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**Final Technical Report**  
Research Project T9233, Task 42  
TDM Program Implementation Evaluation: An Analysis

**AN ANALYSIS OF FACTORS ACCOUNTING  
FOR SUCCESSES AND FAILURES IN THE  
ACCEPTANCE AND UTILIZATION OF  
EMPLOYER TDM PROGRAMS  
BY EMPLOYEES**

by

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## **EXECUTIVE SUMMARY**

Washington State's Commute Trip Reduction (CTR) legislation was created to reduce traffic congestion, energy consumption, and air pollution. Among other actions, it requires certain businesses to develop programs that will meet single-occupancy vehicle and vehicle miles traveled reduction goals. These companies will attempt to reach these goals through transportation demand management (TDM) programs.

Before the passage of this legislation, a number of employers in this state had created and implemented TDM programs. However, little detailed information existed about these companies' efforts. Although some limited studies had documented the types of TDM programs that existed and had listed the programs' components and the types of incentives they offered to workers, they had not included any information concerning the reasons that some organizations' TDM efforts had succeeded while others had failed.

In order to help firms that desire to create successful programs and to determine valid and useful criteria by which to measure and explain TDM "effectiveness" and "success," detailed information about what has been done, what works, and why is required.

### **PROJECT GOALS**

This project studied a select population of employers in a tri-county area (King, Snohomish, and Pierce counties):

- to gain a detailed understanding of what other TDM programs have done
- to uncover the factors that help determine a program's effectiveness and its utilization by an organization's employees
- to give direction to research and planning as the state's legislated TDM efforts begin and develop.

The general aim of this research was to help increase the employee participation in CTR programs while reducing costs due to unnecessary and even counter-productive activities.

An employee survey was developed to measure three main clusters of characteristics:

- a) employee mode choice and commute behaviors, with an emphasis on the reasons for these choices

- b) employee knowledge of and attitudes about their organization's existing TDM/CTR program
- c) behavioral and attitudinal characteristics of the organization.

A second method employed as a part of the data analysis triangulation involved interviews of employee stakeholders at four levels in the organization. For each organization, at least five interviews were conducted with individuals associated with the initiation or implementation of the organization's TDM program. These included:

- (1) the organizational CEO and/or other senior managers most familiar with the programs
- (2) the employee transportation coordinator (ETC) responsible for implementing the program throughout the organization
- (3) a selection of first-line supervisors and middle managers who were responsible for making the program work on a day-to-day basis.

In all, the researchers interviewed 45 people.

A third source of data was also examined where available. The researchers reviewed documents associated with the organization's TDM programs. These typically included brochures, annual reports and evaluations, program forms and materials, materials used in collecting program related statistics, and other documents that described to employees the TDM program, its goals, and its mechanisms.

## **RECOMMENDATIONS**

The results of the research led to recommendations for action at the employer, local, state, and federal levels.

- 1) **Jurisdictions and organizations must first identify all policies that relate to the targeted behavioral changes and then make those policies consistent in their support of the change goals.**

One of the most basic components of a policy that is successful at creating and maintaining lasting behavioral changes is a perspective that links all related rules and policies so that participants can create both intra- and inter-organizational supports for the new programs.

The elements that must be synchronized include but are not limited to money (such as tax codes), regulations, and enforcement. Behavioral change strategies can only become fully effective when all parts of the public and private sectors are pulling in the same direction.

At the public policy level, organizational managers were well aware of the dual messages that various public policies were sending. For example, congestion is growing primarily in areas where population or the number of jobs is increasing rapidly. In response to this congestion (and its related effects), many local and county governments have tried to slow, contain, block, or redirect growth through growth management plans. At the same time, other policies have encouraged the same firms to expand their work forces so that the (congested) jurisdictions may reap the tax benefits from local successful businesses. The dual messages are that the regions want the tax benefits that arise from a growing tax base, but they do not want any of the drawbacks that are associated with growth, such as congestion, a loss of open spaces, or higher densities.

A second example of such dual messages involves the full marginal costs of free parking for employees. While one set of policies has directed organizations to reduce drive-alone commuters, current tax policies allow all employers to deduct the expenses up to \$155 per month for providing free parking spaces for drive-alone commuters, including capital and operating expenses for building and maintaining the spaces. Furthermore, any travel allowance over \$60 per month provided to employees as an encouragement to change from an SOV mode is treated as taxable income, and travel costs such as parking fees or transit fares generally cannot be deducted from personal income as business expenses.

This same recommendation is also applicable at the organizational level, where incongruous policies can also be found. For example, at the same time that one organization was encouraging a group of employees to carpool or ride transit, it also notified them that they would no longer have access to company vehicles during the work day. Travel to customers' offices during business hours was a very real and necessary part of this group's work. They were told, in effect, "Please ride the bus or carpool to work, but you must have

your own car available each day should you need to go to a customer's work site." Within a week after losing access to company cars, virtually all employees ceased transit and carpool commuting.

**2) The primary means of communication about an organization's TDM program efforts should be informational sessions provided in work group settings.**

Changes are needed in the communication strategies organizations use to inform and educate employees about their TDM program efforts. The study's surveys found that information about the existence of the organizations' TDM programs was not as widespread as would be expected from a set of established, "model" programs.

The surveys revealed that approximately 30 percent of all employees were unaware that their organization had a TDM program. One possible explanation is that employees were aware of programmatic components such as ridematching without being aware of a formal TDM program. This possibility was examined in a survey question that asked people whether they knew about any TDM-related actions their organization was taking. The results were that, even among those who rode public transit to work, approximately eight percent did not know that they could receive some form of reimbursement/subsidy from their employers for their HOV commuting behavior.

Organizations' primary communication approach has been broad based, typified by the management memo and employee newsletter. The survey data showed that this approach was missing nearly half of the employees, who had first heard about their organization's efforts through some form of interpersonal communication.

People's immediate work groups are valued instruments for behavioral monitoring. Employees listen to and are supported by their immediate co-workers. For example, alternative mode users felt that the people in their work groups were more supportive and communicative about each others' use of alternatives than were SOV drivers. Thus, information and specific requests for action commitments should be presented to meetings of these groups instead of through the generic broadcast methods now used.

**3) Extensive, specific "how-to" information on selecting and utilizing HOV commute modes should be provided to all employees.**

The survey data showed that all organizations conveyed a great deal of information about the needs and goals for reducing the number of SOV commuters. They also were clear about their desire for employees to switch to an HOV commute mode. However, accompanying "how-to" information was missing.

It is not enough to tell employees what they should do. Organizations must educate people about how to accomplish the new behaviors, especially when these behaviors are viewed as potentially difficult or frightening. This means actively training and role playing or modeling new behaviors. None of the organizations in this study provided much of any such training or help.

At work group meetings, including an employee of similar status and job duties who is a TDM participant can be very beneficial because he or she can answer SOV drivers' practical questions about the realities of using an HOV mode. Without the answers to these questions and more, a potential transit rider or carpooler is unlikely to risk ridesharing to work even as a one-day trial.

Meeting people with whom employees can identify and who can answer questions from their own experience and serve as a role model may help SOV drivers overcome the many reservations they may have about their ability to use an alternative mode.

**4) Behavioral change goals should be graduated and public.**

This recommendation arises from lessons learned in previous research, which were confirmed in this study's interviews and focus group sessions. First, behavioral change goals should be graduated. The focus groups and the interviews revealed that individuals thought of and labeled themselves as "an X mode" type of commuter. As a result, people whose usual means of commuting was SOV driving typically envisioned that changing modes meant an absolute, 100 percent change to an alternative mode. However, not only would such an extreme switch be programmatically undesirable (or impossible), it is not required.

The second part of this recommendation is that the goal be public. This is true in two senses. In the most general sense, committing to such a modest trial change publicly, that is, in front of one's peers in a small work group setting, is the same as making New Year's Day resolutions known to family and friends. People are most likely to make a change if they know that others are aware of their goals. A number of people in the interviews and the focus groups described how their colleagues monitored their behavior and good naturedly challenged them and encouraged them to meet their goals, all of which were powerful motivators for them.

**5) Program efforts should include public monitoring and specific feedback regarding behavioral change goal attainment.**

Data collected from the organizational literature and procedures, which were confirmed in the interviews, showed a problem pattern. Many supervisors and employees, upon hearing their organization's programs and goals, set out to create individual goals and to change commuting behaviors. Unfortunately, while much attention and hoopla are attached to the communication and establishment of goals, much less attention is paid to attainment (or failure to attain) the goals. In the words of one supervisor, "We all worked very hard on this, and when it was all over, no one really seemed to care that we had [reached our TDM SOV reduction goal]."

The goals that people and organizational units set should be made public, even displayed in the same way that contribution drives create visual displays (e.g., with giant thermometers) to show the target goal, progress toward the goal, and final achievements. Rewards for achieving such goals should also be explicit and public.

It is worth stating that behavioral change goals should be created in terms of "changes in behavior" not in "attempts to change behavior." In many public policy settings, although TDM program goals are created to change SOV commuting behavior, monitoring and penalties for failing to achieve these goals are framed in terms of having a plan to do so. The outcome of such contradictory messages is predictable. When the goal is to change behavior,

but monitoring and evaluating relate to the creation of plans, the creation of plans is more likely than a change in behavior.

- 6) **Supervisors and managers should be encouraged or required to model and reinforce the importance of HOV commuting by doing so themselves.**

The final recommendation relates to the behaviors of management. Supervisors at all levels play a crucial role in creating and maintaining organizational norms. People look to their immediate supervisors for feedback about their professional progress and growth. In this sense, they look to their supervisors to model expected behaviors, both in current situations and at higher levels in the organization.

