit service and fare data from the 1974 National Transportation Study (1974 NTS) and available fare information from the American Public Transit Association, the fare patterns and trends for transit operations in 36 representative urbanized areas in four population groups are analyzed.

More than 2 million population (8 areas)

New York	Detroit
Chicago	Cleveland
Los Angeles	Boston
Philadelphia (SEPTA)	San Francisco (BART) (MUNI)

500,000 to 2 million population (17 areas)

Baltimore	San Diego
Houston	Seattle
Jacksonville	Buffalo
Columbus (Ohio)	Cincinnati
Portland (Oregon)	Denver
Rochester	Indianapolis
Miami	St. Louis
Dayton	New Orleans
Pittsburgh	

250,000 to 500,000 population (6 areas)

Flint	Honolulu
Grand Rapids	El Paso
Tacoma	Richmond

50,000 to 250,000 population (5 areas)

Fort Wayne	Raleigh
Peoria	Corpus Christi
Madison	

Distributions of average fare level by fare type are shown in Table 3. The majority of the 36 urbanized areas analyzed set their basic adult cash fare between 25 cents and 40 cents in 1972. The highest fare charged any child or student in the 36 areas in 1972 was 34 cents. The senior citizen fare in the majority of the 36 areas was less than 30 cents in 1972. Six areas offered free fares to senior citizens, while two areas charged senior citizens a fare of between 45 cents and 50 cents. Nine of the smaller urbanized areas provided fare discounts in 1972 through multiple-journey tickets--the typical discount was on the order of 2 cents to 4 cents per ride. Larger urbanized areas which offer a multiple-journey ticket plan normally do so at full cash fare. Nine of the areas sold passes or permits which would yield discounts if used a sufficient number of times during the period for which they were valid.

TABLE 2

MOST IMPORTANT REASON FOR SELECTING CURRENT MODE: TRANSBAY SURVEY RESULTS

CHARACTERISTIC	MODE (% of respondents)		
	BART	Bus	Automobile
Total travel time	31.6	42.2	33.4
Walking time	2.7	5.5	.8
Waiting time	2.8	3.8	2.4
Dependability	8.4	15.5	10.7
Seat availability	3.1	14.0	1.8
Comfort and smoothness	10.6	.4	.4
Safety from accident or injury	4.7	3.2	1.4
Security from crime	1.6	.9	2.7
Privacy	.3	.3	.9
Ability to do what you want	5.2	.9	2.9
Flexibility to travel	8.6	2.6	21.3
Ability to combine different purposes	.6	.3	15.4
Total trip cost	16.4	10.0	4.5
Place to park	3.5	.4	1.6

Source: BART Impact Program, October 1974 Surveys of Transbay Travel.

TABLE 3

FARE LEVEL BY FARE TYPE
(36 Urbanized Areas)

	Type of Fare Offered by Urbanized Area				
	Fare (cents)	Basic Adult	Senior Citizen	Student	Child
	0-24	3	16*	26	24
	25-29	10	11	7	7
	30-34	5	3	3	5
	35-39	8	1		
	40-44	5	3		
	45-49	3	1		
	50	2	1		
Total Number of Areas Analyzed		36	36	36	36

Note: All information as of 1972. Information obtained from transit operator statistics submitted to the American Transit Association.

*Six transit firms offer senior citizens free fare.

Source: U.S. Department of Transportation, A Study of Urban Mass Transportation Needs and Financing, op. cit., p. V-10.

Fares for the 36 selected urbanized areas for the period from 1958 to 1976 (or 1961 to 1976, depending on the availability of data) are given in Table 4. During this period fares typically increased, doubling in many of the urbanized areas. By 1970, many of the 36 areas had stabilized fares; fares in Tacoma have not increased since 1958.

From 1970 to 1972/1973, 12 of the 36 cities increased their fares while five reduced fares. The largest reduction was 50 percent in Cincinnati, from 50 cents to 25 cents. From 1972/1973 to 1975, seven cities increased fares while four cities reduced fares. The largest reduction was 50 percent in Cleveland, from 50 cents to 25 cents; the largest increase was 43 percent in New York, from 35 cents to 50 cents.

A policy of fare stabilization since 1970 implies that farebox revenues will cover a decreasing percentage of operating and maintenance costs as these costs rise. The ratio of revenues to costs for the 36 areas for 1974 is also shown in Table 4. Only two areas had revenue-to-cost ratios that exceeded 1.0; that is, only two of the 36 urbanized areas had revenues that exceeded operating and maintenance costs. The data in Table 5 show that the revenue-to-cost ratio for the nation was 0.85 in 1972 and was the same for the nine largest urbanized areas in the nation. Thus it is evident that farebox revenues are falling short of covering operating and maintenance costs by a significant amount.

The 1974 NTS data reported by the states for the 1990 Plans were analyzed and compared with the 1972 average fares and revenue-to-cost ratios as shown in Table 5. These data, in effect, constitute an aggregate of the individual plans and forecasts prepared by the states in cooperation with urban planning agencies and local transportation officials. The average fare for the nation is not expected to increase from 34 cents in 1972 if in fact the fare policies reported by the states are followed. The average fare for the nine largest urbanized areas would increase from 35 cents in 1972 to 42 cents in 1990 (expressed in relative 1971 dollars). This suggests that, at the time data for the 1974 NTS were obtained, urbanized areas as a whole planned to pursue a policy of fare stabilization well into the future. Although the 1974 NTS data indicate that some large urbanized areas plan to increase their fares, a number of transit operators in these areas indicated their desire to stabilize fares. The rest of the nation plans to reduce average fares from 33 cents to 24 cents, which would cancel out the proposed increases for the nine largest urbanized areas. This planned fare policy will result

TABLE 4

BASIC ADULT CASH FARES, 1958-1975, AND REVENUE-TO-COST RATIO, 1974
(36 Urbanized Areas)

Urbanized Area	Adult Fares (cents)[1,2] 1958	1970	Changes between 1970-1973	Changes between 1973-1975	1975 Revenue-to-Cost Ratio[3]
More than 2 million population (8 areas)					
New York	15	30	35	50	.69
Chicago	25	45	-	-	.71
Los Angeles	25 (1961)	30	-	25	.53
Philadelphia (SEPTA)	22 (1960)	30	35	-	.61
Detroit	20	40	-	-	.61[4]
Cleveland	20	45	50	25	.83
San Francisco (MUNI)	15	25	-	-	NA
(BART)			30 to $1.25	-	NA
Boston	20	25	-	-	.33
500,000 to 2 million population (17 areas)					
Baltimore	25	30	-	35	.81
Houston	22	45	-	40	.82
Jacksonville	20 (1959)	30	25	-	.68
Columbus (Ohio)	25 (1961)	35	40	-	.81
Portland (Oregon)	25	35	-	-	.42
Rochester	20	25	40	50	.80
Miami	20	30	-	-	.72
Dayton	15	35	40	-	.75
San Diego	20	40	25	35	.42
Seattle	20	25	20	-	1.09
Buffalo	25 (1960)	35	45	40	NA
Cincinnati	25	50	25	-	.50
Denver	15	40	35	-	.48
Indianapolis	20 (1960)	40	50	-	NA
St. Louis	25	45	25	-	.47
New Orleans	10 (1960)	25	-	30	.48
Pittsburgh	25	35	40	50	.50
250,000 to 500,000 population (6 areas)					
Flint	25	35	-	-	NA
Grand Rapids	25	35	-	-	NA
Tacoma	25	25	-	-	.44
Honolulu	20 (1960)	20	25	-	NA
El Paso	10	10	20	25	1.07
Richmond	15	25	30	-	NA
50,000 to 250,000 population (5 areas)					
Fort Wayne	25	35	-	-	NA
Peoria	20	40	-	-	NA
Raleigh	15	30	-	-	.88
Corpus Christi	20	25	-	-	.66
Madison	15 (1960)	25	-	-	.62

[1] Zone, express, and transfer fares are not indicated.

[2] Fare data are taken from transit operator statistics reported to the American Public Transit Association.

[3] Operating revenue and operating cost data are taken from American Public Transit Association, Transit Operating Report for Calendar/Fiscal Year 1974.

[4] City Transit Division.

NA Not Available

TABLE 5

COMPARISON OF 1972 AND 1990 NTS AVERAGE FARE, REVENUE, AND OPERATING COSTS, AND REVENUE-TO-COST RATIO*

	Average Fare# (cents)		Revenue Minus Operating Costs [Deficit ($ billion)]		Revenue-to-cost Ratio@	
	1972	1990	1972	1990	1972	1990
Total Nation	34	34	-0.4	-2.5	0.85	0.65
Nine Largest** Urbanized Areas	35	42	-0.3	-1.9	0.85	0.63
Rest of Nation	33	24	-0.1	-0.6	0.83	0.71

*All figures expressed in terms of 1971 constant dollars.

#Average fare is calculated as NTS reported revenue divided by annual unlinked trips.

@NTS revenue divided by NTS operating (annual) costs.

**New York, Boston, Philadelphia, Chicago, Cleveland, Detroit, Los Angeles, San Francisco, Washington, D.C.

Source: U.S. Department of Transportation, A Study of Urban Mass Transportation Needs and Financing, op. cit., p. V-15.

in rapidly escalating deficits, especially if accompanied by no actual increase in transit ridership. It is this planned trend that transit managers are urged to reverse.

To reverse the planned trend for fare patterns, it is necessary to fully understand the definition of transit demand elasticity and its relationship to pricing and other transit service characteristics. By understanding how transit demand can increase with combinations of pricing and transit service strategies (i.e., product planning) it is possible to choose new pricing strategies for the future and reverse past and current trends.

DEFINITIONS AND EXAMPLES OF ELASTICITY

Before changing the fare or other elements of a transit service, it is important to determine what effect the change will have on ridership, costs, revenue, and the quality of the service. In particular, it is important to know the consequences of the proposed actions intended to generate additional demand for transit service, increase the revenue from it, lower the cost of providing it, etc. Demand elasticity is a measure of the effect of a change in the price or quality of transit service on demand.

Understanding the definition of fare and service elasticity and applying the appropriate elasticities to design pricing and service strategies are very important. Most people know that fare increases will lead to decreases in ridership, and service improvements will result in increases in ridership. As a result, there has been considerable reluctance to increase fares since 1970, as previously discussed, to retain existing levels of ridership. As is shown below, fare increases do not have to result in significant decreases in ridership. Evidence also shows that the public is less sensitive to fare increases for peak period travel than for off-peak travel. Also, when fare increases are made in conjunction with improved service packages, increased ridership could result because the public is more sensitive to the service improvement than to the fare increase.

Definition of Elasticity

Fare elasticity[1] is defined as the proportional change in ridership resulting from the proportional change in the fare charged. Elasticities can be estimated by recording the actual changes in ridership following a fare increase or decrease as shown below in equation form:

$$= \frac{\text{percent change in ridership}}{\text{percent change in fare level}}$$

or

$$\frac{\dfrac{\text{New Ridership - Old Ridership}}{\text{Old Ridership}}}{\dfrac{\text{New Fare - Old Fare}}{\text{Old Fare}}}$$

Fare elasticities have negative values. This means that a fare increase will cause a decrease in ridership, and a fare decrease will cause an increase in ridership. An example of fare elasticity is illustrated below for a case of local bus service where the fare is lowered from a flat 35 to 25 cents, a decrease of 28.6 percent. Within a three-month period the reduction in fare results in an increase of the daily ridership from 1,000 to 1,150, an increase of 15 percent. The fare elasticity is calculated as follows:

to be -0.525

$$\frac{\dfrac{1150 - 1000}{1000}}{\dfrac{25 - 35}{35}} = \frac{0.15}{\dfrac{-10}{35}} = -0.525$$

[1] A more precise term for the form of elasticity calculated in the above example is arc elasticity. Another name for arc elasticity is shrinkage ratio, a term commonly used by the transit industry. Shrinkage ratio has a more narrow definition than arc elasticity, since it is normally used to mean the percent loss in ridership for every 1 percent increase in the fare. Because of this narrower meaning and negative connotation, the broader term arc elasticity will be used.

Other demand elasticities can also be determined that are meaningful in market research of transit demand. Instead of fare, the demand elasticity could be based on headway or elapsed time between two successive transit vehicles. This includes the amount of time a passenger spends waiting for a vehicle, the amount of time a passenger actually spends in the vehicle, the passenger's income, cost of traveling by some other mode of transportation, the time required to travel by an alternate mode, and many other variables. Market survey evidence shows that service elasticities will be positive, indicating that service improvements (i.e., reduced travel, wait, transfer time or combinations), will cause increases in ridership.

Demand arc elasticities[1] are defined in relation to changes in the particular causal variable as inelastic (value less than 1.0), unit elastic (value equal to 1.0), or elastic (value greater than 1.0). An elasticity less than 1.0, indicating inelastic ridership, means that a proportional change in fare or in the service factor produces a smaller proportional change in the ridership. An elasticity greater than 1.0, signifying elastic ridership, means that a proportional change in fare or the service factor produces a larger proportional change in the ridership. In the foregoing example, the ridership on the local bus service is inelastic to the change in the fare because the 28.6 percent decrease in the fare induces only a 15 percent increase in ridership. The larger the numerical magnitude of the fare elasticity, the more sensitive is the ridership to change in fare.

Application of Fare Elasticity

In cases where the price arc elasticity is less than 1.0, a fare decrease will cause ridership to increase and revenues to decrease. Using our previous example of the price elasticity of -0.525, while ridership increases by 150, revenues decreased by $625 from $3,500 to $2,875.

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[1] Elasticity may be computed in another way as point elasticity. Point elasticity can be interpreted as the sensitivity of the demand to the slightest change in a causal variable at some particular value of that variable. Arc elasticity is the same as point elasticity only for changes in the causal variable that are extremely small. Both are useful for analysis but for different purposes. Since point fare elasticities involve infinitesimal changes in the fare, while arc fare elasticities can involve changes of any magnitude, arc rather than point elasticities should be used to determine the consequences of any actual fare change.

A fare increase of 25 to 35 cents for the same example of fare elasticity of -0.525 would cause a ridership decrease of 242 from 1150 to 908 and a revenue increase of $303 from $2875 to $3178. The calculation of this result is as follows:

$$\text{Proportional ridership change} = \text{elasticity} \times \text{proportional fare change}$$

$$\text{Proportional ridership change} = -0.525 \times \frac{35-25}{25}$$

$$= -0.525 \times \frac{2}{5}$$

$$= -0.210$$

$$\text{Ridership change} = -1150 \times 0.210 = -242$$

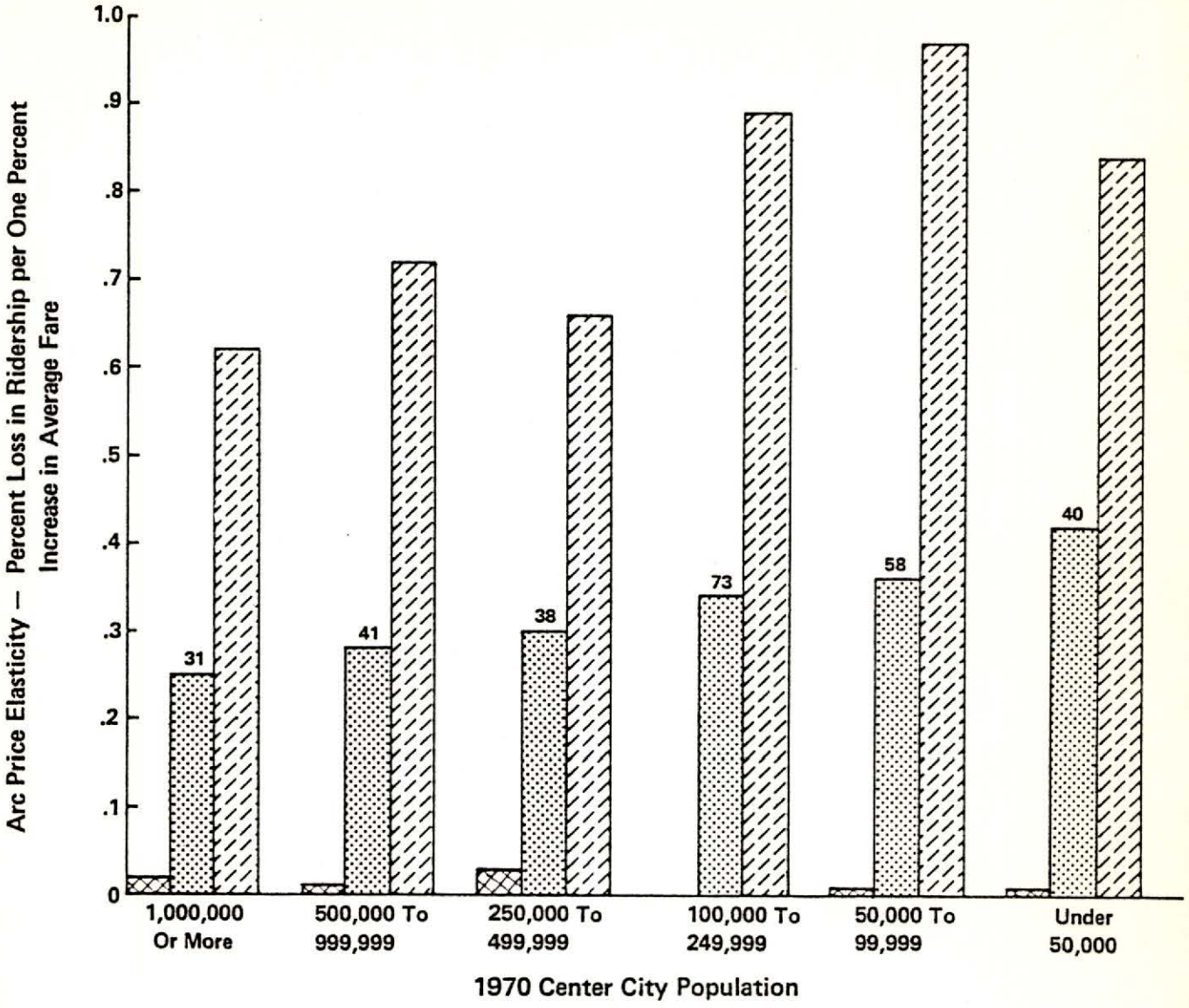
$$\text{Therefore new ridership} = 1150 - 242 = 908$$

A fare elasticity of -1.0 will produce no change in revenue for either a fare increase or fare decrease. For an elasticity value over -1.0 (elastic), a fare reduction can produce a revenue reduction. To illustrate, suppose that lowering the fare from 40 cents to 25 cents causes the average daily ridership to increase from 1,000 to 1,500 passengers. The arc fare elasticity equals -1.33, indicating that the proportional increase in ridership is greater than the proportional decrease in the fare. Nevertheless, the average daily revenue falls from $400 to $375.

Examples of Fare Elasticity

Applying data of the American Public Transit Association, the effect of fare increases on ridership between 1950 and 1967, a period during which experience in fare increases was reported, has been determined and arc elasticities for 281 cases of an increase in fare in 114 American cities ranging in population from under 50,000 to over 1 million are shown in Figure 1. The value of arc elasticity for cities over 1 million population was -0.25; for cities between 100,000 and 1 million, -0.32; for cities under 100,000, -0.40; and an overall average of -0.33. A wide variation in elasticities in each group between minimum and maximum values can be noted.

While previous studies on fare elasticity have suggested an average value of -0.33 (Curtin Rule), it is evident that indiscriminate use



SOURCES: American Public Transit Association, Estimated Loss in Passenger Traffic Incident to Increases in Urban Transit Fares (Washington, D.C.: American Public Transit Association, 1961).

American Public Transit Association, Estimated Loss in Passenger Traffic Due to Increases in Fares (1961-1967) (Washington, D.C.: American Public Transit Association, 1968).

FIGURE 1: VARIATION IN THE ARC PRICE ELASTICITIES BY POPULATION OF CENTRAL CITY FROM AN ANALYSIS OF 281 CASES INVOLVING A FARE INCREASE

of the -0.33 value can lead to highly inaccurate estimates of the loss of ridership accompanying a fare increase. Residents of large cities have elasticities less than -0.33 and small cities have elasticities considerably greater. Further analysis of the American Public Transit Association data has disclosed that neither the magnitude of the average fare before the fare increase nor the percentage increase in the average fare had any discernible relation to the size of the arc price elasticity.

Analysis of data for Atlanta, both for a fare increase in March 1971 and a fare reduction in March 1972, resulted in differing arc fare elasticities. The arc fare elasticity for the fare increase ranged between -0.51 to -0.53 and for the fare reduction between -0.25 and -0.29. A fare reduction in San Diego in September 1972 had a much greater arc fare elasticity than Atlanta, resulting in a value of -0.58. A similar value of -0.57 was obtained in the case of fare reduction in April 1973 for Cincinnati. Therefore, there does not appear to be firm evidence that arc price elasticities are different for either fare increases or reductions.

Available evidence on fare elasticities shows that demand for public transit is more responsive to fare changes in the off-peak than the peak hours. Travel habits of transit riders appear to be influenced by the purpose of their trip (i.e., work trips in peak versus non-work trips in the off-peak). Data developed for New York revealed a peak elasticity ranging between -0.07 to -0.15 and an off-peak elasticity ranging between -0.24 to -0.44. An analysis of data for 30 British towns disclosed a work trip elasticity of -0.19 and a non-work trip elasticity of -0.49.

By synthesizing the findings of market research and analysis of fare elasticities from several cities, typical ranges of fare elasticities were derived for each of the six significant market segments (high, medium, and low income worker, student, shopper, and elderly and handicapped), as shown in Table 6. The differences in elasticities for peak and off-peak travel are noted. It has not been possible, with available data sources, to determine the effect of location of residence or orientation of the trip on fare elasticity, if any exists.

Examples of Service Elasticity

Available evidence unquestionably demonstrates that transit service characteristics such as speed, frequency (or waiting time), and access time have a much greater effect on the transit demand than the fare. Boston data for 1962 revealed travel time elasticity of -0.39

TABLE 6

TYPICAL FARE ELASTICITIES BY MARKET SEGMENTS

MARKET SEGMENTS	FARE ELASTICITY	
	Peak	Off-Peak
1. High Income Worker	-0.10 to -0.25	N/A
2. Medium Income Worker	-0.3 to -0.4	-0.4 to -0.75
3. Low Income Worker	-0.3 to -0.5	-0.5 to -1.0
4. Student	N/A	Less than -0.3
5. Shopper	N/A	-0.75 to -1.0
6. Elderly and Handicapped	N/A	-0.25 to -1.0

N/A - Generally not applicable since few trips are made during that time period.

and access time elasticity of -0.71 in comparison to price elasticity of -0.09. Recent data on demand for express bus service in the Shirley Highway Corridor near Washington, D.C., showed a travel time elasticity ranging between -1.04 to -1.63 in comparison to price elasticity ranging between -0.22 to -0.29. Data for Atlanta, San Diego, and 17 other cities have provided similar evidence that service elasticities were significantly greater than price elasticities.

In summary, the evidence outlined above strongly suggests that, in most instances, simply changing the fare will only have a minimal to moderate effect on the demand for public transit. Fare increases normally generate more revenue, at the expense of some loss in ridership, while fare reductions increase ridership but at the expense of losing revenue. Peak period effects of fare increases appear to be significantly less than the effects of off-peak fare increase. The evidence available overwhelmingly shows that none of the market segments identified are highly responsive (i.e., elastic) to changes in the fare alone.

Using the elasticity case study data described above, demand elasticities can be estimated for changes in fares and in service characteristics for each of several actual or potential market segments. With these elasticity estimates, one could predict, for any given market, the effect of changes in fares and service characteristics on ridership and revenue. In particular, one might want to know whether a fare increase, accompanied by a service increase, would generate sufficient new revenue to pay the additional costs of the new service. An analysis of the relevant fare and service elasticities developed from comparable markets elsewhere could provide a good indication of the results to be expected in the particular market in question. The procedures to be followed are discussed in Chapter 4. To analyze price elasticities and to evaluate different pricing strategies, it is important to fully understand the different types of fares.

TYPES OF FARES

An analysis of fare structure including transfers, by population group, for the 36 selected cities is given in Table A.6. Of the 25 urbanized areas with populations of more than 500,000 inhabitants, 17 had zone fares (or some combination of zone and flat fares) in 1972, and eight had flat fares. The 11 urbanized areas with populations from 50,000 to 500,000 have bus systems only, of which seven had flat fares in 1972 and the remaining four had zone fares.

This section categorizes the different fare structures into four categories:

- flat fare;
- differential fares (distance and time of day based);
- value-based fare; and
- special discounted fare.

Each fare category is discussed below.

Flat Fare

The flat fare was particularly workable and popular when mass transportation served only limited-length routes in central cities. Approximately one-half the North American transit firms reporting fare data in 1972 to the American Public Transit Association are currently using flat fares. In the last 5 years, several transit firms have simplified their fare structure to offer flat fares.

The major advantages of flat fares are that they are simple and convenient to understand and use. A major disadvantage is that the flat fare offers the same price for trips with different costs and with different values to the transit user. Under a flat fare system, the same price is charged for a long trip from an affluent suburb during a heavily congested rush-hour as is charged for a short trip from a low-income ghetto when there is no congestion and the transit system has excess capacity. This is a very high price to pay for the simplicity of the flat-fare system.

The free fare is the extreme case of the flat fare. The user is charged nothing for the trip, and all of the costs are paid from non-user sources. Like the flat fare, free fare has the advantage of simplicity and the disadvantage of missed opportunities to charge passengers for transit services.

Most of the existing free fare services are not systemwide. They are provided for a particular place, time, or group of passengers. The free fare service in the City of Commerce, California, is the only example of a totally free transit system in the United States.

Differential Fares

There are two economic bases for differentiating transit fares (i.e., for charging different prices to different persons). Either the cost and character of service provided to different persons varies and one wishes to reflect these differences in the prices charged; or the value of the service differs, and one wishes to set fares to reflect these differences (see discussion below on value-based fares).

Distance-Based Fares

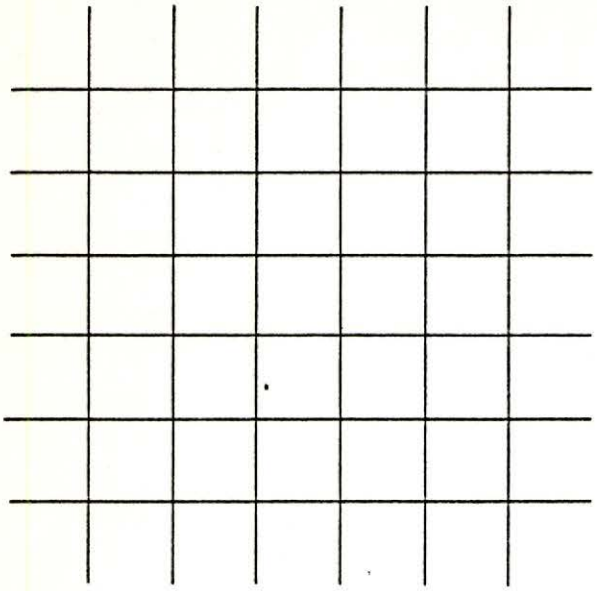
Fares which vary with distance traveled may have either a cost or a value rationale. A long trip is both more costly to the transit supplier and more valuable to the transit user than is a short trip.

Fares which vary with distance would typically include a basic charge for boarding the vehicle and an incremental charge which would depend on the distance traveled. Distance-based fares are handled operationally by either stage- or zone-collection systems. In a stage-collection system, each route is divided into stages, or route segments, with a fare increment being charged for each stage or combination of stages traversed by the user. The stage fare is most appropriate on routes with a few designated stops, or where an automatic fare collection system eases the collection of differential fares. A stage-collection system is in operation on the BART rapid rail system in the San Francisco area where a fare is computed for each origin-destination pair used by a rider.

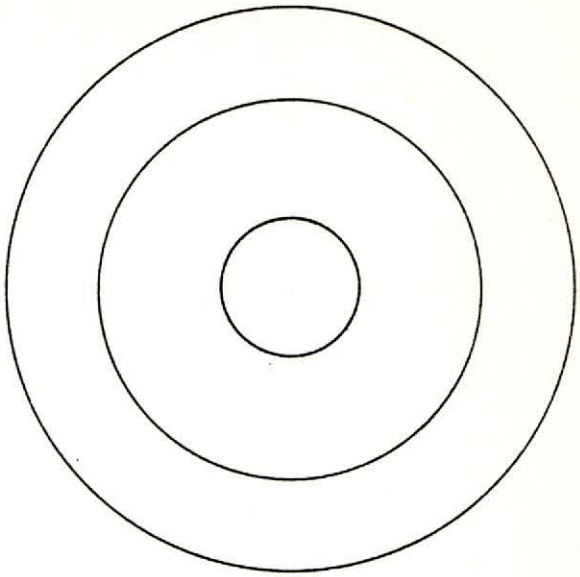
The more common approach to the distance-based fares is the zone-collection system, in which the area served by the transit system is subdivided into zones, with the fare increased each time a zone boundary is crossed. Operationally, the zone-fare system involves charging a passenger a base fare, plus an incremental fare for each zone boundary crossed. There are several ways to design a zone-fare system, some of which are shown in Figure 2.

Fare zones are defined for an area by tessellating the area with a geometric pattern. Geometric forms commonly used include grids, concentric circles, segmented concentric circles, or hexagonal patterns. In most instances, the precise geometric forms are modified to conform to geographic features or jurisdictional boundaries. When concentric circles are used, and there are a significant number of cross-town trips, the circles can be segmented by lines radiating from the city center.

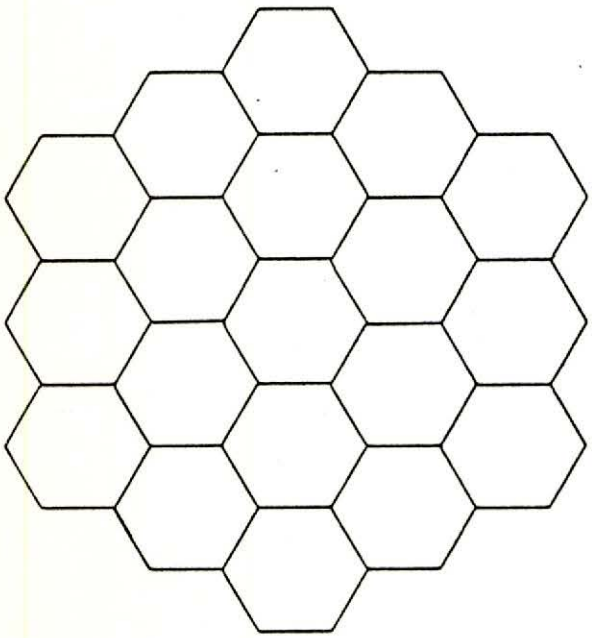
GRID



CONCENTRIC CIRCLES



HEXAGONAL SYSTEMS



SEGMENTED CIRCLE

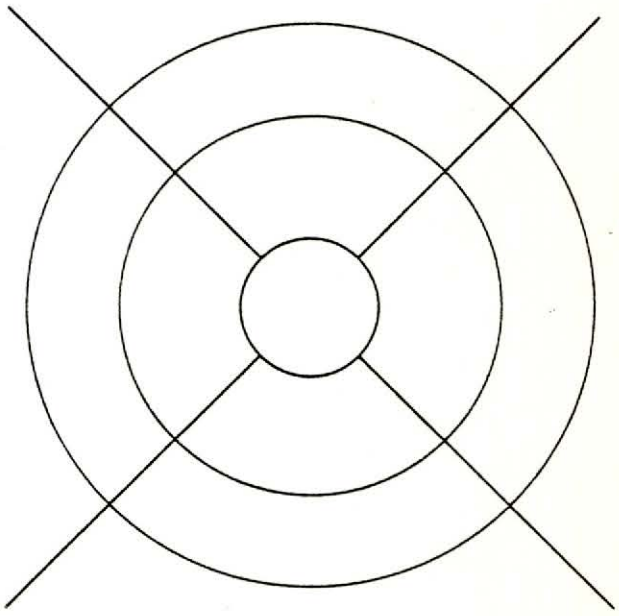


FIGURE 2: ZONAL FARE SYSTEMS

Using any of these patterns, the fare system can be a centrally oriented or a moving-zone system. In the former, the base fare is assigned to the central zone, with increments added to the base fare for trips ending or originating outside the central zone. In a moving-zone system, the base fare is paid for by trips within the zone of origin, with incremental fares paid for trips beyond the origin zone.