## **BACKGROUND AND REVIEW OF PREVIOUS WORK**

Washington State's Commute Trip Reduction (CTR) legislation was created to reduce traffic congestion, energy consumption, and air pollution. Among other actions, it requires businesses of a particular size to develop plans that will meet single-occupancy vehicle and vehicle miles traveled reduction goals. Many companies will attempt to reach these goals through transportation demand management (TDM) programs.

Before the passage of this legislation, a number of employers in this state had created and implemented TDM programs. However, little detailed information existed about these companies' efforts. Although some limited studies had documented the types of TDM programs that existed and had listed the programs' components and the types of incentives they offered to workers, they had not included any information concerning the reasons that some organizations' TDM efforts had succeeded while others had failed.

In order to help firms that desire to create successful programs and to determine valid and useful criteria by which to measure and explain TDM "effectiveness" and "success," detailed information about what has been done, what works, and why is required.

### **PROJECT GOALS**

This project studied a select population of employers in a tri-county area (King, Snohomish, and Pierce counties):

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- to give direction to research and planning as the state's legislated TDM efforts begin and develop.

### **THE TRANSPORTATION PROBLEM**

#### **Impacts of the Car**

In 1915, when there were 43.1 residents per automobile in the U.S., the auto was seen as a "democratic piece of industrial technology" (Bottles, 1987, p. 59). It offered to make

people free to come and go when they pleased, as they pleased, independent of trains, trolleys, or others schedules. By 1990, there were more automobiles than people in urban areas, and privately owned, registered automobiles topped 145 million nationwide.

This democratization of the private car has affected the country's energy consumption and air quality. The last National Transportation Survey results (1992) showed that privately owned automobiles consumed nearly 60 percent of all the energy used in the U.S. for transportation purposes; nearly one-third of that amount was used for daily work commutes. In 1992 the private auto contributed two-thirds of all air pollution (NTS, 1992). The problem will only worsen. Planners predict that by the year 2000, vehicle miles traveled will increase nationally as much as 50 percent over 1987 levels in urban areas (NTS, 1992). For the Seattle area, the Washington State Department of Transportation (WSDOT) has predicted that by 2000, current construction work notwithstanding, the average commute speed during peak hours will slow from 30 to 19 miles per hour (WSDOT, 1992).

As Ferguson (1992), Dunphy and Lin (1990), and others have pointed out, transportation choices also affect land use. Cities that were established within the past 70 years are as much as three times more spread out than pre-automotive cities; their development has been expansive rather than intensive. Roads and parking lots account for as much as one-third of all land used in many urban centers. Demand for more roads accounts for as much as 50 percent of all land use in core centers.

The increase in congestion on Washington State's roads over the past two decades is well known and well documented (WSDOT, 1992). Until recently, transportation supply simply increased to accommodate increased demand. In recent years, however, the expense of highway construction has increased dramatically, concern over environmental impacts has risen, and resistance to further building has stiffened. The result is that we can no longer solely build to meet rising demand, and concerns about energy consumption, air quality, and congestion levels make even current transportation levels unacceptable.

Clearly, we need to select policies that will maximize existing transportation resources while minimizing transportation system's negative impacts, such as pollution,

unwise land use, congestion, excessive energy consumption, and reliance on foreign nations to meet our energy needs.

### **Transportation Demand Management**

Transportation system management (TSM) is a collection of strategies aimed at increasing the transportation system's efficiency by changing related construction, operational, and institutional actions. TSM strategies include narrowing lane widths to increase the number of lanes, coordinating signal timing, creating high occupancy vehicle (HOV) lanes, and implementing the advanced technologies known collectively as Intelligent Transportation Systems.

Transportation demand management (TDM), traditionally seen as a subset of TSM, is aimed at transportation demand rather than supply. Recent literature has begun to categorize issues of supply as TSM, while TDM has begun to be treated as separate and distinct from TSM. TDM seeks to maintain our urban mobility and safety by reducing and shifting the demands upon the transportation system.

There are four main methods for reducing travel demand:

- (1) Direct regulation can limit future development, or other zoning-related actions can be adopted.
- (2) Travel behavior itself can be regulated through actions such as gasoline rationing or road use pricing.
- (3) Financing can serve as a tool for reducing travel demand. In the main, financing has been used to increase capacity through various tax strategies. However, it can also be used to fund TDM programs. For example, it can be used for public mass transit because an increase in transit ridership may decrease overall demand on the system's per-vehicle capacity.
- (4) Operational strategies aimed at existing sites and workplaces can also be used to reduce demand. Such strategies can be implemented through transportation management associations, trip reduction ordinances (such as Washington's Commute Trip Reduction Act has created), and negotiated agreements.

Typical operational TDM strategies include incentives to reduce the number of SOV trips and/or increase multiple occupancy vehicle (HOV) trips. These incentives can shift travel demand from SOVs to any alternative HOVs, including carpooling, vanpooling, and

public transit, or to non-motorized modes, such as walking and bike riding. Vehicle traffic can be shifted to less congested highways, or it can be eliminated in highly congested zones such as central business districts.

Demand for travel can also be shifted from the peak demand times to other times of day. In addition, total demand can be reduced by decreasing people's need to travel (the number of trips) and/or reducing the miles they travel per trip. These goals can be met with strategies such as the creation of restricted, HOV freeway and arterial lanes; ridesharing; transit use subsidies; preferential parking for HOVs; telecommuting; flex-time; and SOV disincentives such as parking charges or tolls.

### **History of Transportation Demand Management Efforts**

The history of TDM efforts extends farther than most people realize. For example, Reader's Digest magazine established an employee commute assistance program in the late 1920s after it moved its headquarters from New York City to suburban Westchester County. To attract employees, the company began providing commuter bus services to its headquarters and subsidized the price of a fare at 20 cents. The program was so successful that the company maintained the subsidized fare at that price for more than 50 years (Lowe, 1981).

The Second World War supplied the catalyst for the first nationwide TDM effort, an attempt by the federal government to reduce civilian demand for gasoline. For more than a year, the government Petroleum Administration for War tried to convince the private sector to reduce gasoline consumption by one-third through voluntary reduction measures. These efforts failed, and by 1942 the U.S. government had imposed mandatory gasoline rationing.

Although many government agencies began their own voluntary rideshare programs, the Department of War issued regulations in 1942 that required all government-contracted manufacturers to start rideshare programs. These companies were required to survey employee travel patterns, to submit a plan to encourage carpooling, to encourage employee use of public transit, and to designate an employee to oversee these efforts (Roark, 1981).

Throughout the war years, many public and private agencies actively promoted conservation and ridesharing efforts. These included the American Legion, the Automobile Clubs, and a variety of local women's clubs and auxiliaries. A number of employers began offering material incentives for trip reductions such as extra gasoline coupons, tire allocations, and preferential carpool parking. Other organizations created free rideshare matching services.

These efforts proved highly successful. From 1941 to 1945, the total miles traveled actually decreased by one-third (Ribner, 1983). Public transit ridership reached an all time high of 23.3 billion passengers in 1945 (APTA, 1988). The Petroleum Administration for War found that average vehicle occupancy rose from 2.0 per person in July 1942 to 2.7 by March 1943, and to 2.9 per car by the War's end (Roark, 1981).

When WWII ended, such efforts generally faded. However, some companies continued and even expanded their voluntary efforts over the decades following the War. For example, the Connecticut General Insurance Company began a successful commuter assistance program in 1957 when it began offering bus service to its Hartford headquarters. At the 25-year mark of its program, Connecticut General reported that only 56 percent of its employees drove alone to work, while 25 percent rode in carpools, 11 percent rode in vanpools, and 8 percent rode public transit to work each day (Dunphy & Lin, 1991).

With the 1962 Highway Act, Congress began to focus attention on the transportation needs of urban centers and on more formal urban transportation planning. The 1970 Federal Aid Highway Act initiated federal funding to relieve of urban congestion. In 1975, the joint Federal Highway Administration-Urban Mass Transit Administration's Urban Planning Regulations required concrete actions to create and implement supply and demand management strategies.

The energy crises of 1973-1974 and 1979-1980, which were accompanied by severe gas shortages and skyrocketing prices, once again focused the nation's attention on ridesharing and public transit. In January 1974, Congress passed the Emergency Energy Conservation Act, which authorized the use of government funds for rideshare demonstration

projects. With a 10 percent local match arrangement, the act funded 106 demonstration projects in 34 states and 96 urban areas. The act also allowed the designation of existing highway lanes for the exclusive use of buses and carpool vehicles, along with accompanying traffic control devices and the construction of publicly owned parking facilities for the use of carpools and public transit riders. The Federal Energy Act of 1974 offered tax breaks for the purchase of energy-conserving investments, including vans for ridesharing.

By 1983, a survey of Fortune 500 corporations revealed that 235 firms had active ridesharing or transit assistance programs. Three quarters of the firms said that the reason for their programs had been the impact of the two gasoline shortages. Administrators of such programs cited the following obstacles to creating and maintaining the programs: employee apathy, administrative difficulties, obtaining top management support, a lack of sufficient information, difficulties in obtaining insurance, objections from mass transit carriers, and union issues (Weber, 1983). At the same time, a full 20 percent of the firms reported that they saw no need for such programs. These firms were wrong. Recent surveys show an escalation in registered vehicles, vehicle miles traveled, and single occupancy vehicle (SOV) use. There is clearly room for more application of TDM principles.

Through the 1970s and 1980s, California sought and obtained exemption from the 1969 National Environmental Policy Act in order to implement restrictions tighter than the federal requirements. By doing so, California was able to continue to press for increases in management regulations. Nevertheless, Los Angeles and its neighboring communities repeatedly failed to meet their air quality and mobility standards. Consequently, an agency called the South Coast Air Quality Management District (SCAQMD) took action.