The primary disadvantage of the zone system is that, because it is only an approximation of distance relations, it can charge a passenger making a short trip which crosses a zone line a higher fare than a passenger making a long trip within a zone. Overlapping zonal boundaries can partially rectify this problem, but will complicate the fare collection system. Problems of handling zone-fare collection systems will be discussed in the next section on fare collection systems.

Time Differentiated Fares

There are several reasons for charging fares differentiated by time of day, although some of the arguments supporting this differentiation are conflicting. The basic economic argument for time-differentiated fares rests on cost differences. Transit systems acquire most of their capital stock (i.e., buses, rights-of-way, trackage, rolling stock) to accommodate peak loads that occur during the morning and evening rush hours. The cost of this equipment has been incurred to provide services to the peak period users, and should be charged to those users. Moreover, since the incremental cost of serving a non-peak period is very small compared to the cost of providing for peak period demand, the price of an off-peak trip should be less than the price for a peak period trip.

A peak/off-peak pricing differential can also be justified by differences in the value of the service. Persons who ride transit during peak periods typically have different transit requirements than do off-peak riders and are generally less responsive to changes in transit fares. The peak period transit rider is typically making a trip to or from work. He may be expected to continue using transit even at a higher fare because he cannot forego the trip, and the available alternative, principally an auto trip on congested highways, may be relatively unattractive.

Examples of transit systems which offer systemwide off-peak fare reductions are given in Table 7. Off-peak discounts occur for midday periods (often oriented toward the downtown or neighborhood shopper), for evening, or for weekend/holiday travel.

TABLE 7

TRANSIT SYSTEMS OFFERING OFF-PEAK FARES

TRANSIT ORGANIZATION	LOCATION	DESCRIPTION OF SERVICE	SPECIAL FARE	REGULAR FARE
South Coast Area Transit	Ventura, Calif.	Passes for unlimited weekend travel	$2.00/weekend $1.50/Sunday	$.20
Massachusetts Bay Transportation Authority	Boston, Mass.	Reduced fares 10 a.m. to 2 p.m. and all day Sunday	$.10, $.25/ride	$.25, $.30
Toronto Transit Commission	Toronto, Ontario, Canada	Sunday/Holiday Family Pass	$1.00/family/day	$.40
Port Authority of Allegheny County	Pittsburgh, Pa.	Sunday/Holiday Pass	$1.75/weekend	$.40
Regional Transportation District	Denver, Colo.	Off-Peak Fare	$.25/ride	$.35
Tri-County Metropolitan Transportation District	Portland, Ore.	Sunday/Holiday Pass	$1.00/day	$.35
A C Transit	Oakland, Calif.	Sunday/Holiday Pass	$.60/day	$.25
British Columbia Hydro & Power Authority	Vancouver, British Columbia, Canada	Sunday/Holiday Pass	$.50/day	$.25
Metro Regional Transit Authority	Akron, Ohio	10 a.m. to 2 p.m.	$.25	$.35
Municipal Transit System	St. Petersburg, Fla.	Sunday/Holiday Fare	$.75/day	$.25
Western Reserve Transit Authority	Youngstown, Ohio	Shoppers' Special, 9 a.m. to 3 p.m.	$.25/ride $.60/day	$.50 $.25
Tacoma Transit System	Tacoma, Wash.	Sunday Pass Downtown Shop-Around Pass, to be used before 3:30 p.m.	$.25/day	$.25
Erie Metropolitan Transit Authority	Erie, Pa.	10 a.m. to 2 p.m., after 6 p.m., Sundays and Holidays	$.20/ride	$.30
Mercer County Improvement Authority	Trenton, N. J.	10 a.m. to 2 p.m., after 6 p.m., Sundays	$.15/ride	$.30
Canton Regional Transit Authority	Canton, Ohio	10 a.m. to 2 p.m.	$.20/ride	$.30
City Transit Authority	Billings, Mont.	Saturdays	$.10/ride	$.25
New York City Metropolitan Transportation Authority	New York, N. Y.	Sundays	Round trip for the price of one way	$.50
Washington Metropolitan Transit Authority	Washington, D.C.	Off-Peak Base Zone Fare	$.40	$.55

Source: Fare data reported to the American Public Transit Association.

One example of daytime off-peak fare reduction is the Massachusetts Bay Transportation Authority's (MBTA) "dime time" which extends from 10 a.m. to 2 p.m. The fare on the rail system during this period is reduced from 25 cents to 10 cents (from 50 cents to 25 cents on one line). Another example of an off-peak reduction is the Sunday reduced fare offered in New York City by the New York City Metropolitan Transportation Authority (MTA), where two rides are offered for the price of one on bus, rail, and commuter services to, from, and within the city. Any passenger purchasing a transit token on Sunday receives a coupon permitting free entry through the station gate for a return trip. On commuter lines, a passenger receives a round-trip ticket for a one-way fare. On buses, the passenger receives a return round-trip ticket in return for a full fare.

Value-Based Fares

A value-based fare is set at a price an individual would be willing to pay for a service, rather than at the cost of supplying the service. A value-based fare has two distinctly different kinds of applications:

- In cases in which special services are being considered, the service should be supplied only if the revenue generated at that fare exceeds the incremental cost of supplying the service. Vehicles should be supplied in the service as long as the incremental revenue is at least as great as the incremental cost of the last vehicle supplied. Time-differentiated fares are sometimes special cases of value-based fares. Specific examples follow for fares for special origins-destinations and for services in limited areas.

- In cases in which a decision has been made to supply a fixed amount of service, the appropriate fare is the highest non-negative fare that can be charged and still give the public an incentive to utilize the full capacity supplied. The cost of the service is not considered for determining the fare since a decision has already been made to supply the service.

Fares for Special Origins and Destinations

Examples of transit services for special origins or destinations are listed in Table A.7. Included are services to special sports events, recreation areas, and other special destinations. These services are typically provided from one or several points in a metropolitan area to a single destination.

Subscription bus service and buspools offer further examples of specific origin/destination combinations especially designed and priced to meet specific patronage needs. The subscription service and buspools provide some indication of the successes possible with special services and fares. Two examples of successful subscription bus services are the Peoria Premium Special, which has a specific destination, and the Murraysville bus club service, which has a specific origin:

- The Peoria Premium Special (initiated in Peoria, Illinois, in 1964 with HUD mass transit demonstration funds) offered home-to-work subscription service. Most of the buses served the Caterpillar Tractor plant. Schedules matched workshift times for plant and office workers. For an average trip distance of 3.5 miles, the average fare was 23 cents and payment was made monthly. The majority of the plant-destined routes became self-sufficient.

- In Murraysville, a suburb of Pittsburgh, Pennsylvania, local citizens organized a bus club service in 1974 and contracted with the Allegheny County Port Authority to provide the service on a 20-mile route between Murraysville and Pittsburgh. The fare was $40 per month, with the club members collectively specifying the arrival and departure times and the bus routing.

There are also examples of transit systems offering express service at special fares as shown in Table A.8.

Special Fares for Services within Limited Areas

Service within limited, and usually high density, areas can be specially priced to reflect the difference in costs or value of the service. An example of this service is the central business district loop service which offers circulation throughout the central business district at reduced fares. The low fares reflect both the low cost due to the limited route length and high density of use as well as the relatively low incremental value of a trip to the individual passenger. The service may also yield some public benefits by reducing downtown congestion and pollution and by increasing downtown accessibility.

Several examples of systems offering reduced downtown rates are given in Table A.9. Some downtown loop services use special

vehicles, such as the downtown minibus operated by the Washington Metropolitan Area Transit Authority. The Magic Carpet Service in Seattle is free to all passengers traveling within the 105-block district in the city center encompassing the government, financial, and retail business districts. Following institution of the service and free fare, ridership in the free zone tripled, traffic volume downtown decreased approximately 2 percent, and retail sales in the central business district showed an increase, largely during the noon hour.

Special Discounted Fare

Several transit firms have reduced fares for certain groups--the elderly, handicapped, poor, school children, and college students. The reductions have come primarily in response to pressures from the public, who believe that reduced fares for these groups provide public benefits through an increased opportunity for them to travel. Fares for each of these groups are discussed below.

Senior Citizen Fares

As of April 1975, 44 percent of the transit systems in North America reporting fare data to the American Public Transit Association offered reduced or free fares for the elderly. Prevalence of such fares is expected to be increased by the provision in the National Mass Transportation Assistance Act of 1974 which makes off-peak half-fares for the elderly and handicapped a condition for transit capital and operating assistance. In particular, 145 of 279 urbanized areas (54 percent), by September 1976 had an UMTA-approved project subject to this provision.

Special fares for the elderly include reduced or free fares, and the provision of special tickets, tokens, or multiple trip passes at reduced rates. These fares are frequently restricted to off-peak periods on weekdays and use all day on Saturdays, Sundays, and holidays. The fares are generally limited to persons aged 65 or older, although some programs allow inclusion of women at age 62, and in a few cases, maximum permissible income is specified.

The objectives of special senior citizen fares include:

- providing increased mobility opportunities to the aged who are often unable to drive;

- providing mobility at reduced rates since the aged are often living on small incomes;

- increasing off-peak capacity utilization; and

- increasing peak-period bus speeds through reduced peak-period number of elderly boardings.

Fares for the Blind and Handicapped

Fares for the blind and handicapped are often provided in the same manner as those for the elderly. As of April 1975, 38 North American transit systems reporting fare data to APTA provided special fares for the blind and handicapped. An increase in the number of reduced fares for the handicapped has occurred as a result of the provision in the National Mass Transportation Assistance Act of 1974 for off-peak half-price fares for the elderly and handicapped. Special fares for the blind and handicapped may take the form of fare reductions, free fares, or passes. The forms of identification required may be an identification card or, in the case of the blind, a white cane or seeing-eye dog. Occasionally, the blind person must be accompanied by a non-blind fare paying passenger who is charged a reduced fare.

Fares for Welfare Recipients

Reduced fares for welfare recipients are not widespread. In Omaha, welfare recipients pay reduced fares through purchase of 100-trip ticket books. In Detroit, transportation for welfare recipients is provided in the form of a welfare allowance by a social agency. To encourage low-income ridership, the Port Authority of Allegheny County (Pittsburgh) offers a 10-cent special loop bus in the model cities area and 10 cents off the regular fare for regular bus service through the model cities area.

Special Fares for Students and Children

Several states require transit systems to have reduced fares for students. A large number of systems accommodate students through the use of reduced fares, special tickets or tokens, and passes. The fares are generally confined to weekdays and daylight hours and are available to those who attend elementary through high school and, sometimes, those up to a specific age. Other restrictions include distance of residents from school.

Special fares for children, other than student fares, are provided by some transit systems. These fares are generally free for the very young (up to 5 years) and reduced for children up to a specified age (generally 12).

Fares for College Students

In some college communities, students receive reduced or free fares. In some cases, these fare reductions are subsidized by the students. Examples of special fares for students include the following:

- at the University of Massachusetts at Amherst, a fleet of buses managed and operated by the students provides free transportation service throughout the campus and through the surrounding town to designated apartment complexes. The system, originally supported by student fees matched by state funds, has been expanded upon the receipt of a $475,000, 18-month UMTA demonstration grant. The system has been intended to reduce campus congestion and air pollution and ease the parking problem on campus; it has been coordinated with a campus policy of increasing the cost of a campus parking space and limiting the spaces. The coordinated bus/parking approach was one factor which encouraged UMTA to make the grant.

- at the University of California at Santa Cruz, the students voted to impose a special fee of $10.50 per student on the student body at registration to subsidize free bus service for students. The students receive free bus service by showing their student ID on boarding.

- in Peoria, Illinois, free tickets are provided to new residents and freshmen at the local college to encourage transit ridership.

Various combinations of flat, differential, value-based, and special discounted fares are applied in cities that have single transit modes and in cities with a mixture of bus, rail, and/or commuter rail service. A flat fare may be used for the bus system and a stage fare for the rail commuter. The success of implementing a new fare structure will depend in large part on the fare collection system used. The next section highlights the different fare collection systems and the close relationships with feasible fare structures and policies.

FARE COLLECTION TECHNIQUES

Determining the appropriate set of fare collection techniques is important because of the several roles that fare collection plays in affecting two aspects of transit service. Fare strategies are affected because collection systems make certain types of fares workable and preclude the use of other types of fares. Moreover, collection techniques partially affect the types of discounts and prepayment techniques that a transit firm can implement. Fare collection techniques affect the quality of service by affecting the ease and speed of ingress to and egress from the vehicle, the need to make special arrangements to pay fares, and the dwell times at stops along with the resulting schedule reliability.

Several fare collection techniques are examined below with regard to their effects on fare and service policy. The discussion includes:

- on-board collection techniques;
- prepayment plans; and
- automatic fare collection.

On-Board Fare Collection Techniques

In its simplest form, the fare collection process involves the passenger giving the required fare to the driver of the vehicle, or in the case of rail system to a station attendant. The introduction of the farebox has eased the driver's job. The various on-board fare collection techniques are discussed below.

Exact Fare

Of the 204 transit firms reporting fare collection data to APTA in 1975, 116 reported having some form of exact fare requirement. Under this system, the bus driver carries neither change for fares nor the key to the locked farebox. The passenger deposits in the farebox either exact fare, a token, or ticket purchased elsewhere. Eighty-four of the 116 systems with exact fare requirements reported the use of script systems, where the passenger without exact fare receives paper script worth the amount paid in excess of the fare and redeemable at designated transit offices or by mail.

The exact fare requirement for buses was first instituted in the United States in June 1968 by the D.C. Transit Company following

the murder of a bus driver. The system was initiated to reduce robberies. (The Washington, D.C. system had experienced approximately 500 bus robberies in the year prior to the change to exact fare.) In addition to improving safety for drivers, the exact fare system yields several other advantages. Bus service is quicker and safer for the passenger with fewer stack-ups at busy stops because the driver no longer makes change and drives at the same time. The problems in recruiting bus drivers have been reduced. Finally, there have been several financial returns to the bus companies. In addition to savings from reduced robberies (D.C. Transit lost $38,000 to robbers during 1967 and the first half of 1968), bus transit companies realized the returns from investing the money otherwise needed for making change-requirements of $300,000 per day in Washington, D.C., and $200,000 per day in Pittsburgh prior to instituting exact fare.

Zone Charge

The introduction of a zone system complicates the fare collection process because each passenger trip must be monitored to assure that the full amount is collected. A ticketless zone system puts passengers on their honor, subject to the memory of the driver, because each passenger must declare a destination upon boarding and depositing appropriate fare. Alternatively, each time a zone boundary is crossed, the driver could collect a zone increment from each passenger--a system which is quite cumbersome to employ and inconvenient to the passenger.

Most transit systems with zone fares use some form of ticket to identify the origin of the passenger or the destination paid for. The ticket is surrendered at the end of the ride with an additional fare, if necessary. The ticket can be issued by the driver, but a remote machine speeds the boarding process.

Pay/Leave Collection

Under this technique, the passenger pays the driver upon leaving the vehicle. The technique is most appropriate for a zone system and assumes a common origin for each passenger (for example, downtown) unless the passenger has obtained a zone check upon boarding to indicate otherwise. The advantages of the technique are that it would speed up the boarding process in congested boarding areas, and any delays from fare collection occur when passengers are on-board, a benefit in inclement weather. A disadvantage of the technique is the opportunity for passengers to ride and then claim no funds on departing.

This technique can be even more complicated, such as the pay-enter/pay-leave system in Cleveland, with appropriate charges for each different enter-exit combination (i.e., the rider pays a specific fare on boarding and again on exiting the vehicle depending on the on-off stop combination). A disadvantage of this system, besides its complexity, is the need for the passenger to interact with the driver both upon entering and exiting from the system.

Transfers

Transfers are paper checks given to the passenger to permit switching from the initial vehicle of a trip to another vehicle as part of the same trip. They provide second and subsequent legs of a trip at reduced or free fare. Transfers are generally used for switching between buses or between bus and rail. They usually have a time limit to assure their use for a single, continuous trip.

Transfers lend themselves to some abuse and revenue loss when passengers give them to other passengers or violate the transfer regulations. Some systems charge a fee for transfers to try to limit abuses and to gain additional revenue. Of the 167 systems reporting the use of transfer systems to the American Public Transit Association in 1975, 97 offer free transfers with the rest charging fees ranging from 1 cent to 15 cents. The tendency to charge for transfers has been declining as systems prefer not to penalize the passenger whose desired origin-destination combination fails to match the system design.

Transfers generally are printed with the time and origin of issue to try to eliminate fraud. Transfers can indicate time of issue by the way the paper is manually torn from the transfer holder. Alternatively, for bus or off-bus locations, electromechanical dispensers can print the time on the transfer, giving the rider and the operator no excuse for misreading.

Prepayment Plans

Prepayment requires the passenger to pay in advance for a ticket, token, pass, or other right to ride transit. Prepayment indicators can be unrestricted or can be specialized for certain groups, places, times of day or week, or special services. In some cases, when prepayment indicators are sold at banks, stores, and other designated places in addition to transit offices, the transit firm offers reimbursement for the administration expenses. Prepayment

indicators can also be sold through the mail. Prepayment has numerous advantages because it:

- is convenient for the passenger, who no longer must bother with exact change on exact-change-requiring systems.
- speeds up the fare collection process by eliminating payment and, if necessary, special identification, as part of the boarding process.
- would make transit more competitive with the automobile. The use of prepaid monthly bus tickets would be comparable to the use of credit cards, monthly parking tickets, etc., which separate payments of auto-related expenses from individual trip decisions.
- permits differentiation of fares for different groups using the same service.
- can secure passenger commitment to different kinds of special services like special commuter or school buses.
- can serve as a promotion device when combined with discounts.
- can encourage participation by subsidizing organizations which purchase the appropriate prepayment indicators and resell or give them to their patrons.
- can aid recordkeeping for accounting and/or subsidy purposes.

Several kinds of prepayment are discussed below. An example of combination of prepayment plans for Allegheny County is shown in Table 8.

Tokens and Ticket Tokens

Tokens and ticket tokens (tickets used as tokens) are deposited in the farebox in place of the fare. Tokens, discs accepted in lieu of cash, are most appropriate for flat fares. Tickets can be sold in denominations and presented in quantity for a ride whose fare varies with trip length.

TABLE 8

SPECIAL PURPOSE PACKAGES OFFERED TO COMMUTERS BY THE PORT AUTHORITY OF ALLEGHENY COUNTY

DESCRIPTION OF SERVICE	SPECIAL FARE	REGULAR ONE-TRIP FARE
Reduced weekly permit	$2.60/week	$.40
Reduced monthly permit	$10.00/month	$.40
Reduced annual permit	$100.00/year	$.40
Ten trip tickets in outer zones for 49 Red Flyer Express and other multi-zone routes	$4.05	$.45 (express)
Early Bird Special (before 7 a.m.)	$.25	$.40
Wild Card Bus (one morning trip daily)	Free	$.40
Stop-over transfer for one hour	$.10	

OTHER PROVISIONS

Payroll deduction and annual subscription programs

Credit Card charge for permit purchases

Free outlying parking (3,600 spaces)

20-Trip downtowner zone ticket for close-in park-n-ride parking for $4.00 (2,000 spaces)

Sources: "A Price Package for Every Rider's Pocketbook," Port Authority of Allegheny County, June 6, 1975 and "Fare Reports," American Public Transit Association, December, 1973.

Fifty-two transit firms reported offering undiscounted ticket tokens, according to the American Public Transit Association in 1975. Forty-four other firms reported generalized reductions for tokens and ticket tokens ranging from 4 to 20 percent of the regular fare, with purchase in specified bulk often required to receive the discount.

Although some experience with prepayment in the United States and abroad suggests the passengers' unwillingness to trouble themselves with prepayment, experience in Washington, D.C., has shown that a significant proportion of bus passengers are willing to purchase undiscounted prepaid tickets and tokens. In January 1974, one-fifth of all weekday passengers, excluding school and commuter ticketholders, used 40-cent token tickets. When all passengers are included, the proportion rises to about one-fourth.

Another example from Washington, D.C., shows how the use of tickets aids the subsidy process. The city subsidizes 30 cents of each student's 40-cent ride to and from school. The student pays 10 cents per ride and deposits a school ticket in the farebox. Every week, the tickets for students are placed in bags and weighed with the weight of the tickets in the bags used as the basis for determining the subsidy.

Passes

Transit passes allow the bearer to receive multiple transit rides. Passes are issued for specific times of day, periods (weekends or a particular month), destinations, and groups (elderly, students, families) and may be used for a limited or unlimited number of trips. Passes offering discounts are useful ways to encourage capacity utilization in off-peak periods, as with unlimited weekend passes, or to implement fare reductions for specific groups which need identification on the transit vehicle.

Passes may or may not be transferable. If they are not, the passes must be inspected by the driver which may be time-consuming and present a greater opportunity for misuse than transferable passes. Passes may require no additional payment upon boarding, or they may require an extra cash fee for each ride to reduce usage violations, or for crossing zone boundaries (passes requiring additional fees are often called permits). Passes used for a limited number of trips may require cancellation.

Passes are one way to identify members of a special group for subsidy purposes, as with the use of the senior citizen card in

Albany. To reimburse the bus system for reduced elderly fares, each county in the Albany area contributes a subsidy based on the number of cards issued by the county to its residents multipled by the average number of rides per card user, with the latter information obtained through mail surveys supplemented by bus head counts.

Club Subscriptions

Club subscription is one way to secure prepayment for a special type of service, limited to only its subscribers. Certain commuter services and school buses are examples of situations where subscription is used. An example is the Cincinnati Club Flyer, a commuter service with assured seats operated over three routes during the rush hour. Members pay $12.00 for the monthly permit card and 10 cents per ride. The commuters are billed monthly for the service and send their card in the mail.

Automated Fare Collection

Automated fare collection devices range in complexity from simple coin-operated turnstiles to complex electronic systems that can compute varied fares and read magnetically-encoded tickets. Along with the collection of fares, an automated fare collection system can provide numerous benefits, including:

- easier collection of distance-based fares by automating the process of computing alternative fares for trips of different distances;
- faster passenger entry to the transit system;
- reduced opportunity for fare collection fraud; and
- continuous data collection about different aspects of system operations and the ridership.

Although all of these benefits could accrue to both bus and rail systems, one of the primary advantages to rail systems of automated fare collection is the cost savings resulting from the reduction in numbers of fare collection and monitoring personnel. One of the primary advantages to bus systems is the use of more accurate distance-based fares permitted by an automatic collection system. To date, most automatic fare collection systems have been installed on rail systems because of the potential personnel cost savings, the relatively smaller number of automatic fare collection devices per

passenger which would have to be installed. There remains the problem of reliability of devices on buses, that restricts their use. The following discussion briefly discusses the main issues in using automated collection devices for rail and bus installations.

Rail

Rail automated fare collection systems have been successful in reducing fare collection costs on many systems. For example, 8 percent of the operating expenses on the high-speed Port Authority Transit Corporation (PATCO) line between Philadelphia, Pa., and Lindenwold, N. J., are estimated to relate to fare collection, compared with 20 to 30 percent of the expenses normally attributed to conventional manually-operated fare collection systems.

There is substantial variation among the automated fare collection systems currently used on rail transit systems. The simplest device is the turnstile, operated by either cash or a transit token. A more complicated version of this single-trip collection system is used by the Montreal Metro where the automated fare collection system accepts tickets or punched rail/bus transfers.

More complicated automated fare collection systems accept magnetically-encoded tickets prepaid for more than one trip, sometimes applicable to distance-based fare systems. On systems which use such collection devices, passengers can purchase multiple-trip or stored-value tickets, usually coded with such information as time and day of travel, number of trips allowed or total value of travel purchased, and route code. The passenger inserts the ticket into the entry gates to gain acceptance to the transit system. The gate checks the validity of the ticket and admits the passenger to the system (or denies the passenger access if the ticket is invalid). The passenger repeats the validity check when exiting from the system. At the time of entrance or exit, the value of a trip is deducted from the ticket.

The most elaborate automated fare collection system currently in operation in the United States is the one installed on the San Francisco Bay Area's BART system, where passengers are charged according to a relatively complex fare structure based on distance traveled and scheduled travel speed. The passenger buys a ticket which is inserted into the gate when the passenger enters the system. At the destination, the system deducts the fare for the trip from the value of the ticket and either returns the ticket to the user and permits exit, retains the ticket if its value is exhausted, or rejects it

for insufficient value (in which case the value of the ticket must be increased at an Addfare machine).

Implementation of an automated fare collection system for rail transit involves several considerations:

- Will the system work? One of the most troublesome parts of the automatic fare collection system has been the ticket vending machinery which often accompanies the automatic fare collection gate. For example, during the initial stage of the PATCO system, an average of one-quarter of the 58 ticket vendors were out of service sometime during a typical weekday. Such problems are important to the success of such a system because they cause passenger inconvenience, affect passenger attitude toward the system, and cause overall system operational problems.

- How can special reduced fares be incorporated into the system? In New York City, since the transit system accepts only tokens, half-fare passengers (i.e., the elderly or return-trip Sunday riders) gain access to the system through a gate opened by an agent. In Montreal, students and children can buy special tickets and use them on the nonautomatic turnstile next to the station agent's booth. Since BART's gates can handle only a single-fare table, BART intends to sell special tickets at a reduced rate by mail and over-the-counter.

- How do automated fare collection systems permit intermodal transfer? Chicago Transit Authority rapid transit travelers, for example, pay an additional 10 cents upon entering the system to get a transfer which, when validated on leaving the system, permits free travel on a connecting bus. No transit fee is charged for riding on another rapid transit line and, if riding the second rapid transit leg requires leaving the station, a free paper transfer is issued at the station exit. A Montreal bus passenger connecting with the Metro can request a free transfer permitting entry to the Metro within 90 minutes after issue. The transfer is inserted into the entry gate of the Metro system and checked automatically for validity. The development of automated fare collection systems for buses will facilitate in the future intermodal transfers.

- Will labor constraints interfere with adopting such a system? Port Authority Trans Hudson (PATH) system handled such a transition successfully in changing from a token to an exact change turnstile system which resulted in the elimination of jobs for several people formerly involved in issuing and handling the tokens for the system. PATH agreed that no employees would lose their jobs because of the adoption of the new collection system; employment would be reduced only by attrition, retirement, or promotion.

- Does the layout of the system lend itself to the passenger control necessary for an automated fare system; that is, does it have closed entrances and exits? Lack of suitable layout is one reason automated fare collection is generally easier to install on newer systems. For example, of the 197 stations on the Reading and Pennsylvania commuter lines in the Philadelphia region, 142 would have to be rebuilt and the others would have to be adapted to provide the necessary control for automated fare collection; the total cost of modification is estimated at $12 million.

Bus

Automated fare collection systems for buses are still in the developmental stage, with little implementation to date. Although such systems offer bus operations the opportunity to develop more elaborate fare structures, such as distance-based fares, the adoption of automated devices on buses has been discouraged by the lack of clear cost savings from the elimination of employees as has been the case for rail systems. The impetus for the adoption of automatic fare collection systems on buses must come from three sources:

- the cost savings realized when the entire system of collecting and processing bus fares is automated and human errors in processing bus fares and potential for theft are minimized; or

- the increased coordination of rail and bus systems with the latter often acting in feeder capacity. For example, WMATA is planning a fare system in which the cost of feeder bus service would be deducted from the transit fare with ultimate use of prepaid magnetic tickets on the buses.

- make possible a reliable and comprehensive method of ridership data collection, for example, recording the number of passengers by entry-exit point and by type of fare paid.

Automated devices for buses would have to be low-cost and compact to be installed on every vehicle. Examples of simple devices include the coin- or token-operated turnstile on the San Juan buses and the ticket-issuing machine on buses in Turin, Italy. A more complicated example is the system used to collect the graduated fares on the London Transport double-decker bus system. If a passenger has exact change, he uses the automated fare collection system, which involves pushing a button to select one of the three fares, paying the fare in the coin slots, and taking a ticket to release the turnstile. The driver issues tickets manually to those passengers without exact change. This collection system is based on the honor system, with traveling inspectors ensuring that passengers are carrying valid tickets.

CHAPTER IV

DEVELOPING PRICING POLICIES AND STRATEGIES

This chapter addresses two basic issues that arise in the process of establishing transit fare strategies. These issues include the economic rationale or logic which is involved in a pricing decision and the groups which are influential in determining what fare strategies will be chosen.

The first issue is that a fare structure, for a market segment or for an entire transit operation, is established in an attempt to achieve one or more marketing objectives of the transit agency. Examples of marketing objectives accomplished by new pricing strategies include charging a fare surcharge for peak-period travel and otherwise reducing fares for off-peak travel to increase off-peak ridership. A second example is introducing a pass system for the convenience of the riders (i.e., elimination of paying the existing exact fare). Another new pricing strategy includes providing premium rush off-hour and guaranteed seat service for suburban residents at fares that recover long-run average costs to increase suburbs-to-Central Business District (CBD) ridership. Whatever the specific objectives, they will have underlying economic rationales. These rationales will reflect the cost of service and the value of service to the user, or the value of service to nonusers.

The second issue is that fare policy is not established solely by transit management to meet its objectives. Rather, there are a number of groups, including transit labor, government, special interests, and the general public, which have specific objectives for, and influences on, transit fare policy.

This chapter concludes by discussing guidelines for determining fare levels, structure, and collection techniques and by suggesting an implementation program.

PRICING RATIONALES

Transit fares may be set based on three alternative pricing rationales. The first of these pricing rationales (cost-based fares) has as its objective the allocation of direct costs incurred to the transit service provided. The strategy for achieving this objective is to set fares based on the incremental or marginal cost (i.e., maintenance and fuel

expenses, but excluding labor and general administrative) to provide an additional increment of transit service.

The argument for pricing transit service at incremental cost is quite straightforward. The incremental cost of the next larger amount of service reflects only the direct expejses used in its production. If the additional service cannot be priced for at least its incremental cost, there is a presumption that the service is not worth the expenses used to produce it, and those financial resources should be allocated to a more valuable use.

The second pricing rationale (value-based fares) has as its objective the maximization of transit farebox revenues. The strategy for achieving this objective is to offer different transit services to different market segments at differentiated fares based on the value users place on the services. The essential point of market segmentation is to determine what transit services users or potential users in different markets want and are willing to pay for, and to provide those services at fares which are equal to the valuation users place on them.

Finally, the third pricing rationale (public benefit fares) has as its objective the maximization of social benefits derived from increased transit use (including the provision of service to the transportation disadvantaged and the reduction of air pollution, congestion, and energy consumption). The strategy for achieving this objective is to set transit fares below the marginal cost that will encourage the use of transit services at a socially desired level. The essence of this pricing rationale is that transit subsidies should be provided in situations where evidence shows that subsidies could help to achieve some real social benefit.

Each of these pricing rationales (cost-based, value-based, and public benefit fares) is to be considered in the development of pricing strategies. The specific considerations for implementing each of these pricing rationales are detailed below.

Cost-Based Fares

There are two measures of unit cost which are frequently used in economic analysis. One measure is average total cost, which is the total cost divided by the number of transit units operated (i.e., vehicle miles). The other measure of unit cost is incremental (or marginal) cost. Marginal cost is the change in total cost resulting from operating one additional unit. Incremental cost is the change in total

cost resulting from operating the next larger possible increment of service (which may be substantially greater than one unit). Examples of average and marginal costs expressed on a per vehicle-mile basis are presented in Table 9 for a cross-section of bus and rail systems.

The costs considered should be short-run costs, which means that the size of the transit system (principally the number of vehicles, the size of the maintenance facilities, and the number of employees) is fixed so that costs which can vary with the level of operation are mainly the cost of fuel consumption, that portion of maintenance which is proportional to miles or hours of operation, and incremental additions to labor force if extra special peak service is being considered. These variable costs are the short-run incremental costs and set the prices at which the transit manager can supply successive increments of service. All other costs are irrelevant to supply the short-run supply decision because they are already committed and cannot be avoided by reducing the amount of vehicle-miles operated.