In 1987, the SCAQMD adopted a series of tough regulatory actions known collectively as Regulation XV in the Los Angeles basin. Regulation XV requires a range of actions, including some specific TDM measures. For TDM, it requires employers with 100 or more employees at a work site to implement trip reduction programs for employees who arrive at and/or depart from work during the peak commuting hours of 6:00 a.m. to 10:00 a.m. and 4:00 p.m. to 7:00 p.m., Monday through Friday.

The Regulation XV guidelines have been influential in many areas nationwide, including the state of Washington. In 1991, Washington State passed its own Commute Trip Reduction law, modeled after the federal Clean Air Act. The CTR law has a similar goal of reducing the number of single-occupant vehicles (SOVs) and vehicle miles traveled (VMT) during peak commute hours.

## **COMMUTE TRIP REDUCTION PLANS**

### **Costs of Congestion to Employees and Employers**

Increasing roadway demand is accompanied by a number of hidden prices. The stress employees experience in dealing with commute-time congestion is but one. It takes its toll on productivity.

Stokols (1978) measured the degree of stress that employees experience as a result of commuting. He found that home-to-work commutes that are both long and congested are significantly correlated with heightened physiological arousal, as measured by blood pressure, and with the number of days hospitalized for various illnesses.

Stokols and others have discussed the possible relationship between job performance and the residual effects of driving. Related studies by a number of environmental psychologists and social ecologists (e.g., Glass and Singer, 1972; Sherrod, Hage, Halpern and Moore, 1972; Novaco, 1980) have shown that stress caused by factors such as noise and congestion is carried over into on-the-job performance. Thus, employers bear the hidden costs of their employees' stressful commute situations. These costs include tardiness to work when employees are stuck in traffic, time lost during work-day business trips and health care costs.

In the past ten years, these problems have grown as more suburbs have become regional employment hubs (Orski, 1985). A typical pattern is that an overcrowded urban core makes resettlement in undeveloped suburbs attractive, or an overcrowded suburban area makes resettlement in rural areas attractive. The subsequent development in the suburban and rural areas quickly leads to traffic problems because suburbs generally lack expansive

transit service, and their roadways are usually constructed to handle much lower traffic volumes than those of urban areas.

### **Transportation Demand Management and Employers**

With the focus on reducing work commute trips that began in the early 1980s came the strategy that focuses on employers, both public and private (Crain, 1981; Jones, 1985). Employers are viewed as a means of reducing vehicle trips by changing employee commuting patterns, an approach that does not cost the public a lot of money (Bautz, 1988).

Specific TDM regulations vary from state to state. Affected employers are usually targeted by size: either the number of employees, number of trips generated, or some other such measure. The Washington State CTR law initially defined the minimum company size to be affected as 100 full-time, permanent employees arriving at work between 6 and 9 a.m.

Washington's CTR law requires affected employers to create and implement a program that outlines how they will meet their goals. Moreover, employers are required to designate an employee transportation coordinator (ETC) and post information on alternatives. ETCs are frequently existing employees who are given added responsibility for implementing and monitoring the company's TDM/CTR plan. If employers fail to reach their required SOV trip and VMT reduction goals, they will be required to modify their programs.

Another reason for the popularity of employer focused TDM/CTR programs is that employers are a relatively visible target. While many public policies are aimed at changing individuals' behaviors, identifying and communicating to each citizen is difficult. By affecting the employer, public policy makers can more easily access a large percentage of commuting drivers.

As a social change agent, TDM is unusual. Organizations constantly face the necessity of implementing public policies, many of which are aimed at individual behaviors (Woodworth, 1992). However, such behaviors have traditionally been limited to behaviors that occur on the job. TDM is different because commuting is a behavior that takes place outside of the work environment, off the work premises, and during non-work hours. Thus,

TDM/CTR programs are forging a new way for government to alter private behavior by using employers, rather than direct regulation, as the agents of change.

### **Transportation Demand Management Evaluations**

Various TDM/CTR measures have not proved as successful as hoped. In part, the problem has been due to a lack of comprehensive evaluation, without which we can not always be sure which programs worked or did not work, let alone understand why.

Typical measures of a program's effectiveness have been based on outcome criteria, such as vehicle miles traveled, vehicle occupancy rates, and the like (Judycki and Berman 1990; Glazer, 1993). These evaluations have been traditional, "black-box" studies that have produced quantitative measures without an understanding of the reasons behind the numbers (high or low). More importantly, they have lacked information about the actions employers can take to maximize their employees' participation in TDM/CTR programs (Richardson and Gordon, 1989).

Ferguson (1990b) is one among many who has called for comprehensive evaluation of existing and emerging TDM programs. He has recommended a combination of methods in a large sample of matched organizational sites. "One critical obstacle to the significant allocation of resources to TDM program implementation from either the public or private sectors is the great uncertainty concerning the likelihood of success and expected magnitude of TDM program impacts." (Ferguson, 1990)

His conclusion, although aimed specifically at TDM measures, is important to transportation studies and travel behavior in general. Whenever we seek to engineer changes in the behavior and reactions of organizations and individuals, we need a detailed understanding of why our interventions have and have not worked. The purpose of this understanding is not to lay blame or to assign credit, but to ensure that we receive the most effective return on our limited resources and accomplish our goals.

## **PUBLIC POLICY AND BEHAVIORAL CHANGE**

Both the U.S. public and private sectors are trying harder than ever to effect significant and long-term changes in people's behaviors in a variety of areas, from health care to work commuting. Unfortunately, the methods chosen to accomplish these changes have not been as successful as desired, nor have they proved to be long lasting and stable. This report outlines strategies available to the public and private sectors to bring about and maintain long-term behavioral changes related to transportation.

These ideas draw, to some extent, on other fields. For example, there is an extensive body of literature on strategies for changing health-related behaviors such as smoking, over-eating, under-exercising, and risky sexual contact. The practical significance of this research is that formal behavioral change programs (such as Commute Trip Reduction) can be improved so that program implementation is more likely to lead to the desired outcomes. A formal change program is a purposeful and organized attempt to solve a problem by affecting individual behavior. Thus, understanding how to structure programs and why they do or do not lead to the desired outcomes is crucial.

The general aim of this research was to help increase the employee participation in CTR programs, while reducing the costs due to unnecessary and even counter-productive activities.

## **PROCEDURES**

### **ORGANIZATIONAL SELECTION PROCEDURES**

When the project began in the summer of 1992, information about the study's purpose was shared with a number of government and civic organizations. These organizations included the local county governments and the county transit agencies of Snohomish, King, and Pierce counties, the Washington State Energy Office, the Washington State Department of Transportation, the Governor's office, and the Economic Development Council of Seattle and King County. One purpose of this communication was to generate potential suitable participants from both the public and private sectors.

Because the study focused on existing employer TDM programs, one criterion for participation in the study was that the organization already have a TDM program. Another criterion was that the organization be located in King, Pierce, or Snohomish county. No other restrictions applied. At the same time, efforts were made to get a cross-section of organizations representing the public and private sectors; locations in suburban, urban, and central business districts; and sizes from small (100+ employee) to large (1000+ employee).

Over the course of a month, approximately 27 organizations were recommended for contact by one or more of the civic/governmental sources. The nominated firms spanned the three-county region and included profit, non-profit, private, and public entities ranging in size from several hundred to several thousand employees.

All firms initially received a contact letter during the fall, which was followed up by a phone call a week or two later. The letter briefly overviewed the study and its goals. Of the initial 27 target organizations, 19 agreed to a meeting. The other eight declined to participate further for one or more stated or unstated reasons.

The researchers then met with representatives of each of the 19 organizations within two months. The initial meetings usually included the employee transportation coordinator (ETC) and one or more additional managers. Each of the 19 sites agreed to pursue the matter

further with internal discussions about potential participation. After internal discussions and reviews, and in some cases a second face to face meeting, 14 locations representing eleven organizations (some with multiple sites) agreed to participate in the study. In October 1992, work began on developing the survey instrument, which was intended for use between January and February 1993. However, to avoid conflict with the state transportation demographic survey (known as the Washington State CTR Employee survey), which would cover a small part of the same topic and was scheduled for distribution at the same time, most organizations requested that this study's data collection be postponed until April and May. Unfortunately, the statewide survey was delayed. As a result, this study's survey was not distributed until late May through November 1993.

During the delays, several organizations changed their positions and declined to participate. The reasons for their decisions ranged from changes in senior management to internal concern over the sensitivity of the results to questions about employee satisfaction and also over transportation issues within the organizations.

To fill the void created by these withdrawals, organizations that had originally declined to participate were recontacted. By this method, three additional organizations were recruited. Finally, 14 sites representing eight organizations were set to participate.

### **MEASURING THE SUCCESS OF PROGRAM IMPLEMENTATION**

The most obvious measure of successful program implementation is the degree to which targeted behaviors change. In the case of TDM programs, the measure of whether a program is successful is a comparison of the percentage of individuals who are not SOV drivers during at least part of their work commutes at the organization with the TDM program and at other locations in the same region.

Another indicator of successful program implementation measures the degree to which targeted attitudes change. In the case of existing TDM programs, this is a measure of the awareness of the TDM program within the organization and of the belief that TDM program efforts are worthwhile.

## DATA COLLECTION METHODS

### Surveys

An employee survey was developed to measure three main clusters of characteristics:

- a) employee mode choice and commute behaviors, with an emphasis on the reasons for these choices
- b) employee knowledge of and attitudes about an organization's existing TDM/CTR program
- c) behavioral and attitudinal characteristics of the organization.

A copy of the final survey is contained in Appendix A.