Incremental or marginal cost of transit will usually be much less than the average total cost of accommodating the additional passengers because the labor and capital costs will be included in the average cost, but will not be included in incremental cost. Thus, fares which are equal to the incremental cost will be less than average cost and will cause deficits that will have to be offset by subsidies.

Value-of-Service Fares

A second approach to transit fares considers only the demand for transit services and disregards costs altogether. In this approach, fares would be set at levels which correspond to the value or benefit of the service being priced.

Two sets of situations can be identified in which value-based pricing is an operationally useful approach to transit fare strategies. Probably the most important situation is one in which different services are offered in different market segments at different fares. The main point of market segmentation for establishing fares is to determine what transit services the users or potential users in different markets want and are willing to pay for, and to provide those services at fares which are equal to the value users place on them.

A second situation for marginal benefit pricing occurs in instances in which a decision has been made to provide a minimum frequency of service. Since it makes no sense to provide unused capacity, the

TABLE 9

LONG-RUN AVERAGE AND SHORT-RUN MARGINAL COSTS
EXPRESSED ON A VEHICLE-MILE BASIS
(In 1975 Dollars)

COSTS	BUS		RAPID RAIL		COMMUTER RAIL	
	Average	(Range)	Average	(Range)	Average	(Range)
Average cost per mile (operating, maintenance, and general admin. costs)	$1.20	($.55 to $2.80)	$2.00	($1.20 to $3.35)	$4.00	($1.85 to $9.10)
Marginal cost per mile (maintenance and fuel costs)	$.40	($.15 to $.80)	$.60	($.40 to $.80)	$.85	($.35 to $2.30)

economically justified fare is the highest non-negative fare which will cause the entire capacity to be utilized. From the viewpoint of the transit firm, this fare would meet the objective of providing maximum service to the community. From a financial viewpoint, however, the fare to charge under these assumed conditions is the one which maximizes revenue.

Public Benefit Fares

A third approach takes account of benefit to nonusers as well as to users in establishing fare strategies. This approach would imply fares below the levels indicated by either the cost-of-service or value-of-service rationales discussed above if a governmental body believed that transit offered social benefits in addition to private benefits. In that case, a governmental entity could, through regulation or subsidy, influence the transit manager to reduce fares to increase the level of service supplied and demanded to the socially desired level. The notion of social benefits includes the following:

- Transit provides several benefits to the public. These benefits, including reduced pollution, congestion, and noise as well as improved and revitalized downtown land use, accrue to everyone in the community.

- Certain groups in society that are more dependent on transit, such as the young, poor, elderly, and handicapped, would demand more transit if they could afford those services; and the public in general would benefit from the improved travel opportunities of these groups.

Through regulating and subsidizing reduced fare levels, government can affect the provision of transit service, since transit managers facing increased demand for the lower-priced service would increase the supply of service and, correspondingly, increase the provision of social benefits.

INFLUENCE OF PARTICIPATING GROUPS ON FARE POLICY

The purpose of the following discussion is to identify the groups that are likely to influence transit fare strategy decisions and to indicate the fare objectives of those groups. The discussion also identifies the general sets of economic forces which affect the various groups. It is suggested as a way for the transit manager to visualize

the groups which are likely to affect fare policy decisions, identify the objectives of those groups, and analyze the effects of the objectives on fare policy decisions.

The influence of different groups and their relation to the transit manager are shown in Figure 3. Although transit managers and their boards of directors are, in most instances, immediately responsible for transit fare policy decisions, their decisions are indirectly affected by a number of groups, each with its own objectives for fare policy. These groups include government at all levels; transit users; transit labor; and others, including employers, merchants, welfare agencies, school districts, and persons with special demands for transit services. The general public or taxpayer is also considered as a group.

In addition to the groups which directly influence transit fare strategy or pricing decisions, there are two generalized sets of economic factors which come into play, and function through the direct participants. These factors are shown in the top two boxes on Figure 3. The set of factors designated "Highway Development, Pricing, and Operational Policies" comprises the set of policies which affect the cost of automobile trips. Included are highway and street investment policies; public policies concerning the provision of parking facilities; and pricing policies for streets, roads, and parking facilities. These policies affect the out-of-pocket cost of choosing automobile trips rather than transit trips, as well as the time cost of automobile trips rather than transit trips. Also included in this set of factors are the policies generally included in the transportation system management (TSM) programs. To the extent that the operational policies promulgated under these TSM programs change the relative dollar and time costs of automobile and bus trips, they will affect transit fare policy. Different types of TSM programs are illustrated in Table A.10.

The other general set of influences on transit fare policy is "General Economic Trends." Particularly important are economic trends which affect the general cost of living because these will affect labor costs, which comprise some 70 to 85 percent of transit operating costs.

Another general economic factor which can have an explicit, if indirect, effect on transit fare policy is gasoline price and availability. Experience during the 1974 fuel shortage indicated gasoline availability to be a more important determinant of relative automobile and transit usage than is gasoline cost. In the long run, however, gasoline price would also be expected to have some effect on relative automobile and transit use and on transit pricing.

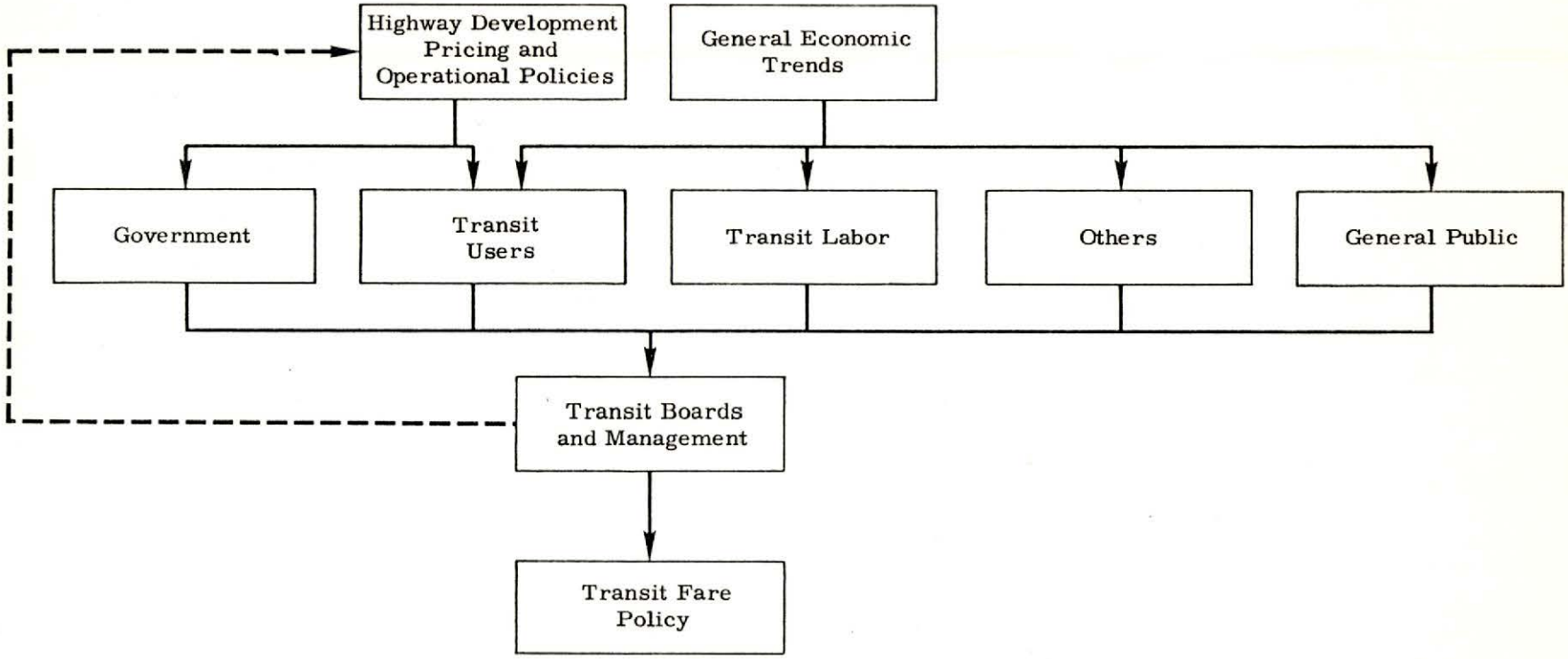


FIGURE 3: INFLUENCE ON TRANSIT FARE POLICY

Concern for the quality of the environment, particularly air quality, can also have long-term effects on transit use and on fare policy. Although it will be argued that attempts to improve air quality through manipulation of transit variables have not been particularly successful, this is largely because the attempts have not been very successful in achieving a major mode shift to transit. If, however, large numbers of persons were to take air quality improvements seriously and shift to the use of transit, substantial improvements would occur in air quality and there would be marked implications for transit fare policy.

It is evident from Figure 3 that the effects of general economic conditions, or of policies affecting the use of the automobile, all work through the direct participants in transit pricing. The nature and objectives of each of the participants in the organization are discussed in the next subsection.

The fares resulting from a transit manager using one or more of the three pricing rationales will be examined. The preferences of each group for fares based on one of the alternative pricing rationales are given in Table 10 and are discussed below. The table has been constructed so that the first column shows each group having a potentially major role in transit pricing decisions. The objectives of each group are indicated in the second column. The third column identifies the particular role that each group would usually play. The fourth column indicates the pricing rationale each group is likely to use and the last column in the table indicates the set of pricing objectives that each group would advocate.

Transit Management

From observation of transit manager decisions, particularly decisions to expand service and stabilize fares in the face of increasing deficits, the main objective of transit management appears to be to maximize ridership, subject to financial constraints.

The pricing objectives that the transit manager would be expected to advocate would be to:

- maintain fares at a level to attract and retain transit ridership;

- offer special services at compensatory (i.e., price to cover full costs) fares to attract ridership, and accomplishing this objective through a comprehensive marketing effort;

TABLE 10

GROUPS THAT INFLUENCE PRICING DECISIONS

GROUP	OBJECTIVE FOR URBAN MASS TRANSIT	ROLE IN PRICING	PRICING RATIONALE	PRICING OBJECTIVE
Transit Management	. maximize ridership, subject to financial constraints	. make pricing decisions . implement pricing decisions	. public benefit . value of service for high income users	. price low relative to competition to attract riders . offer special services at compensatory fares to attract riders . maintain or increase subsidies to relax financial constraints . provide convenient fare collection
Government	. ensure existence of public benefits provided by transit subject to constraints on subsidy payments	. finance portion of transit costs through subsidy . exert control over transit pricing and service decisions to varying degrees through the regulatory and financing processes . control roads, parking restrictions, and other factors which influence the most competitive mode, the automobile	. public benefit . value of service for specific markets	. minimize subsidy payments . price low to achieve social objectives for transit . offer special services at compensatory fares to attract riders and reduce deficit . minimize competition from underpriced automobile trips
Transit Users	. obtain better transportation services or lower costs than are available from competing modes	. pay fares . demand specific transit services . participate in fare hearings or deliberations	. public benefit . value of service	. maintain low fares . offer special services at compensatory fares to meet customer needs . provide convenient fare collection
Transit Labor	. growing labor force . increasing wages	. increase transit costs through wage demands	. public benefit . value of service	. stabilize fares . offer special services at compensatory fares . maintain or increase subsidies
Others: Merchants	. achieve high accessibility for potential customers	. advocate reduced fares to and within commercial area . subsidize lower fares	. value of service	. maintain low fares . maintain large subsidies . provide some subsidy for special service out of increased sales resulting from that service
Employers	. achieve transit accessibility to work for employees	. provide subsidies to employees . support transit through prepayment plans and organization of company buspools, in some areas	. value of service	. maintain low fares . maintain large subsidies . provide some subsidy for special services which reduce costs
Sponsor Groups (school boards, welfare organizations)	. secure mobility opportunities at low cost	. advocate and lobby for special reduced fares . subsidize reduced fares, in some areas	. value of service	. maintain low fares . maintain large subsidies
General Public	. good service . minimize subsidy	. vote funds . lobby for lower taxes	. cost of service . value of service	. maintain low subsidies

- maintain or increase subsidies to further relax financial constraints; and

- provide convenient fare collection systems, including a prepaid alternative to maximize the ease of using transit.

To accomplish these objectives, the transit manager may be expected to adopt a pricing rationale that emphasizes the public benefits aspects to transit services to maintain high and expanding levels of subsidies. One may, however, also adopt a value-based fare for high income market segments in which offering special services at compensatory fares, accompanied with an adequate marketing program, could increase transit ridership and the level and quality of service provided to the community. It should also have some effect on reducing transit deficits.

Government

The transit objectives of government are to ensure the provision of public transportation services to obtain public benefits, such as pollution and congestion reduction; to conserve energy; and to provide mobility to low-income persons and to persons for whom the automobile is not an option. At the same time, however, government has the objective of maintaining control over the subsidy payments made to achieve the first set of objectives.

The fare policy objectives that government would be expected to advocate would be to:

- minimize subsidy payments;

- set fares at low levels to achieve the social objectives and provide the social benefit of transit;

- offer special services at compensatory fares to reduce deficits and subsidy requirements; and

- minimize competition from underpriced automobile trips through coordination of transit with auto services and by taxing automobile trips where appropriate.

To accomplish these objectives, government would also be expected to adopt pricing rationales that emphasize the public benefits aspect of transit services and the value of special services to particular market segments.

Transit Users

Transit users, or customers, are probably the key participants in the determination of transit pricing. Users participate in fare decisions in at least two ways: through their choice to accept or reject transit services at the offered fares and through their participation in fare hearings before transit boards of directors or regulatory agencies.

Although passengers, as individuals or in groups, can undoubtedly be effective in fare hearings, they can exercise their vote for fare and service characteristics more effectively through the market. If current and potential transit riders are presented with a range of service options and fares, along with adequate information, they will decide which combinations of fares and service characteristics are worthwhile to them.

Transit users have a quite straightforward objective: to obtain better transportation services at lower costs or at competitive costs in relation to service provided than are available from competing modes. To achieve their objective, transit users would be expected to advocate pricing that would maintain low fares; provide special services at compensatory fares to meet the needs of current and potential users in particular market segments; and provide convenient fare collection techniques, including simple means for fare prepayment.

The pricing rationale that transit users are most likely to adopt is some combination of value-of-service and public benefit pricing. The public benefit rationale would help to maintain low fares through large subsidies. It has been shown that transit users are more interested in (and responsive to) changes in the quality of service than they are to changes in fares. One would expect, therefore, that users would place a relatively high emphasis on the provision of high quality services designed to meet the needs of specific market segments, even if these services require higher fares.

Transit Labor

Transit labor costs are currently the largest single transit operating expense, accounting for some 80 percent of that cost. Moreover, since labor contracts with transit organizations generally include cost-of-living provisions, it is expected that this cost element will continue to increase at least as rapidly as the increase in the cost-of-living index.

The main objectives of the labor participants are a stable and growing labor force and increasing wages. Labor plays a significant role in transit pricing through its wage demands and efforts to maintain a stable labor force through limiting substitution of capital for labor by transit management.

From these points of view, labor would advocate a fare policy that would:

- maintain stabilized fares and achieve high ridership and high employment;
- offer special services at compensatory fares to maintain high levels of service; and
- maintain or increase subsidies to allow both increases in levels of service and in wages.

One would therefore expect labor, like transit users, to place emphasis on value-of-service and public benefits rationales for transit pricing. Also, labor might be expected to support differential pricing for peak and off-peak periods because this could have several benefits from its point of view. It would increase revenue during peak periods, maintain relatively higher levels of ridership during off-peaks, and maintain a more constant ridership volume throughout the day, which will at least partially alleviate the split-shift problem.

Other Groups

There are three other special groups indicated in the bottom section of Table 10 that may, on occasion, play roles in determining some aspects of transit fare policy.

Merchants

One of the special groups is merchants, who are interested in high accessibility for potential customers. For downtown merchants, accessibility has often meant adequate transit service; whereas for the suburban merchant, accessibility has required the provision of extensive parking. There is increasing interest, however, in providing transit services to high traffic-generating suburban centers.