Part one of the survey was based on a number of previous TDM surveys, including the Washington State Commute Trip Reduction Employee survey of 1993. The survey instruments that were referenced included those used by Winters (1993); Chun (1993); Christiansen, Gorden, and Young (1993); Glazer (1993); Collier and Christiansen (1993); Hartgen and Bullard (1993); Ewing (1993); Siweck (1993); Rosenbloom and Burns (1993); and Micozzi and Rowen (1993). The goal of the survey was to gather all the essential program effectiveness, program utilization, commuting, and demographic data collected in pieces by other surveys and unite them in a single, coherent whole. The final result included nearly 100 multi-part questions in six subsections.

Part two of the instrument was designed to be a comparative study of culture and climate, with an emphasis on TDM/CTR topics. It included two major subsections, which were divided even further into question subgroups. The questions were modeled on Taylor and Bowers' Survey of Organizations (SO) questionnaire (1972). The original SO questionnaire and its later refinements were developed following organizational research that took place between 1966 and 1980 as part of the Intercompany Longitudinal Study at the Institute for Social Research at the University of Michigan. The SO questionnaire covers behavioral characteristics of organizations, as well as the context of the work/peer group, job design, leadership, group functioning, satisfaction, and goal integration. It has been completed by over 46000 individuals in more than 6000 work groups, in over 200 organizations (Dennison, 1990).

Many jurisdictions had an impact on questionnaire development. The Washington State CTR law is under the jurisdiction of the Washington State Energy Office (WSEO). Funding for this project came primarily from the Washington State Department of Transportation, which generally oversees all matters related to utilization of the state's roads and freeways. Many of the participating organizations were located within King County, whose transportation needs are served by the King County Department of Metropolitan Services, known as Metro. Metro monitors CTR implementation in King County. All of these agencies had input into the instrument. For example, one adjustment involved rewriting many of the demographic questions so that the WSEO's State CTR survey was included verbatim. In addition, the participating organizations had suggestions about what could, should and should not be included in the survey in order to continue their participation. Most of these issues dealt with attitudes about the organizations' management.

Beyond these agencies, a number of feedback mechanisms helped with development of the final TDM/CTR instrument. A variety of professionals in the field of TDM/CTR programs provided comments on survey versions. At the same time, the alpha and subsequent instrument versions were tested in a series of in-company pretests. These were accompanied by focus group follow-ups, which usually focused either on items that were worded unclearly or on items that were potentially sensitive to managers.

The surveys were distributed to employees in the participating sites, which varied in size from 100 employees to several thousand. In each case, the organizations determined the extent and nature of the survey distribution population and methodology. Generally, distribution was limited to all employees who commuted during the target a.m. or p.m. peak periods. Four organizations chose to survey a random sample of the peak-hour work force; the remainder surveyed all peak-hour workers.

### **Interviews**

A second method employed as a part of the data analysis triangulation involved interviews of employee stakeholders at four levels in the organization.

For each organization, at least five interviews were conducted with individuals associated with the initiation or implementation of the organization's TDM program. These included:

- (1) the organizational CEO and/or other senior managers most familiar with the programs
- (2) the employee transportation coordinator (ETC) responsible for implementing the program throughout the organization
- (3) a selection of first-line supervisors and middle managers who were responsible for making the program work on a day-to-day basis.

In all, the researchers interviewed 45 people. The interviews took place after an organization had collected completed surveys but before any information gathered from the surveys had been released.

The interviews followed a schedule of directed, open-ended questions covering the following topics:

- TDM program initiation and reasons for adoption
- TDM program goals and components, with an emphasis on the underlying theory connecting a specific component with a specific goal
- planning and implementation activities and problems
- ways in which resources were allocated to the program, including funding authority; staff leadership, size, training, and expertise; internal cooperation and support; and facilities
- changes in goals, activities, or resources over time
- current and future TDM program status and changes
- program outcomes, including changes in behaviors and attitudes, perceived project successes and failures, and perceived explanations (theories) accounting for them

A copy of the interview guidelines is included in Appendix B. Each interview lasted approximately 30 minutes. They were conducted during the course of regular business hours, usually within the subject's office. Interviews were conducted by the principal investigators (Poulenez-Donovan and Ulberg), as well as by three Masters degree students. Interview training was provided by the principal investigators. Most interviews were conducted with at least two members of the research team present.

### **Documentation Collection**

A third source of data was also examined where available. The researchers reviewed documents associated with the organization's TDM programs. These typically included brochures, annual reports and evaluations, program forms and materials, materials used in collecting program related statistics, and other documents that described to employees the TDM program, its goals, and its mechanisms.

### **DATA ANALYSIS**

In multivariate research the researcher must often include all variables of potential interest to the study. The final length of this study's survey instrument is testimony to the large number of independent variables that were included to maximize the number of relevant factors. To limit the subsequent number of comparisons needed in analysis, a combination of data simplification methods were utilized.

First, where possible, variables that were selected to measure the same construct, such as an individual's attitude toward the organization, were combined into composite variables or sections.

Multiple dimensional scaling and related techniques were used to determine the relative explanatory value of the independent variables. In the variance analyses of the individual independent variables, t-tests were used to control the independent variables that would be tested for significance (Cohen & Cohen, 1975; and Kerlinger, 1973).

### **DATA PRESENTATION**

#### **Mosaic Box Plot**

While the presentation format of many of the results in this report is familiar, two types of figures may not be. The first of these is the presentation of a contingency table through the more graphic mosaic box plot. As illustrated in Figure 1, a mosaic box plot shows response rates of the Y levels for each level of the X factor. The plot is divided into small rectangles whose areas are proportional to the frequency counts. The plot is equivalent to side-by-side divided-bar charts.

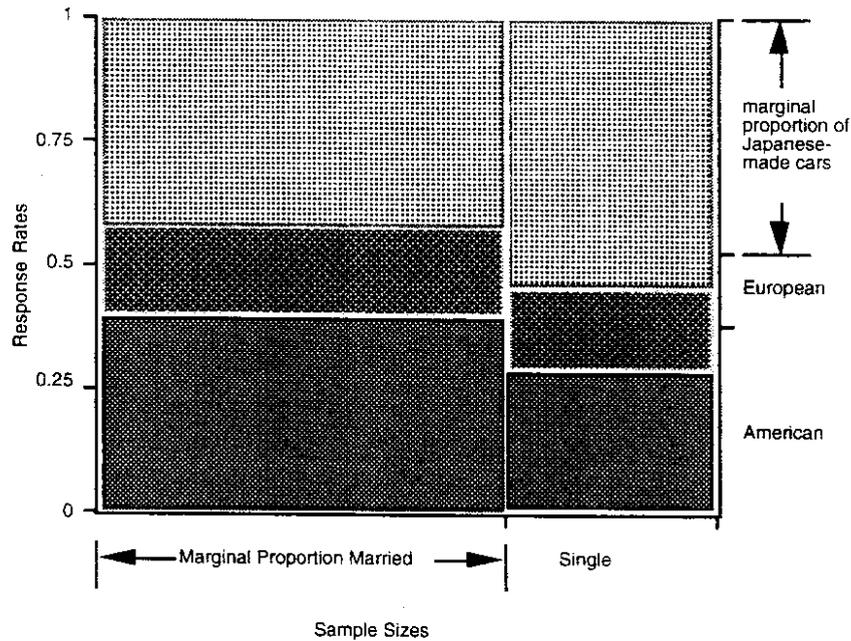


Figure 1. Sample Graph (Mosaic Bar Plot)

In the mosaic box plots from this analysis, the proportions shown on the X axis typically indicate the relative size/population proportion of the mode choices (SOV, Other, Carpool, and Transit). Likewise, the proportions shown on the right side are the Y axis, which represents the relative size/population proportions of the contrasting variable.

The scale of the X axis shows response probability, where the whole axis is a probability of 1.0 (the total sample). The scale of the Y axis shows the corresponding response probability, with the whole Y axis also being equal to a probability of 1.0 (the total sample).

To see how the response probabilities vary for different levels of X, compare the heights of Y levels across the X levels. If the response divisions line up horizontally across the X levels, then the response rates are the same.

In Figure 1, along the X axis are the relative proportions of "Married" and "Single" individuals, while on the Y axis are the relative proportions of cars from a particular country or region ("Japanese," "European," and "American") owned by the target population. It is apparent from viewing the plot that single individuals are more likely to purchase a car made

in Japan than are those who are married, while the ownership percentage of European-made cars is equal between the two groups.

### **Diamond Schematic Box Plot**

A second type of presentational display, the graphic diamond schematic box plot, provides an analysis of variance between the modes. As Figure 2 illustrates, the X axis along the bottom shows mode choice percentages, where the whole axis is a percentage of 100 (the total sample). In the diamond schematic box plots within this analysis, the proportions on the X axis typically show the relative size of the mode choice (SOV, Other, Carpool, and Transit). For each of the X axis mode categories, there is a means diamond. The line across the center of each diamond represents the group mean. The height of each diamond represents the 95 percent confidence interval for the mean for each group. The taller the diamond is, the more that the people within each mode differed in their answers. Across each plot is also a single horizontal line that represents the sample mean across all groups.

Where it is relevant, box plots are overlaid on the means diamonds (see Figure 3). The box itself represents the spread from the 25th to the 75th percentiles (that is, the middle 50 percent of people's answers). A linear whisker shows the lower 10th percent of responses and the upper 90th percent of responses. A line within the box at the mid point shows the 50th percentile. The taller or more spread out the box is, the greater is the range of people's answers. It is also possible to compare boxes between each mode to see whether the spread on responses varies by commute mode.