Merchants currently contribute to transit through direct promotional subsidies, through validation of consumer transit tickets, and

by advocating greater attention to public transportation. Increased accessibility to and mobility within the downtown area for potential shoppers would be expected to increase the value of downtown commercial property.

The role of merchants has often been to advocate low fares, particularly during off-peak times when there is excess capacity and when shoppers are more likely to travel. Merchants also subsidize fares on occasion. In general, merchants may be expected to advocate low, subsidized fares, or special services at compensatory fares. An example of special services might be services to suburban shopping centers.

Employers

The objective of employers for transit is to achieve transit accessibility for workers. This increased accessibility can have three beneficial effects:

- an increase in the size of the labor pool;
- a reduction of the workers' cost of transportation to work, permitting a lower wage while leaving the worker with the same income set of transportation costs; and
- a reduction of parking requirements and their associated costs.

All three of these effects will tend to reduce employers' costs. The cost savings will be available to pay a portion of the costs of the transit service through some form of subsidy. Employers may also provide free transit tickets to employees, analogous to the free parking which employers sometimes provide. Several employers in Pittsburgh, for example, buy transit permits and sell the permits to employees at reduced rates. Employers also contribute to transit support through subsidy of special bus service for their employees. The transit pricing one might expect employers to advocate would be to maintain low fares, to provide large subsidies, and to provide some subsidy for special services which reduce cost.

Sponsor Groups

This group includes schools, welfare organizations, etc. The objective of these groups is to achieve mobility for their constituents at

a low cost. Their main roles in pricing decisions are to advocate or lobby for low fares and to subsidize fares for the persons they represent from their own sources of income. The fare policy that they would be expected to advocate would be low fares and large subsidies. The pricing rationale that they represent is almost entirely for social benefit pricing for their constituents.

General Public

The general public is taking increasing interest in transit fare policy because of the increasing deficits and tax-financed subsidies that have been occurring over the past several years. Since much of the general public uses transit infrequently, it is becoming increasingly concerned about the tax costs of transit subsidies and the problematic nature of the benefits received. The general public may then be expected to hold objectives of good service and minimum subsidy, which implies cost-of-service or value-of-service pricing rationales.

Accordingly, it is necessary to become aware of the differing objectives of each influence group to ensure success in implementing new and more effective pricing strategies for boosting ridership and reducing deficits.

GUIDELINES FOR DETERMINING FARE LEVELS, FARE STRUCTURE, AND FARE COLLECTION TECHNIQUES

The overall guidelines are illustrated in Figure 4 and involve a five-step process beginning with: (1) conducting market research to delineate market segments, (2) performing service planning and development to determine service needs, (3) reviewing elasticities and testing fare levels, (4) determining fare structure, and (5) selecting fare collection techniques. Each step is discussed as follows:

1. Market Research to Delineate Market Segments

Market research will identify the particular market segments that one serves, or potentially could serve, and specifies the main characteristics of these markets. The main characteristics have already been discussed, and include trip purpose, time-of-day, geographical location, age distribution of travelers, income distribution of travelers, auto availability, and so forth. These data can be developed either by survey of the community or from more general economic and demographic information about the community.

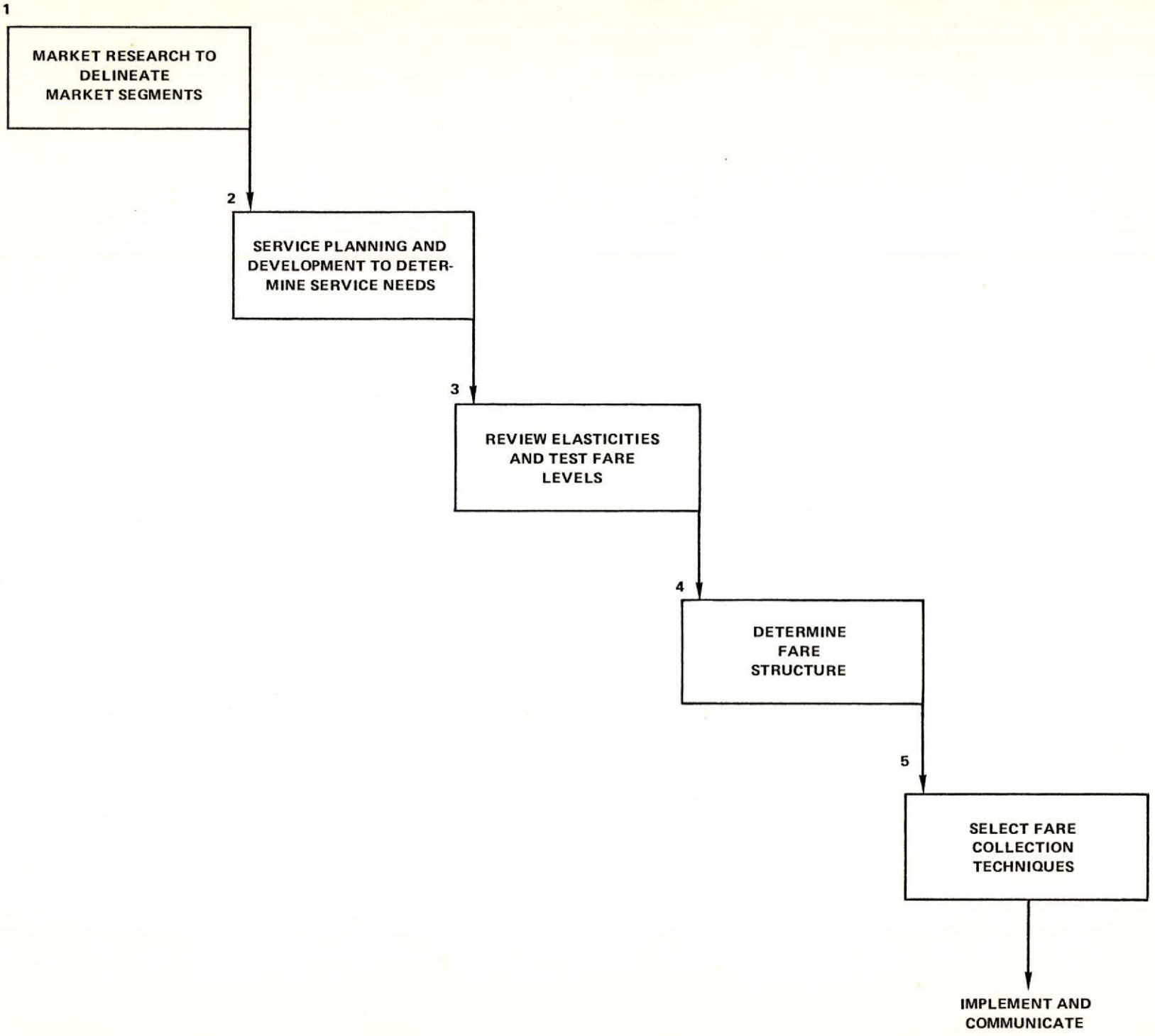


FIGURE 4: GUIDELINES FOR DETERMINING FARE LEVELS, FARE STRUCTURE, AND FARE COLLECTION TECHNIQUES

Six market segments have been found to be important and should be analyzed as follows: high-, medium-, and low-income worker markets; student market; shopper market; and the elderly and handicapped market. These markets can be further stratified by location of residence (central city or suburban area), the orientation of the trip (central business district or non-CBD), and time-of-day (peak and off-peak period). As discussed in Chapter 2, at least 26 market segments need consideration. This set of segments can be further expanded to identify special origins and destinations and special ethnic groups residing in a specific area who make trips to shop at stores owned by people of the same ethnic background in another specific area. There are other unique travel patterns that occur in urban areas that, if identified and provided the needed service, could result in new ridership and additional revenue. These should be identified.

2. Service Planning and Development to Determine Service Needs

Service planning is the logical sequence of analysis, but is not necessarily required if the service plan has been predetermined. In this case, Step 2 is skipped, and one proceeds to Step 3. However, if the service plan has not been set and it is recognized that the service needs of each market segment are different, then this step analyzes those needs.

High-income workers will desire premium service (high frequency, high speed, reliable and low arrival time variance, seat available, overall good accessibility door-to-door). Medium-income workers will desire similar service as the high-income segment. The lower-income worker residing in the inner city will want frequent service, with convenient accessibility between residence and work place. The student segment will require essential service between residence and school. Shoppers will want reliable and good accessible service between residence and shopping centers. Finally, the elderly and handicapped will require service that allows the necessary mobility from door-to-door. These particular service needs should be analyzed, and the appropriate and cost-effective service packages developed.

On a system-wide basis, these needs translate into an operations and service plan that provides high quality and convenient service in the peak period and a base level of service in the off-peak to ensure an adequate level of accessibility throughout the urban area.

3. Review Elasticities and Test Fare Levels

The fare elasticities for each market segment would be determined in this step. These fare elasticities, as previously described, can be developed from historical traffic data and special purpose market surveys. Typical elasticity values for each market segment were presented in Chapter 3. High-income workers have low fare elasticities (less than 0.25); medium-income workers have moderate fare elasticity (0.3 to 0.4); and low-income workers have a fare elasticity typically greater than 0.3 in peak and greater than 0.5 in off-peak periods. Elasticity values are developed also for students, shoppers, and the elderly and handicapped.

Having developed the necessary fare elasticity values, the different fare levels can be tested for each market segment. The highest fare level can be charged to the high- and medium-income worker who travels in peak periods. In the case of the high-income worker residing in the suburbs a premium fare can be charged for special express service. These fares would typically be set to recover long-run average costs. Fares for low-income workers might typically be subsidized by a local social agency. All travel[1] during off-peak by workers, students, shoppers, and the elderly and handicapped would be priced to recover short-run marginal costs.

4. Determine Fare Structure

Market research studies show that the medium- and high-income workers are not very price-sensitive (i.e., low fare elasticities) when they travel in peak periods. Hence a zone fare structure could be considered over a flat fare structure; the rider would pay a fare in accordance with the approximate distance traveled. By implementing a zone fare structure, elimination of the need to identify market segments by location of residence and orientation of the trip is possible because the rider pays a distance-based fare based on approximate distance traveled. High-income riders living in the suburbs and working in the CBD would pay a fare compensatory for the value of the services received. If premium express service were introduced to link suburban areas with the CBD, then a premium fare could be charged to recover more than the full, average costs. The low-income worker

[1] The transit system is staffed and equipped to handle the peak period demands, and hence peak period fares should be based on average costs. Because the system costs are largely incurred for the peak period, the off-peak fares would be set based on marginal costs.

who travels from an inner city residence to a suburban factory location would likely use a pass subsidized by a local social agency, and hence would not be adversely impacted by a zone fare structure.

Because the different market segments have different preferences for travel by time of day (i.e., work in peak periods, students, shoppers, and the elderly and handicapped in off-peak periods), time-differentiated fares should be charged. A peak period surcharge would be implemented, and the base fare would apply in the off-peak period.

5. Select Fare Collection Techniques

This step analyzes the appropriate fare collection techniques. Typically, transit systems widely use exact fare collection methods. However, this technique causes some inconvenience to the rider who does not have the exact fare. Also the continual cash drop of the fare is a constant reminder to the rider of the price for the service, which market research has shown contributes to the rider's perception of the high expense of transit. The application of prepaid passes eliminates the inconvenience to the rider of exact fare collection methods, and also masks the actual cost to the rider. If the rider uses the pass more than the expected number of uses, then the rider in effect receives a discount on all rides or rides free for each additional trip over the average. Pass systems can work effectively for flat fare systems but also can be successful in zone fare systems. For zone systems, a cash drop would be required for trips outside the base zone.

As an overall guideline, a combination of fare collection techniques will typically be used, including exact fare structure, prepaid tokens, and passes (monthly or annually). Transfers may or may not be free; and if not free, a cash drop will be required at the time of each transfer.

PRICING STRATEGIES FOR MARKET SEGMENTS

This section describes pricing strategies for each of the six major market segments (high-, medium-, and low-income workers, students, shoppers, and the elderly and handicapped). As suggested above, if a distance-based fare structure (i.e., zone) is implemented, then the further segmentation of these markets by place of residence and orientation of the trip may not be necessary. (It is argued that the differentiated fare charges the rider a fare depending on the mileage traveled. Accordingly, the rider pays the appropriate amount for his

origin-destination trip and eliminates the need for origination-destination segmentation.) Differentiation of the markets according to peak and off-peak travel is important to maximize increased ridership achieved by time-differentiated fares. Pricing strategies must be clearly integrated with service improvements to ensure maximum ridership response, and guidance on how to accomplish this integration is presented below.

High-Income Worker Market Segment

This is a market of high-income suburban residents making work trips to the CBD (and non-CBD) during peak periods. They have similar (meaning no physical disabilities) abilities to use transit and have automobiles available for the trip. These persons typically drive to work and constitute a very difficult market penetration problem as long as automobile trips are underpriced.

Suggested integrated fare and service objectives would include full cost recovery and premium transit service. This market segment has been penetrated with some success by subscription services and commuter clubs, such as those in Columbia, Maryland; Reston, Virginia; and the Washington, D.C., metropolitan area. Other commuter clubs operated by the Golden Gate Bridge, Highway, and Transportation District serve Sonoma, Marin, and San Francisco Counties. This type of service generally has the following characteristics:

- high frequency service during peak periods;
- low travel time (line-haul express service);
- low arrival time variance;
- reasonably high probability of seat availability;
- high vehicle reliability;
- integrated collection/distribution system that provides good accessibility; and
- short wait times due to small variances from published schedules.

As a general guideline, pricing these transit services to recover at least the maximum costs (i.e., peak period long-run average costs)

to provide them is necessary. If the quality of the services offered does not generate substantial ridership, one could experiment with prepayment and/or discounted fare packages. Subsidized fares would only be justified, however, if the resulting modal shift to transit and the accompanying reduction in congestion and pollution costs and other generated non-revenue benefits were at least as great as the cost of the subsidy.

Generally, these transit services should be priced to achieve full cost recovery (i.e., at compensatory fares). The fare arc elasticity of this market segment will likely be less than -0.25 and, for peak period trips, may be as low as -0.10. Service quality will be significantly more important to this market segment than will the pricing level. It is expected that the transit services offered to this market segment and priced at compensatory level fares will have the greatest likelihood of success in attracting ridership if the services are complemented by a set of Transportation Systems Management programs which contribute to the quality of bus service and raise the perceived costs of automobile trips (i.e., so they nearly approximate the actual costs incurred--see Table 10).

Middle-Income Worker Market Segment

This is a market of middle-income residents of the central city or a suburban area making work trips to CBD and non-CBD destinations during peak periods. They typically have ability to use transit and have an automobile available for the trip. The characteristics of this market segment are much the same as those of the high-income market segment, except that the income level is somewhat lower. Therefore the fare elasticity of this market will typically range between -0.3 and -0.4 and probably follow the Curtin Rule of -0.33. The peak period elasticity will be less than the off-peak and the difference should be determined.

The objectives of an integrated fare and service policy for this market would be about the same as for the high-income market segment, except that it would not be expected that the market would be willing to pay quite as much for high-quality service. Potential savings in energy consumption would not be quite as great as for the more distant suburban market, but a significant shift to transit would be expected to produce substantial reductions in traffic congestion and air pollution. Since this market has an automobile available for the trip, the fare and service adjustment policy would be expected to generate substantial new ridership when complemented by a set of TSM programs to improve the quality of bus service and raise the perceived

price of automobile trips to more closely approximate (i.e., service variables must be much improved and/or the attractiveness of auto travel much reduced in order to increase transit ridership).

Low-Income Worker Market Segment

This is a market of low-income, inner-city residents making work trips to CBD and non-CBD locations during peak and off-peak periods. They typically have ability to use transit but do not have an automobile available for the trip. This market segment is often referred to as the "captive" market for transit and the greatest social benefit to the public is achieved by subsidizing the trips of this market segment. However, for those urban areas which price transit with a single flat fare, this is the market segment that appears to be overcharged, due to the short length of their trips. The fare elasticity of this market segment is between -0.3 and -0.5 in peak periods and between -0.5 and -1.00 for work trips made in the off-peak period. This market segment should be given some pricing relief when one considers that the purpose of these trips is to provide general inner-city circulation and opportunities for inner-city residents to find and hold employment.

Suggested integrated service and fare strategy objectives for this market would be to provide a high-frequency, convenient service between the inner-city residential areas and the principal work and shopping places at fares which reflect the marginal cost of providing the service. The marginal cost may be determined separately for peak and off-peak service, and especially providing low fare service in the off-peak period.

Since low-income persons are deserving of transit trips at less than cost, subsidies to these persons should be provided through local welfare agencies. The welfare agency, not the transit operator, should be expected to provide whatever transit subsidies seem appropriate as a part of an overall set of subsidy programs for low-income persons. The purchase of transit rides with "transit stamps," analogous to food stamps, would be one approach. Transit operators would be entitled to redeem the transit stamps for the full value of the fare, and the welfare agency could determine the desirable amount of subsidy to be provided.

Student Market Segment

This market segment is for school trips during off-peak periods made by youth from central city and suburban families with typical ability to use transit and without the availability of an automobile.

One of the principal service objectives for this market segment is to provide the essential travel mobility. Since the trips are typically made in the off-peak period, the pricing would be based on marginal costs (which should be relatively low). Where the service is used during peak periods, peak-period pricing would apply. If subsidy is necessary, the school boards and community should reimburse the transit operator.

Shopper Market Segment

This market segment is for shopping trips from the central city and suburban areas during off-peak periods by persons with typical ability to use transit and without an available automobile.

Objectives of the transit manager for this market segment would be to provide mobility for a group when the family automobile may not be available and to provide access to downtown (or other) shopping areas from near suburban areas. Using marginal cost as the basis for setting fares, these off-peak fares would be relatively low. Since high fare elasticities have been measured for this market segment (i.e., typically approaching -1.00), the ridership response should be favorable. To ensure high ridership levels, high quality of service should be provided. In particular, short wait times due to small variances from published schedules, high probability of seat availability, low arrival time variances, and integrated collection/distribution systems that provide good accessibility would be expected to be important service characteristics.

It is sometimes argued that these services should be subsidized to help maintain the vitality of downtown commercial areas. Off-peak trips priced at marginal cost would have low fares, below long-run average costs. There is no justification for free fares since there is no evidence that free fares will generate more transit ridership. If additional subsidies were to be provided, they should be aimed at improving service in specific ways that will increase ridership.

Elderly and Handicapped Market Segment

This market segment includes elderly, low-income persons living in central city and suburban areas and making trips in the off-peak period for some miscellaneous purposes such as welfare or doctor visits. They are restricted in their use of transit and they do not have an automobile available. The objective of the transit managers for this market segment is to provide necessary mobility. Desirable transit

service characteristics might include reasonable wait times due to small variances from published schedule times, low arrival time variances, high probability of seat availability, and integrated collection/distribution systems to provide good accessibility and minimize the number of transfers required.

The fare elasticity will typically average -0.50 and will range between -0.25 and -1.00 based on case studies conducted. The pricing strategy should be based on marginal cost pricing which would yield relatively low fares, if the trips are taken during off-peak periods. A fare subsidized by the transit operator (except for that represented by the difference between marginal and average cost) is not desirable and if further subsidies are given to this market, they should come from welfare or other social agencies, perhaps in the form of transit stamps.

In general, it seems useful to make a distinction between handicapped persons who require special public transportation facilities (i.e., social benefits need to be addressed) and other persons in this market segment who do not. Those persons who do not require special facilities should generally be expected to pay a fare which reflects the full marginal cost of their trip. They would not be treated differently from other transit users. They would, however, have the opportunity to travel at off-peak times at very low cost. In the cases where the transit operator is required to provide special facilities to accommodate handicapped persons, the cost of those facilities should be paid by social welfare agencies in the community and not by the transit operator.

The following discussion will illustrate that if the transit manager follows the above pricing guidelines for market systems, the fare structure and collection will be very straightforward. The base fare level should be set for peak period travel based on peak period, long-run average costs. The differentiated off-peak fare should be based on marginal costs. Typical examples of average and marginal costs were presented previously in the pricing rationale section. A stage- or zone-based fare structure should be considered and would include a peak and off-peak, zone fare structure (i.e., only two fares per zone).

There are good opportunities for certain service and pricing additions. In cases of special high amenity services, particularly over intermediate and long distances, the rider would typically have a higher fare to pay for the additional service characteristics, and to maintain

a high probability of securing a seat. These premium fares, or surcharges, might differ for different routes, depending on cost, but persons traveling regularly on one particular route would pay only one surcharge. For simplicity, too, all routes could have the same surcharge even though there were small differences in the costs of the services. Any route then would have only three fares: basic peak, basic off-peak, and special peak. The special peak period service would be distinctively marked so that riders could easily make a choice between the basic service or the special service at a higher fare.

At the low-income end of the transit market, all riders would pay the basic peak or off-peak fare based on the marginal cost of the trip. Those persons who are eligible for subsidies could purchase either regular or special tokens or tickets from social service agencies at subsidized prices. The social service agency would have purchased the fares from the transit agency at full cost so the subsidy would be provided by the social service agency, not by the transit operator.

In monitoring the fare collection, the transit driver need be concerned with only a single zone fare for basic peak and off-peak, or for special peak service. The driver would never be collecting more than one of these fares at any time. Furthermore, the transit manager may seriously consider using some form of prepayment pass system to minimize the administrative responsibility of the driver.

It would seem that the objectives of the different interest groups are met by these proposed guidelines. The combination of improved and tailored service to each market segment plus the pricing strategy outlined should increase ridership and reduce operating deficits, especially when this service and pricing strategy is compared to a strategy based on a single flat fare that recovers only 50 percent of the transit operating costs, a typical practice throughout the country.

IMPLEMENTATION OF PRICING STRATEGY CONSTRAINTS

In the process of determining an effective set of pricing strategies, the transit firm must operate within important institutional constraints. The main institutional constraint which restricts transit fare policy is the pricing policy for urban automobile trips. As long as urban automobile trips are underpriced, it will be impossible to establish economically appropriate transit fares. In effect, by continuing to subsidize urban automobile trips, society is guaranteeing that urban public transportation must be subsidized if it is to continue in existence.

The point is not that the perceived price of the urban automobile trip should be increased so that urban public transportation can survive. It is, rather, that if auto trip makers were required to pay prices equal to the costs they are incurring for society, public transportation would be in a position to offer attractive services at competitive prices which would cover at least the incremental costs of those services. The result would be a better alloction of economic resources among transportation modes.

Transit managers have relatively little control or influence over the pricing of automobile trips. Over time, however, it is expected that they will be able to help urge the removal of the automobile subsidy so that more economically rational urban transportation systems can be developed.

Other institutional constraints are legal or political. The requirement for off-peak reduced fares for senior citizens and the handicapped directly interferes with the ability of local transit agencies to control their own pricing. It has been pointed out that marginal cost pricing would, in most instances, result in quite low fares during off-peak periods, but these fares would apply to everyone. Since it costs the transit firm at least as much to transport an elderly person as anyone else, perhaps all off-peak riders should pay the same fare.

Another major constraint to economically rational pricing is in the political attitude that major social benefits can be realized from large subsidies to transit. Because in the past the general public has been willing to provide extensive subsidies to transit, there has been a decreasing need to generate revenue from operations and little need for a fare strategy integrated with a marketing strategy. However, there is increasing concern about escalating transit deficits and new sources of revenue are being sought. Included in these sources are improved pricing strategies for transit that will permit the control of operating deficits at manageable levels.

Recognizing these constraints, it is next necessary to consider the important issues of implementing a transit pricing strategy. These issues include the approach to take with the pricing strategy, particularly the objectives for accomplishing it, the information required to implement the policy, and available fare collection techiques.

ALTERNATIVE STRATEGY APPROACHES

There are perhaps four alternative approaches which a transit manager could adopt in establishing a pricing strategy. These approaches include:

- develop "no strategy";
- stabilize fares in current dollars;
- stabilize fares in constant dollars; or
- integrate fares with marketing strategy.

Develop "No Strategy"

A "no strategy" approach would mean, in effect, that fare was not considered as an integral part of management strategy to achieve a set of objectives. Fare would be either left constant or changed in response to occasional influences, but would not reflect any coherent management philosophy. This strategy is not recommended.

Stabilize Fares in Current Dollars

Many transit managers have chosen to stabilize fares in current dollars--that is, to maintain fares at their current dollar values in the hopes of encouraging ridership. Under such a strategy, the real value of fares (allowing for inflation) is declining rapidly as the price index increases. Moreover, with sharply increasing operating costs, stabilized fares produce a declining ratio of operating revenue to operating costs. This strategy has not proved particularly useful for increasing ridership, but it has unfortunately led to rapidly mounting operating deficits. This is also not recommended.

Stabilize Fares in Constant Dollars

Although this would seem to be a reasonable fare strategy alternative, there is little evidence that it is being adopted. This strategy would mean that fares were periodically increased in response to changes either in the general consumer price index or in an index of transit costs. This strategy, like the others, would be relatively passive. If fares were adjusted to reflect changes in the general consumer price index, the cost of transit would remain stable in constant dollars but would increase in current dollars. Deficits would still

tend to increase if transit costs rose more rapidly than general increases in the consumer price index, but would not increase nearly so rapidly as with fares stabilized in current dollars. As a minimum the transit manager should adopt this approach.

Integrate Fares with Marketing Strategy

This approach is the only active option of the four. It views fares as an integral part of a total marketing strategy, and it is the approach which has been favored in this pricing manual. This approach was previously described under the section titled "Guidelines for Determining Fare Levels, Fare Structures, and Fare Collection Techniques." The major market segments are first identified through market research, then the appropriate pricing and service strategy is employed.

IMPLEMENTATION

The remainder of this section is concerned with specific steps to be taken in the implementation of a transit fare strategy which is integrated with a comprehensive marketing and management strategy. In implementing this approach, it is necessary that one determine the principal markets which are currently served, or could be effectively served. After the markets have been determined, specific information will need to be developed concerning the costs of providing various services in those markets, as well as the responsiveness of the market to specific fare and service changes. As previously discussed, it will also be necessary to determine the particular institutional and technical constraints within which the fare policy must operate. Probably the most important of the institutional constraints is the pricing of automobile trips; and the most significant of the technical constraints is the kind of fare collection system that can be used as discussed in the final section of Chapter 3. Finally the fare level must be determined.

Market Research

In summary, the market research effort to aid in developing fare strategies will define in explicit terms the characteristics of the prospective user of the transit system and, in particular, those segments of the public (workers, students, shoppers, and the elderly and handicapped) which a marketing program can influence. It is important to know where these people live; their income distribution (and perhaps age and sex); if they are employed; whether they are currently transit

riders or potential new users; and their potential willingness to change their mode from automobile to transit.

It is pointed out that market surveys can be combined with available U.S. Census data and travel survey information, often available from the Metropolitan Planning Organization, and together can be very useful for the identification of the market segments. Special on-board surveys will identify the characteristics of current users in a timely and inexpensive manner. Special telephone polls can be effectively employed to identify the nonusers who may potentially be attracted to ride public transit.

There are constraints to market research and special service and price demonstration projects, such as satisfying local requirements for public hearings prior to service and price changes, and general public apathy about new innovative service and price schemes (reflected by long response time to changes; i.e., three months). Nevertheless, a sound and well organized and publicized market research plan should overcome most restrictions.

Next, one should determine the set or sets of service characteristics that should be provided in each of the market segments in order to increase ridership and revenue. A complementary part of this step is to determine the elasticity of demand in the various markets to changes in fares and service characteristics. Examples of measured elasticities were provided in Chapter 3.

There are three possible ways of estimating service and fare elasticities for various markets. One method, which will work only in limited instances, is to use elasticity information that has been developed in previous studies. Typical examples of fare elasticities for the six market segments for peak and off-peak periods were shown in Table 6. It has been seen that these data are limited in availability. However, at best, the available elasticity estimates provide a general clue to the response that might be expected from a change in a service characteristic, or in a fare in a specific market. The transit manager is cautioned to make every effort to verify an elasticity value before using the average values presented in this manual (i.e., analyze historical ridership data to determine effects of fare changes).

Market surveys provide a second approach to determine the responsiveness of actual or potential transit users to changes in fares or in service characteristics. Through carefully structured sets of questions, respondents can be asked what additional fare they would

be willing to pay for transit services with different sets of characteristics. Cross-tabulation of the responses to these questions makes it possible to construct combinations of fare and service characteristics that would yield different levels of ridership and revenue.

The possibility exists in this approach that respondents would not actually behave in the same way they indicate in response to the questionnaire. It is desirable to validate the results either by comparison with existing transit services or by experimental demonstration projects. Even if all the results of the survey are not valid, it should provide a generally accurate indication of the kinds of transit services desired in specific market segments, and the fare that persons in those markets would be prepared to pay. The survey provides information for the specification of service characteristics and prices that should be a significant improvement over intuition.

An expensive, but most satisfactory, approach to verifying demand elasticities for various market segments is to design and perform experimental demonstrations over a sufficient period of time so that the services can be well promoted. This gives the market ample opportunity to respond (the effects of changes can be measured after at least three months and sometimes longer, up to one year). Presumably, many demonstrations may not be successful and may prove very costly by the time their failures have been established.

In designing the service and fare combinations for a pricing strategy, the best approach would seem to be to conduct a carefully designed survey to make a preliminary estimate of desirable combinations of fare and service characteristics. Then, some demonstration projects can be carried out to validate the results of the survey. The successful demonstrations can be retained as a part of the regular transit service, and the unsuccessful projects can be abandoned when their lack of success has been ascertained, approximately three months after commencement. It is important in planning demonstrations to carefully coordinate with the local regulatory agencies to ensure successful implementation.

Cost Data

The next set of data required for a pricing strategy is cost data. It has been pointed out previously in this manual that transit services should be priced in peak periods at long-run average costs and in off-peak periods at marginal costs. To follow this approach, one should analyze the operating costs for the transit system. Peak period,

long-run average costs will be determined to include all operating and maintenance expenses, annualized capital expenses, and full overhead allocation as if only peak period service were provided. The off-peak marginal costs will typically be incremental costs for off-peak service and will include only fuel, replacement parts, and other maintenance costs associated with the off-peak route mileage. Labor, overhead, and annualized costs typically would not be included. Examples of long-run average costs and off-peak marginal costs were shown previously in Table 9, based on cost data for a cross-section of United States transit operations, and are expressed in 1975 dollars.

Fare Level

The information developed on market segments, service characteristics and elasticities, and costs should be used to prepare cost and revenue analyses of alternative fare and service packages for each of the market segments identified. The purpose of the analyses is to determine the effects of different combinations of fares (average peak and off-peak fares have been calculated and are shown in Table 11) and services by market segment, ridership, revenue, cost, deficit, congestion, pollution, and other variables of interest to the transit manager and to the community. By manipulation of fare and service characteristics by market segment, the transit manager should be able to approximate the combination which will allow one to achieve as much of the operational and marketing objectives as is possible under the financial constraints within which service is operated.

It is recommended that the pricing strategy for a transit system be reviewed periodically. In particular, fares should be increased to reflect current dollar values (i.e., fares illustrated in Table 11 are in 1975 dollars) and to account for the overall rise in operating costs due to inflation. Also, an annual review of the market segments, and appropriate adjustments in both service and price strategy, should be made to ensure that the needs of each segment continue to be satisfied. Market research evaluations and the review of costs and fares should be an annual management action to ensure continuing ridership growth and stabilization and perhaps selected reductions in operating deficits.

TABLE 11

AVERAGE FARES BASED ON PEAK AVERAGE COSTS
AND OFF-PEAK MARGINAL COSTS
(Costs/Mile divided by Passengers/Mile)
in 1975 Dollars

	PEAK PERIOD Average (range)	OFF-PEAK PERIOD Average (range)
Bus[1]	$0.41 (.19-.97)	$0.28 (.10-.56)
Rapid Rail[2]	.47 (.28-.78)	.28 (.18-.38)
Commuter Rail[3]	1.18 (.54-2.68)	.50 (.20-1.36)

These fares are based on total system averages and have a wide range of variation for assumed peak and off-peak period experience. It is recommended that specific rates of passengers per vehicle mile be applied for each transit system.