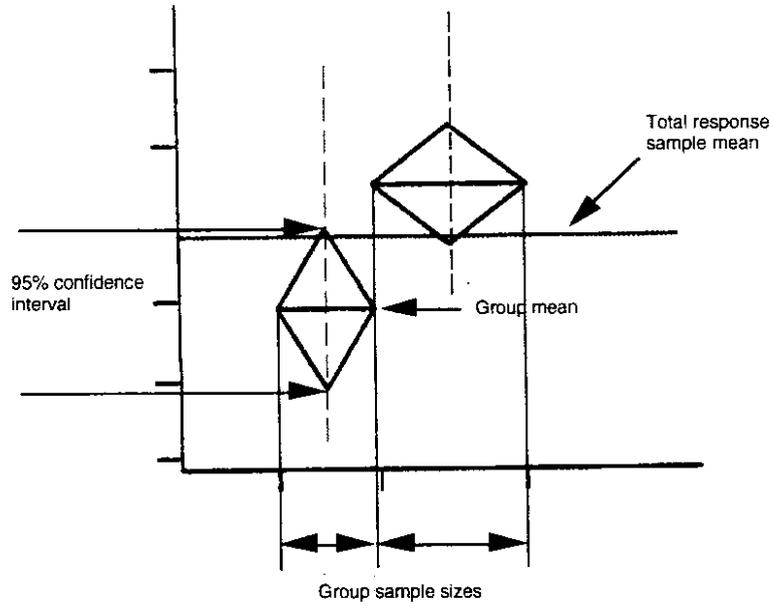


Figure 2. Diamond Schematic Box Plot

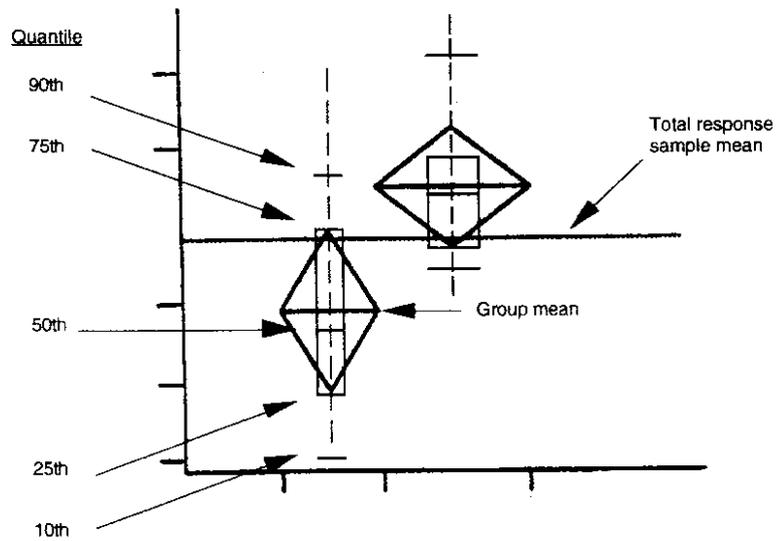


Figure 3. Sample Plot (Box Plot Overlaid on the Means Diamond)

## DISCUSSION

### QUANTITATIVE DATA

Of the 3211 surveys distributed, 2495 were returned, for a completion rate of about 78 percent.

#### Mode Choice and Demographics

It is important to understand the differences among individuals who chose different work commute modes so that we can gain a clearer picture of the typical individual who chooses to commute by a non-SOV mode. For purposes of analysis, mode choice was divided into four categories. These types were single-occupant vehicles (SOV), car- and vanpools (Carpool), transit (Transit), and other modes (Other).

Analysis of the first two subsections of Part one of the survey revealed some obvious differences between the general demographics of the SOV and non-SOV work commuters. In terms of ethnicity, the work force population, reflecting the general population of the region itself, was 83 percent Caucasian. An examination of the relationship between ethnicity and mode showed that Caucasians were more likely to carpool or use other means than were people of other ethnicities, who were more likely to ride the bus than were Caucasians.

The age range of the population was from 22 to over 60 years. The mean age for the population was 40 years. As a group, transit riders, with a mean of 42 years, tended to be slightly older than those who used other modes.

Women constituted 57 percent of the total survey population. They were more likely to be either carpoolers (at 60 percent of the total) or transit riders (at 63 percent of the total), but not walkers, bicyclists, or users of other modes.

Married individuals accounted for 58 percent of the total population. As a group, they were more likely to carpool and less likely to ride transit than were people who were single.

As found in many other studies, income was related to mode choice. Carpoolers had the highest income levels, followed by SOV drivers and those riding transit. The distribution of income differed significantly for transit riders; this group was much more likely to include individuals with the lowest income levels than were the other mode groups. The high income of carpoolers has been observed in other Puget Sound studies (e.g., Ulberg, 1992) and is different from results found in other parts of the nation.

Understanding the characteristics of jobs held by individuals who have different mode choices is also important in understanding the factors associated with mode choice. Jobs appropriate to different mode choices have been widely discussed in relation to job flexibility and organizational position or rank. Job types were divided into five categories. These categories were the same as those created and used by the Washington State Energy Office in its initial employer mode choice survey conducted in the fall of 1992 under the state's Commute Trip Reduction Act of 1991.

The categories were as follows:

- Administrative Support
- Management
- Professional Services
- Technical Services
- Other

Technical Service jobs represented 31 percent of the sample, followed by Administrative Support at 26 percent, and Management at 15 percent. Because the preponderance of organizational sites surveyed could be classified as white collar, the large number of white collar occupational positions was not unexpected. Administrative Support workers, at the lower levels of the income schedule in a typical office environment, were 26 percent of the sample, 36 percent of the transit riders, and 28 percent of the carpoolers. This result is consistent with previous study findings that, as income rises, the impact of

commuting costs, especially SOV costs, becomes less important, while the SOV rate increases.

Technical Service workers were more likely to use other means and less likely to ride transit, while Managers (those higher in income and status) were more likely to drive an SOV than to use any other mode. This latter trend was confirmed by the finding that the likelihood of SOV use increased in proportion with the number of employees (if any) supervised. At the same time, the researchers found that SOV usage was common throughout all the occupations and was not at all restricted to any one group. As noted earlier, carpoolers had the highest incomes.

In summary, mode choice was related to specific personal and job factors. Administrative and Technical Service workers, who were more likely to be women and to be in the lower income groups, were the most likely to ride transit or carpool, while Managers, who were most likely to be males in the upper income levels, were most likely to drive an SOV.

### **The Daily Commute**

While a number of information sources existed to determine general mode choice rates for employees, the researchers were interested in developing a more detailed picture of the daily commute experienced by each of the four sub-groups. The third subsection of Part one included questions that were drawn directly from the WSEO's CTR survey. Thus, the sample responses could be compared to those from the state survey. This study's mode choice numbers were not significantly different from those in the CTR survey reports. To gain a better picture, the survey asked an additional 47 questions about the daily commute. Our examination of the work commute began with a comparison of how SOV commuters and HOV commuters (High occupancy vehicle modes, a combination of all non-SOV modes) responded to the full set of 47 questions about their commutes.

On an item by item basis, we can review the consistency of the daily routine. The survey asked people, "How consistent are your daily work starting and ending times?"

Figure 4 shows that as the likelihood of having the same hours on a regular basis declines, so does the likelihood of using an HOV mode.

Not unexpectedly, the time required to get to work has a direct bearing on mode choice. Figure 5 shows that people who used other modes had the briefest work commute—about 18 minutes—followed closely by SOV drivers. Carpoolers and transit riders took an average of about 10 minutes longer to complete their commutes.

There were also differences in the distance from home to work. Carpoolers traveled the greatest distance—approximately 15 miles—followed by SOV drivers and transit riders, who both traveled an average of 9 miles. People who used other modes lived closest to work about 7 miles.

The ranges of miles to work reveals the common perceptions of the relationship between mode choice and distance to work. At the high extreme, carpoolers came from as far away as 50 miles, while people who used other modes topped out at 20 miles. However, many carpoolers also traveled as few as 5 miles or less. While greater distances are conducive to carpooling, interview data pointed out that living near coworkers leads to the formation of carpools even for very short distances, given a TDM program incentive to create carpools.

Looking to the future, the survey asked, "If you had to start getting to work by a different means than you now use, which would be your most likely choice?" The results showed that, if forced out of their current mode choice, SOV drivers had a slight preference for switching to carpools rather than riding transit. Transit riders were about equally split between switching to carpools or driving alone. Carpoolers, on the other hand, greatly preferred SOV driving to riding transit. The significance of this finding for future mode change is that the current SOV population is more flexible than are carpoolers. If carpoolers will be kept in an alternative mode, it will likely be an automotive one; hence, the maintenance and support of ongoing carpools are critical to maintaining positive HOV rates.

How convenient is transit use? One important measure of this is access to a bus stop. While the researchers cannot ensure the accuracy of the numbers, both SOV drivers and

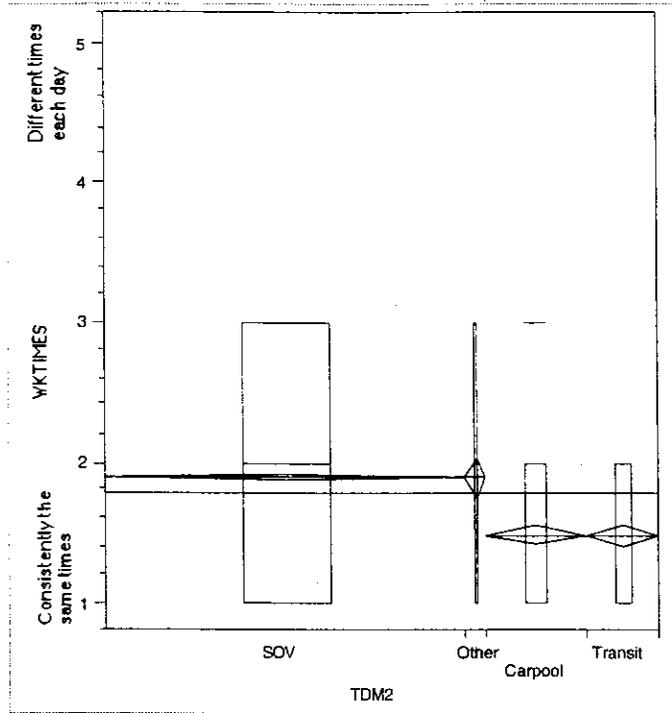


Figure 4. How consistent are your daily work starting and ending times?

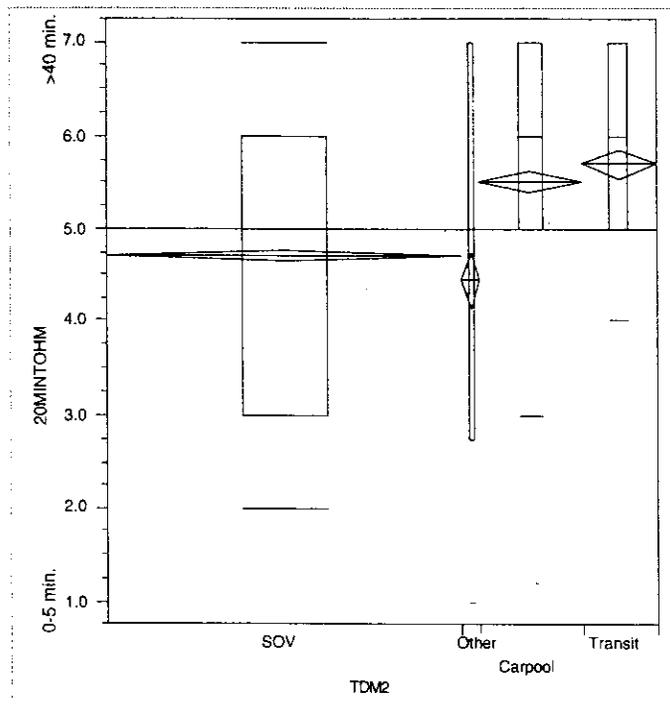


Figure 5. For your normal commute how many minutes does it take you to get home?

carpoolers estimated that, on the average, they lived approximately 15 minutes walk-time from the nearest stop, while transit riders and people who used other modes said the average closest stop was about a 5-minute walk away. If auto-based commuters perceive transit as "hard to get to," information about riding transit, is unlikely to provoke much mode choice change. The results indicated that the potential difference was much smaller at the other end of the journey.

Access to a vehicle would also be a logical constraint on mode choice. However, there was no difference between SOV drivers and carpoolers regarding the number of vehicles at home. People who used other modes, who used a non-automotive mode, actually had a slightly higher number of vehicles than did their auto-using counterparts. On the other hand, transit riders had the lowest numbers. This latter finding could be both cause and effect. The lack of a vehicle could direct someone toward transit (or carpool) ridership, while the ability to commute by the bus would lower the need for and potential likelihood of owning one or more vehicles.

In discussions of work commutes, trip chaining is often mentioned. Trip chaining refers to the number and types of sub-trips, or errands, that people make while on their way between home and work. Not surprisingly, SOV drivers reported the greatest tendency to make stops along the work commute. Carpoolers, people who used other modes, and transit riders did so much less. Here again, cause and effect are difficult to separate, as making a stop is easiest in the SOV mode, and the perceived need to make a stop is likely to increase the selection of an SOV mode. In all cases, stops were more likely on the way home than on the way to work.

Parking issues also differ among mode choices. No parking issue generates as much heat as does the idea of parking charges. Figure 6 shows that carpoolers were somewhat more likely to work at a site that charged for parking, followed by SOV drivers, people who used other modes, and transit riders. Of the total sample population, 65 percent of employees received free parking at work.

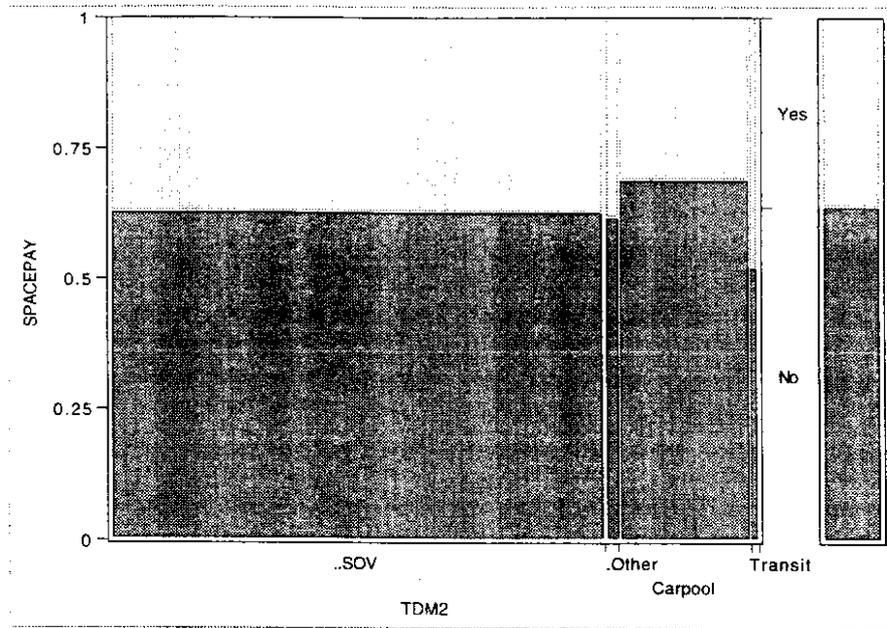


Figure 6. Would you have to pay for a parking space at work?

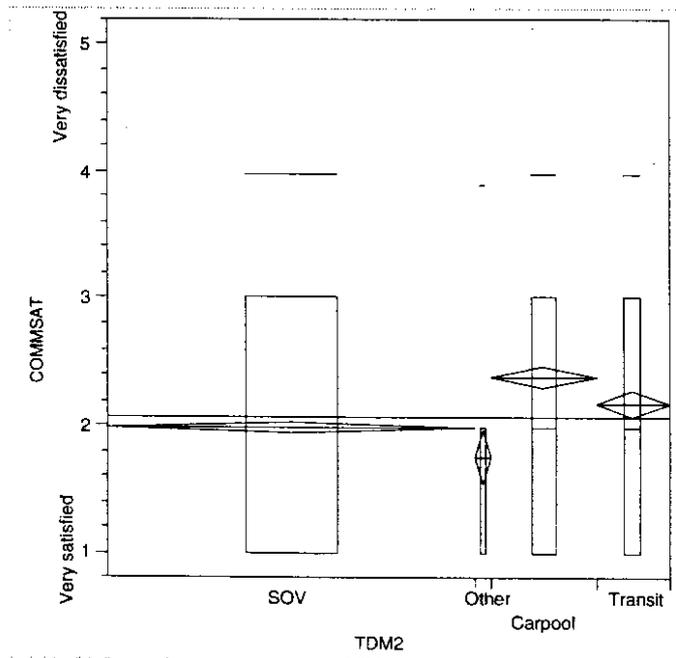


Figure 7. How satisfied are you with your commute to and from work?

Transit riders and people who used other modes were also more likely to perceive problems in finding a close, convenient parking space. Note that although carpoolers, like SOV drivers, reported no perceived problem in finding a parking place, in all cases carpoolers received some form of preferential parking, thus potentially negating any difficulty they might have had as an SOV driver.

Overall, the most telling question was perhaps the summary notion of general satisfaction with the daily work commute. Figure 7 illustrates that carpoolers and transit riders were less satisfied with their daily commutes to and from work than were the SOV drivers. The old slogan "Relax and leave the driving to us" does not seem to apply at all who use an HOV mode. People who are able to use an SOV seem most satisfied with their commutes.

#### **The Organization's CTR/TDM Programs**

The fourth subsection of Part one examined specifics of the TDM programs and people's awareness of the programs. In general, most organizations offered the same range of TDM program elements, including transit information, transit and carpool subsidies, preferential parking for carpoolers, flextime, and compressed work weeks.

Because this project was concerned with the general notion of public policy efforts to change employees' commute modes and reduce their number of trips taken and mileage driven, questions were asked about the funders and beneficiaries of TDM programs. Transit riders, carpoolers, and people who used other modes who did use and receive some direct benefits from the employers' TDM programs believed that the organizations themselves, along with society, were picking up the costs for TDM efforts.

While all groups felt that society was the greatest beneficiary of the programs, program users were more likely to see themselves as the primary beneficiaries than were SOV drivers.

Ideas about program goals also differed. The goal of the current Washington State CTR law is to reduce SOV rates by 35 percent by 1999. SOV drivers felt that this level was too high and that a 30 percent reduction was more appropriate. Carpoolers and people who

used other modes felt that a goal nearer 40 percent was right, while transit riders preferred a nearly 50 percent reduction goal.

The same pattern held true for program outcomes. While all groups were more satisfied than not with the concept of implementing TDM programs as a way to improve the region, SOV drivers were the least impressed with the effectiveness of TDM programs at improving air quality or reducing traffic congestion. Carpoolers and people who used other modes were more satisfied. However, carpoolers felt that TDM programs were slightly less likely to improve traffic congestion than they were likely to improve air quality. Transit riders were the most approving.

Not all employees of all organizations were aware that their employers had a TDM program (see Figure 8). Understandably, those who participated in such programs were more likely than non-participating SOV drivers to be aware of their employers' programs.