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[1]Based on 2.9 passengers per vehicle mile from 1974 NTS for total 1972 system. Peak is set at 2.9, and off-peak is assumed at 1.45.

[2]Based on 4.3 passengers per vehicle mile from 1974 NTS for total 1972 system. Peak is 4.3 and off-peak is assumed at 2.15.

[3]Based on 3.4 passengers per vehicle mile from 1974 NTS for total 1972 system. Peak is 3.4 and off-peak is assumed at 1.7.

APPENDIX

SUPPLEMENTARY TABLES

TABLE A.1

WILLINGNESS TO PAY HIGHER FARES FOR MORE FREQUENT SERVICE: BALTIMORE SURVEY RESULTS

Income Level	Amount of Additional Fare (% of respondents)								
	0¢ More	10¢ More	20¢ More	30¢ More	40¢ More	50¢ More	60¢ More	70¢ More	Number of Respondents
Less Than $3,000	52.0	36.0	8.0	1.0	1.0	2.0	0.0	0.0	100
$3,001 - $4,000	33.3	51.0	7.8	5.9	0.0	0.0	2.0	0.0	51
$4,001 - $8,000	21.7	57.5	11.3	6.6	0.9	0.9	0.0	0.9	106
$8,001 - $9,500	31.6	52.6	12.3	1.8	0.0	0.0	0.0	0.9	57
$9,501 - $11,000	18.6	58.6	15.7	2.9	1.4	2.9	0.0	0.0	70
$11,001 - $16,000	23.0	41.3	24.6	4.0	0.8	3.2	1.6	1.6	126
$16,001 and above	19.0	36.6	30.8	5.9	2.9	2.6	1.1	1.1	273

Source: PMM&Co., Market Survey Working Paper #18, prepared for the Baltimore Region Phase II Transit Study, March 1975.

TABLE A.2

PREFERENCES FOR LOW COST VERSUS FREQUENT SERVICE: BALTIMORE SURVEY RESULTS STRATIFIED BY INCOME LEVEL OF RESPONDENT

INCOME LEVEL	LOW COST VS. FREQUENT SERVICE (Percentage of Respondents)	
Less than $3,000	66.7	33.3
$3,001 - $4,000	61.7	38.3
$4,001 - $8,000	50.0	50.0
$8,001 - $9,500	47.3	52.7
$9,501-$11,000	50.0	50.0
$11,001 - $16,000	48.1	51.9
$16,001 and above	39.8	60.2
Number of Respondents = 761		

Source: PMM&Co., Market Survey Working Paper #18, published in March, 1975 for the Baltimore Region Phase II Transit Study.

TABLE A.3

PREFERENCES FOR LOW COST VERSUS DEPENDABILITY: BALTIMORE SURVEY RESULTS STRATIFIED BY STATUS, AGE, AND INCOME LEVEL OF RESPONDENT

	LOW COST VS. DEPENDABILITY (Percentage of Respondents)	
BY STATUS		
Employed Full-Time	18.0	82.0
Employed Part-Time	29.5	70.5
Homemaker	25.0	75.0
Pre-college Student	22.2	77.8
College Student	23.1	76.9
Retired	42.6	57.4
BY AGE		
14 - 18	20.3	79.7
19 - 24	26.2	73.7
25 - 34	18.9	81.1
35 - 54	20.5	79.5
55 and over	32.7	67.3
BY INCOME LEVEL		
Less than $3,000	44.1	55.9
$3,001 - $4,000	39.6	60.4
$4,001 - $8,000	29.7	70.3
$8,001 - $9,500	19.3	80.7
$9,501 - $11,000	26.1	73.9
$11,001 - $16,000	19.5	80.5
$16,001 and above	12.3	87.7

Number of Respondents by Status = 885; by Age = 897; by Income level = 765

Source: PMM&Co., Market Survey Working Paper #18, published in March, 1975 for the Baltimore Region Phase II Transit Study.

TABLE A.4

HOW MUCH RESPONDENTS WOULD PAY FOR SERVICE IMPROVEMENTS: COLUMBIA SURVEY RESULTS STRATIFIED BY OCCUPATION GROUP OF RESPONDENTS

SERVICE IMPROVEMENT \ OCCUPATION	AVERAGE AMOUNT RESPONDENTS WOULD PAY FOR IMPROVEMENT				
	EMPLOYED FULL-TIME	EMPLOYED PART-TIME	HOUSEWIFE	RETIRED	TOTAL
Cut waiting time from 20 minutes to 10 minutes	9.0	6.8	8.3	8.5	8.4
Pickup at-the-door, instead of 7 minutes away	9.7	6.9	11.0	9.5	9.4
On-time service	8.8	7.9	10.1	9.0	9.0
Certainty of getting a seat	6.7	7.0	10.2	7.9	7.4
Clean, comfortable seat	7.1	7.4	9.4	8.9	7.9
Air conditioning	7.9	7.4	10.0	9.0	8.5
Cut riding time from 20 minutes to 10 minutes	7.5	7.3	8.0	8.8	7.7
Prevent crime	9.7	10.1	12.1	11.4	10.5
Heated, cooled, dry bus shelter	7.7	7.5	9.2	8.8	8.1

TABLE A.5

HOW MUCH RESPONDENTS WOULD PAY FOR SERVICE IMPROVEMENTS: COLUMBIA SURVEY RESULTS STRATIFIED BY INCOME GROUP OF RESPONDENTS

INCOME GROUP / SERVICE IMPROVEMENTS	AVERAGE AMOUNT RESPONDENTS WOULD PAY FOR IMPROVEMENT						
	LESS THAN $4,000	$4,001 to $8,000	$8,001 to $11,000	11,001 to $16,000	$16,001 to $20,000	$20,001 and above	TOTAL
Cut waiting time from 20 minutes to 10 minutes	8.1	7.0	7.9	8.0	7.5	9.2	8.4
Pickup at-the-door, instead of 7 minutes away	8.8	9.2	9.1	9.8	8.9	9.8	9.4
On-time service	9.9	7.5	10.7	10.1	8.8	9.2	9.0
Certainty of getting a seat	7.9	6.3	8.0	7.3	6.7	3.3	7.4
Clean, comfortable seat	7.8	7.4	8.5	7.6	7.2	7.3	7.9
Air Conditioning	7.9	9.3	7.5	8.1	7.9	8.6	8.5
Cut riding time from 20 minutes to 10 minutes	8.5	7.8	7.9	7.8	5.8	8.2	7.7
Prevent crime	9.0	9.5	10.8	10.7	10.4	10.2	10.5
Heated, cooled, dry bus shelter	8.8	8.6	8.9	7.3	8.3	7.0	8.1

TABLE A.6

BREAKDOWN OF FARE STRUCTURES BY POPULATION GROUP[1]
(36 Urbanized Areas)

More than 2 million population (8 urbanized areas)

- 6 areas have existing bus/rail systems.
- 2 areas have bus-only systems.
- 3 areas have essentially flat fare[2] (one gives free transfer, one requires new fare for transfer, one gives free transfer for rapid rail but requires 10 cents for surface transfer).
- 3 areas have zone fare (2 give free transfer, one requires 5 cents for transfer).
- Detroit has combination of flat fare on some routes and zone fare on others--requires 5 cents for transfer.
- San Francisco (MUNI) has flat fare and free transfer; BART has stage fare structure.

500,000 to 2 million population (17 urbanized areas)

- All 17 areas have bus-only systems.
- 5 areas have flat fare (2 give free transfer, one requires 5 cents for transfer, one requires new fare for transfer, and one requires 5 cents for the first transfer but gives the second transfer free).

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[1]All information as of 1972. Information obtained from transit operator statistics submitted to the American Transit Association.

[2]The analysis was conducted on the basis of transit operator properties; where other modes or systems (such as commuter rail in Chicago) are involved, other fare structures (including zone and stage fares) may be applied.

TABLE A.6 (Continued)

- 12 areas have zone fare (5 give free transfer, 2 require new fare for transfer, 3 require 5 cents for transfer, one requires 10 cents for transfer, and one requires 5 cents for the first transfer but gives the second transfer free).

250,000 to 500,000 population (6 urbanized areas)

- all 6 areas have bus-only systems.
- 4 areas have flat fare (2 give free transfer and 2 require 10 cents for transfer).
- 2 areas have zone fare (one gives free transfer and one requires 5 cents for transfer).

50,000 to 250,000 population (5 urbanized areas)

- all 5 areas have bus-only systems.
- 3 areas have flat fare (one gives free transfer, one requires 5 cents for transfer, and one requires 10 cents for transfer).
- 2 areas have zone fare (both give free transfer).

Source: U.S. Department of Transportation, A Study of Urban Mass Transportation Needs and Financing, op. cit., pp. V-8 and V-9.

TABLE A.7

EXAMPLES OF TRANSIT SYSTEMS OFFERING SPECIAL ORIGIN/DESTINATION SERVICE

TRANSIT ORGANIZATION	LOCATION	DESCRIPTION OF SERVICE	SPECIAL FARE	REGULAR FARE
Cleveland Transit System	Cleveland, Ohio	Airport Service	$.75/ride	$.50
Washington Metropolitan Area Transit Authority	Washington, D.C.	Service to Lorton Reformatory	$1.25	$.40
San Francisco Municipal Railway	San Francisco, Calif.	Ball Park Express	$.50/ride	$.25
Niagara Frontier Transit Metro System	Buffalo, N.Y.	Football Special	$1.00/ride	$.40
Southwestern Ohio Regional Transit Authority	Cincinnati, Ohio	Club Flyer-Neighborhood Service	$12.00/month plus $.10/ride	$.25
A C Transit	Oakland, Calif.	Sports Events	$1.00-$1.50/ride	$.25
CNY Centro, Inc.	Syracuse, N.Y.	State Fair Service	$.50/ride	$.35
Calgary Transit System	Calgary, Alberta, Canada	Pennant Express	$.35/ride	$.30
Central Pinellas Transit Authority	Clearwater, Fla.	Sunday and Holiday Bus to Clearwater Beach	$.10	$.25

Source: Fare data reported to the American Public Transit Association.

TABLE A.8

EXAMPLES OF TRANSIT SYSTEMS OFFERING EXPRESS SERVICE AT SPECIAL FARES

TRANSIT ORGANIZATION	LOCATION	DESCRIPTION OF SERVICE	SPECIAL FARE	REGULAR FARE
New York City Transit Authority	New York, N.Y.	Special rush-hour express bus service, Mon.-Fri., between Queens and Manhattan.	$1.00	$.35
Queens/Bronx Surface Division				
Staten Island Surface Division		Special rush-hour express bus service, Mon.-Fri., between Staten		
		Island and Brooklyn,	$.50	$.35
		Wall St.-City Hall,	$1.00	$.35
		Midtown Manhattan	$1.00	$.35
Manhattan and Bronx Surface Transit Operating Authority	New York, N.Y.	Special rush-hour express bus service, Mon.-Fri.	$1.00	$.35
Washington Metropolitan Area Transit Authority	Washington, D.C.	Capital Hill Exp.	$.75	$.40
		DC-Maryland Exp.	$.55	$.40
San Francisco Municipal Railway	San Francisco, Calif.	Express Service	$.30	$.25
Southwest Ohio Regional Transit Authority	Cincinnati, Ohio	Freeway Flyer	$.30	$.25
Regional Transportation District	Denver, Colo.	Express	$.50	$.35
Metro Area Transit	Omaha, Neb.	Express	$.45	$.40
Luzerne County Transportation Authority	Wilkes-Barre, Pa.	Express	$.35	$.25

Source: Fare data reported to the American Public Transit Association.

TABLE A.9

EXAMPLES OF TRANSIT SYSTEMS OFFERING SPECIALLY PRICED DOWNTOWN LOOP SERVICE

TRANSIT ORGANIZATION	LOCATION	DESCRIPTION OF SERVICE	SPECIAL FARE	REGULAR FARE
Department of Street Railways	Detroit, Mich.	Downtown loop area	$.20	$.40
Rapid Transit Lines, Inc.	Houston, Tex.	Service in CBD	$.15	$.45
Cleveland Transit System	Cleveland, Ohio	Downtown loop	$.25	$.50
Washington Metropolitan Area Transit Authority	Washington, D.C.	Downtowner minibus	$.10, $.25	$.40
Southwest Ohio Regional Transit Authority	Cincinnati, Ohio	Downtown Circulator	$.10	$.25
Metro Transit	Seattle, Wash.	Service in CBD	Free	$.20
Regional Transportation District	Denver, Colo.	Downtown	$.10	$.35
Tri-County Metropolitan Transportation District	Portland, Ore.	CBD shopper	$.10	$.35
Citran	Fort Worth, Tex.	CBD zone	Free	$.35
Metro Area Transit	Omaha, Neb.	Downtowner	$.25	$.40
Wichita Metro Transit Authority	Wichita, Kan.	Downtown Shuttle	$.10	$.30
Ottawa-Carleton Regional Transit Commission	Ottawa-Carleton, Canada	Ottawa-Hull Loop	$.25	$.30
Rhode Island Public Transit Authority	Providence, R.I.	Short rides within one-half mile of downtown	$.20	$.35
Jacksonville Transportation Authority	Jacksonville, Fla.	Spirit Special--downtown shuttle	$.10	$.25
Calgary Transit System	Calgary, Alberta, Canada	Downtown shuttle bus	$.15	$.30
Municipal Transit System	St. Petersburg, Fla.	Three CBD routes	$.15	$.25

Source: Fare data reported to the American Public Transit Association.

TABLE A.10

COMPONENTS OF THE TRANSPORTATION SYSTEM MANAGEMENT PROGRAM

ACTIONS TO ENSURE EFFICIENT USE OF EXISTING ROAD SPACE

- Traffic operations improvements to manage and control vehicle flow through:
  - traffic channelization
  - one-way streets
  - signalization
  - progressive timing of traffic lights
  - computerized traffic control
  - metered freeway access
  - reversible traffic lanes
  - freeway incident detection
- Preferential treatment of transit and high occupancy vehicles through:
  - preferential lanes on streets
  - preferential lanes on freeways
  - exclusive bus use of streets
  - bypass lanes
  - bus preemptions of traffic signals
  - bus turning lanes
  - exclusive lanes at toll plazas
  - exclusive access ramps to freeways
- Provisions for pedestrians and bicycles, such as:
  - bicycle paths and lanes
  - pedestrian-vehicle separation
  - bicycle storage areas
- Management and control of parking through:
  - eliminating on-street peak-period parking
  - regulation of parking supply
  - parking taxes
  - encouraging short-term parking
  - suburban parking/transfer facilities

- Reductions in peak-period travel and encouragement of off-peak use of transportation facilities and transit through:
  - staggered work hours
  - flexible work hours
  - reduced transit fares for off-peak use
  - peak-period commuter tolls

ACTIONS TO REDUCE VEHICLE USE IN CONGESTED AREAS

- Encouragement of car pooling or other forms of ride sharing.
- Diversion, exclusion, and metering of automobile access to specific areas.
- Establishment of auto licensing, parking surcharges, and other means of congestion pricing.
- Establishment of car-free zones and closure of specific streets to local or through traffic.
- Restriction of truck delivery during peak hours.

ACTIONS TO IMPROVE TRANSIT SERVICE

- Provision of better collection, distribution, and internal circulation services in low-density areas.
- Provision of express bus service.
- Planning greater flexibility and responsiveness in scheduling, routing, and dispatching of transit vehicles.
- Provision of extensive park-ride services.
- Provision of shuttle service from CBD fringe parking areas.
- Encouragement of paratransit and other flexible paratransit services.

TABLE A.10 (Continued)

- Provision of simplified fare collection systems.
- Provision of shelters and other passenger amenities.
- Provision of better passenger information systems.

ACTIONS TO INCREASE INTERNAL TRANSIT MANAGEMENT EFFICIENCY

- Improve marketing techniques;
- Develop cost accounting and other management tools;
- Establish maintenance policies that provide greater equipment reliability.
- Increase use of surveillance and communications technology.

Source: Federal Register, Vol. 40 (September 17, 1975), 42979

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