Perhaps more surprising was the number of people who were using alternative modes without knowing that their employers had TDM programs: 18 percent of the transit riders and 30 percent of the carpoolers and those people who used other modes. Clearly better communication is needed. Because all organizations had been using both targeted media, such as memos and flyers, and additional reading material such as articles in newsletters, not just more but different communication methods are needed.

Program participants were more likely than SOV drivers to believe that other employees within the organization were aware of the organization's TDM program. For most employees who did know about the organization's TDM programs, the employee newsletter was the means by which they had first heard about them. However, other direct means, such as new employee orientations, coworkers, employee transportation coordinators, and supervisors, were more likely to have introduced the program to participants (HOV users) than to non-participants (SOV drivers). Therefore, this personal touch seems to be an important factor in increasing HOV awareness and potential participation.

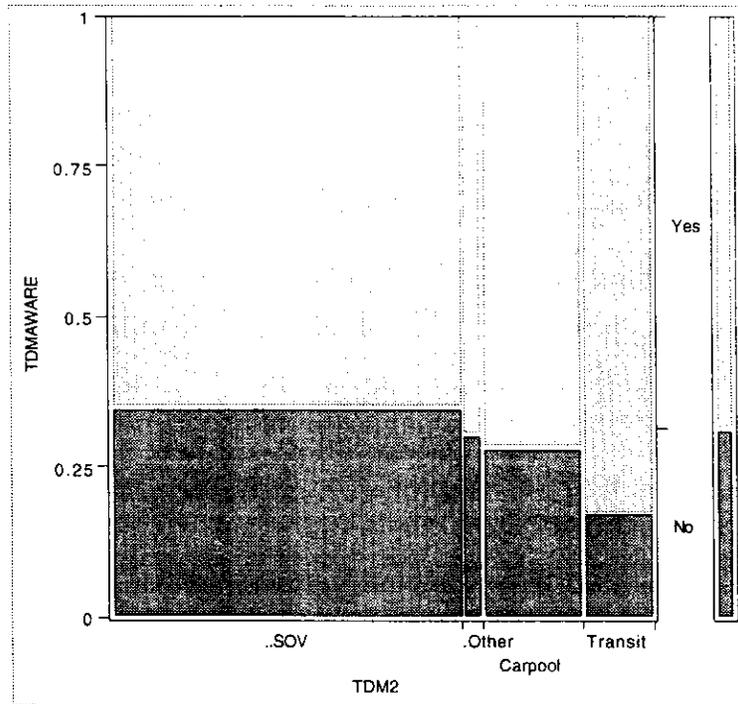


Figure 8. Are you aware of your organization's existing TDM program?

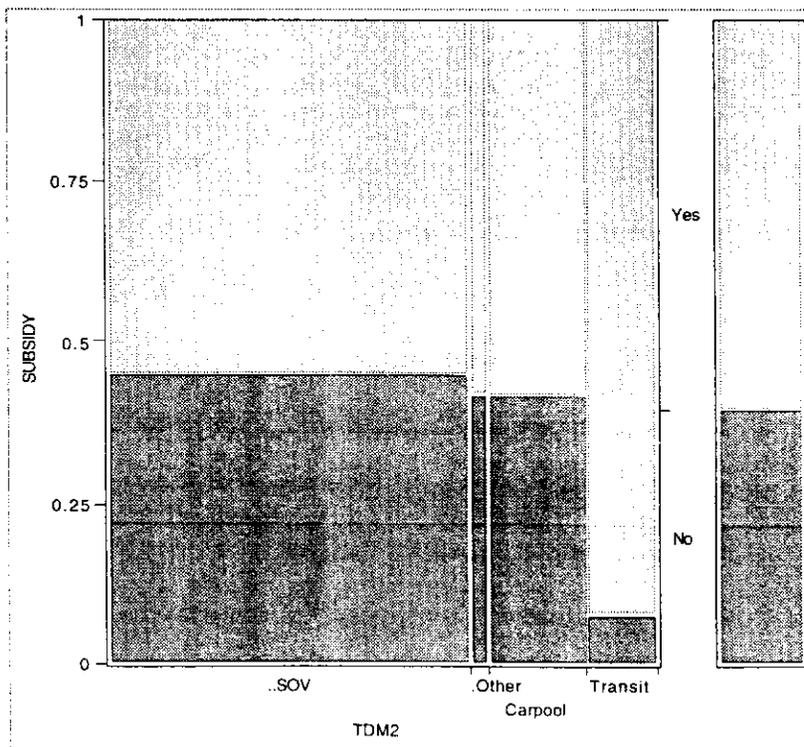


Figure 9. What does your organization do that you are aware of? Subsidizes transit fares.

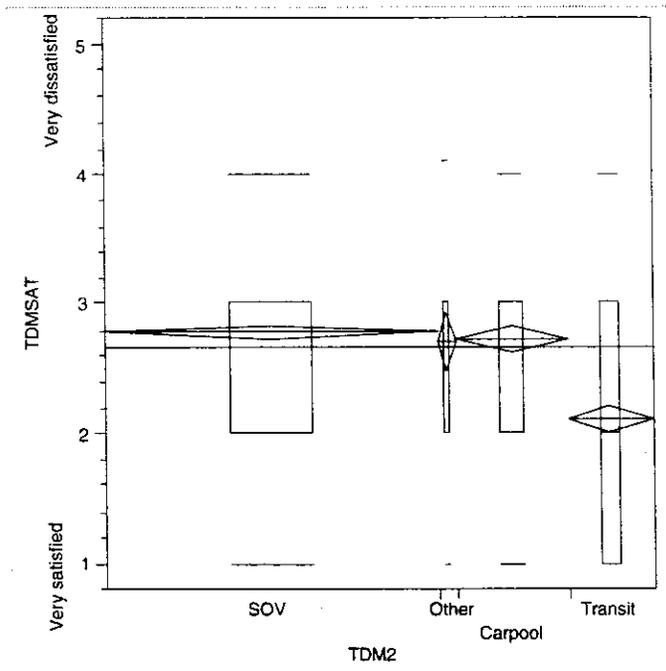


Figure 10. How satisfied are you with your employer's TDM program?

The first six responses from the fifth subsection of Part one confirmed a point of major importance: most people were already using their preferred mode of choice. For SOV drivers this may seem rather natural. However, many have conjectured that people who carpool, ride transit, or use other means to get to work secretly (or sometimes loudly) long to drive alone, if only they could. Our results show that this is not the case. All modal groups chose their existing mode as their primary preference. **It may be that TDM programs have not caused people to change their mode choices as much as they have provided the support needed for non-SOV drivers to successfully utilize their preferred modes.**

The questionnaire addressed the contrast between carpooling with a coworker and carpooling with someone else. Among all groups, carpooling with a coworker was strongly preferred to carpooling with a non-coworker. This result may indicate that programs aimed at general ridesharing should redirect their efforts to be intra- rather than inter-organizational.

The next set of questions asked people about the relative importance of various factors in making their current mode choices. In general, motivational factors can be divided

into either internal-based (such as attitudes and opinions) or external-based (such as rewards and fines).

Public policy makers would like to think that people are more successfully motivated by an external reward or punishment than by the awareness of the larger impacts of their behaviors. The evidence has been mixed to support this notion, including the findings from this project. Figures 11 and 12 illustrate that regional air quality and traffic congestion were more important to HOV users than they were to SOV drivers. As Figure 13 shows, SOV drivers were more concerned about safety than were carpoolers and people who used other modes, who were more concerned than were transit riders.

This is not to say that external factors are not important, especially to those who are not yet using an alternative mode. For example, SOV drivers were more concerned about the factor of travel time (see Figure 14). They wanted flexibility and convenience (perhaps to run trip chain errands). They also saw themselves as more likely to need a car at work and as having the most varied work schedule. In contrast, transit riders were least likely to need a car and were most concerned about the availability of a bus to ride. At the same time, non-SOV drivers were not forced to choose their modes because of a lack of a vehicle. Finally, because the major external programmatic factor of most TDM efforts are a built-in monetary incentive and disincentive, it should be noted that money and the cost of commuting were least important to the SOV drivers (see Figure 15).

These results raise the question, "What alternatives would employees find most desirable as a means of reducing SOV rates?"

HOV lanes were more desirable to transit riders and carpoolers, who can use such lanes, than to SOV drivers. Telecommuting was not particularly attractive to any group. While compressed work weeks and flextime were about equally desirable, SOV drivers preferred both alternatives more strongly than did other mode choice groups. Because SOV drivers showed no preference between compressed work week and flextime, organizations should strongly consider the compressed work week option. While flextime reduces peak

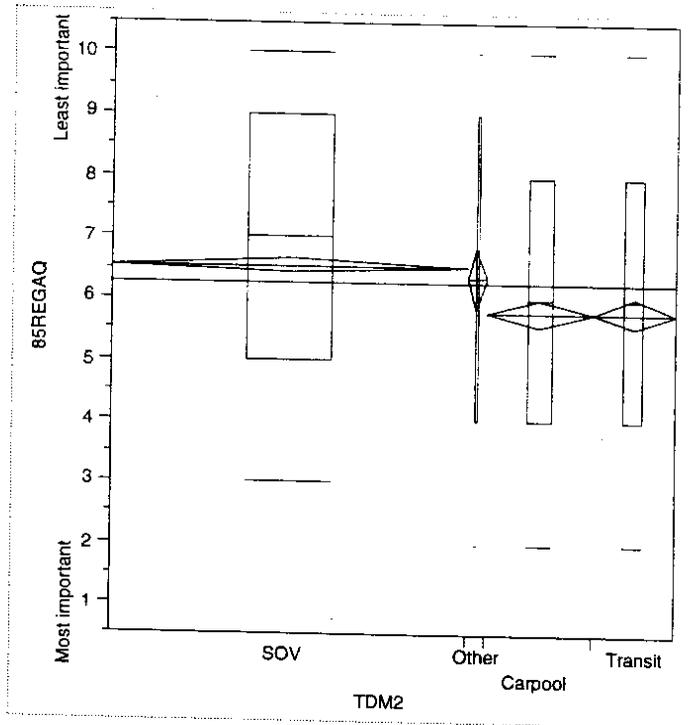


Figure 11. What factors influence your decisions about how to commute to work? Regional air quality

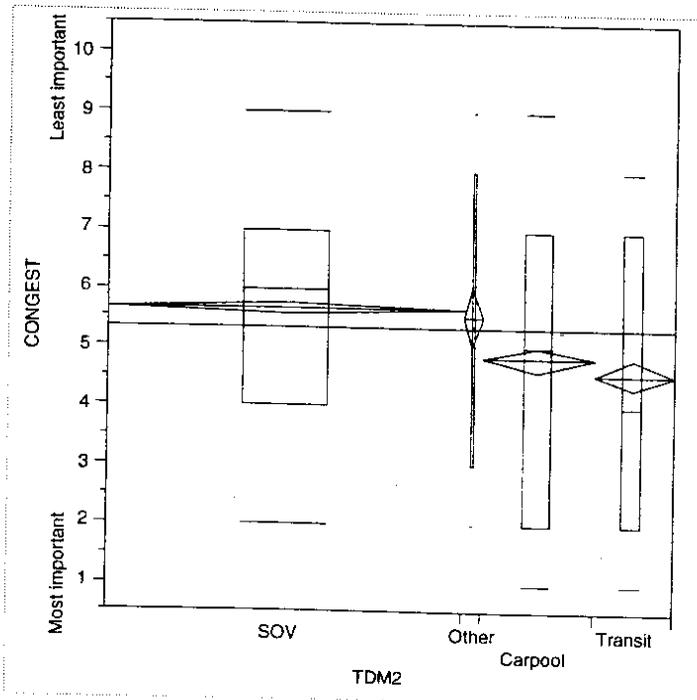


Figure 12. What factors influence your decisions about how to commute to work? Typical traffic

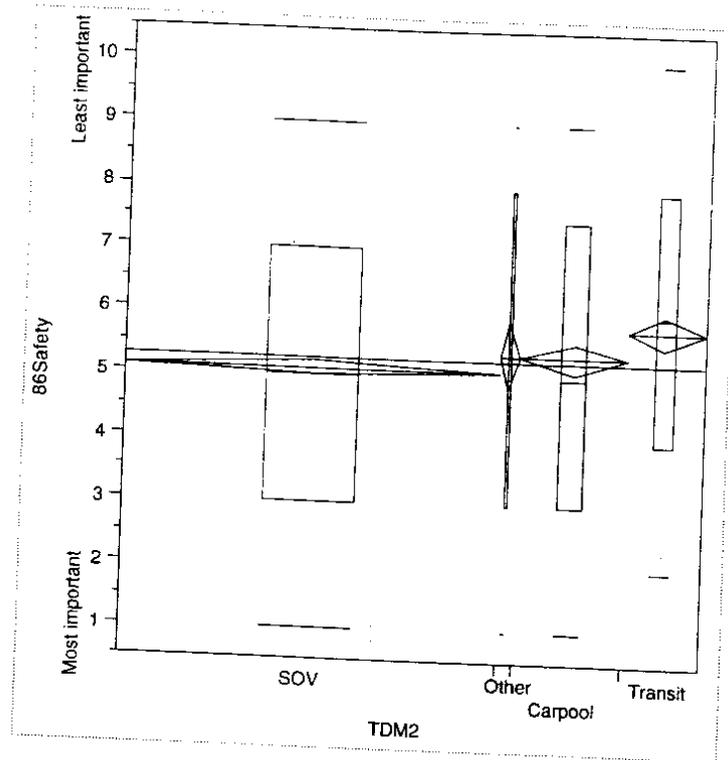


Figure 13. What factors influence your decisions about how to commute to work? Personal safety

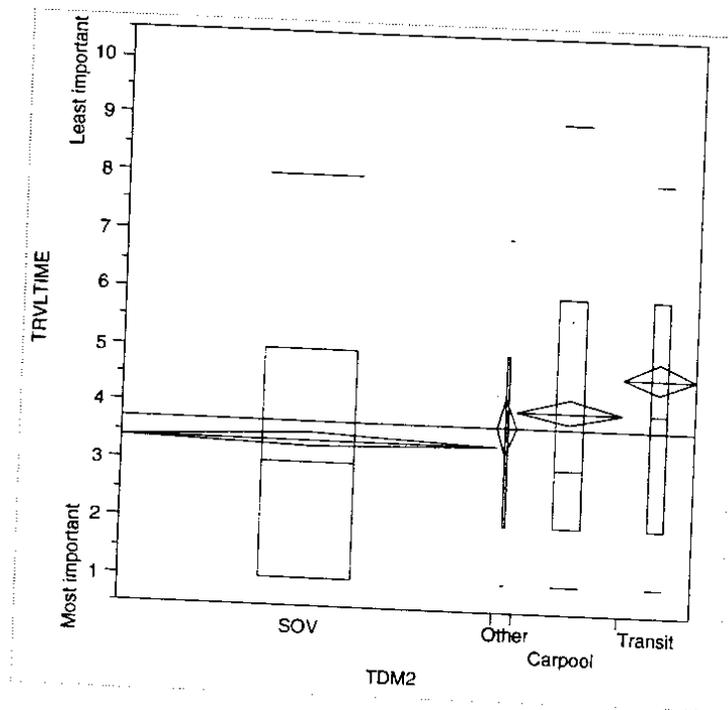


Figure 14. What factors influence your decisions about how to commute to work? Travel time

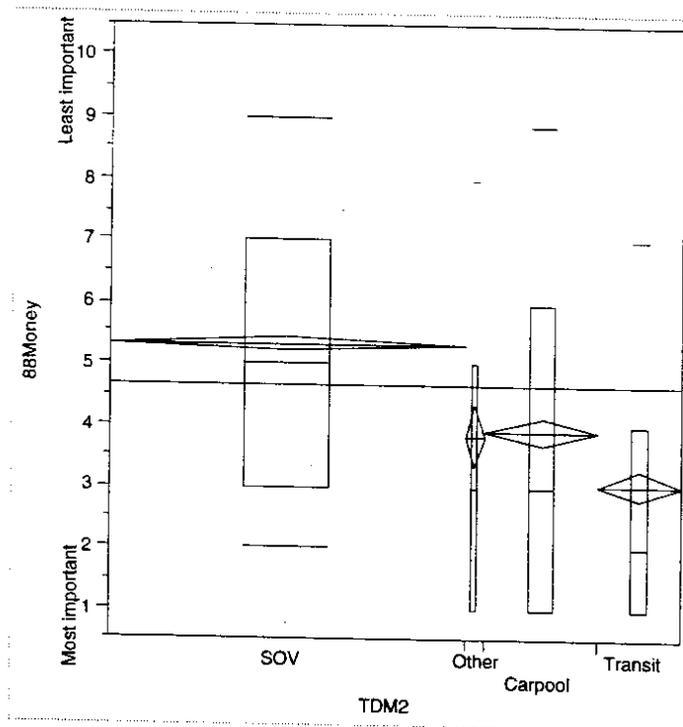


Figure 15. What factors influence your decisions about how to commute to work?  
Monetary cost

hour congestion, it does not reduce the number of trips taken or the mileage driven, whereas the compressed work week does both.

The questions also covered measures of perception, one external and one internal. Participants were asked about their perceptions of changes in the external environment over the past three years, specifically, changes in peak-hour congestion and air quality. SOV drivers saw less of an increase in peak-hour congestion and less of a decrease in air quality than did those who were using alternative modes.

As for internal perceptions, transit riders felt the least commute stress of all. This result contradicts non-riders' notions that riding the bus is stressful. On the other hand, carpoolers, reflecting the complexity and inter-dependency of carpooling, reported having the highest levels of commuter related stress.

### Citizen Prescriptions for Regional Transportation Changes

The sixth subsection of the Part one attempted to measure employees' attitudes about potential policy changes that might be used to realize CTR/TDM program goals such as reducing congestion, improving air quality, and reducing the number of SOV work commuters.

A comparison of the SOV drivers and HOV users shows some general similarities. For example, the SOV drivers and the HOV users stated similar levels of support for a regional transit system, having a rail system as a part of a regional transit system, more bus service, more HOV lanes, and more dedicated pedestrian amenities.

Many studies have found that charging for parking at work is the single most influential factor in mode choice. The survey asked employees about their support for using parking charges to reduce SOV rates. Figure 16 shows, not surprisingly, that transit riders were most likely to support such an idea, and SOV drivers were moderately opposed it. Surprisingly carpoolers tended to oppose the idea.

Participants were then asked, "If there were parking charges, how would you rank your support for the following factors?" The idea of a transportation allowance, that is, charging for parking but providing all employees with a set amount of money to spend on commuting/parking, received only modest support from all groups. The most support came from carpoolers, who already received funds of one type or another.

If parking charges will be levied, two strategies are available to decide the amount to charge. One strategy is to use a regressive disincentive that requires all to pay a set parking fee, regardless of their income. This type of strategy disproportionately affects those who earn less. The other strategy is to use a progressive disincentive that charges for parking on a sliding scale: the amount varies but the percentage of monthly income remains the same. Support was strongest for a flat rather than a percentage fee; SOV drivers were most strongly against a percentage charge. This result may reflect the relative relationship between organizational rank/income and SOV mode choice.

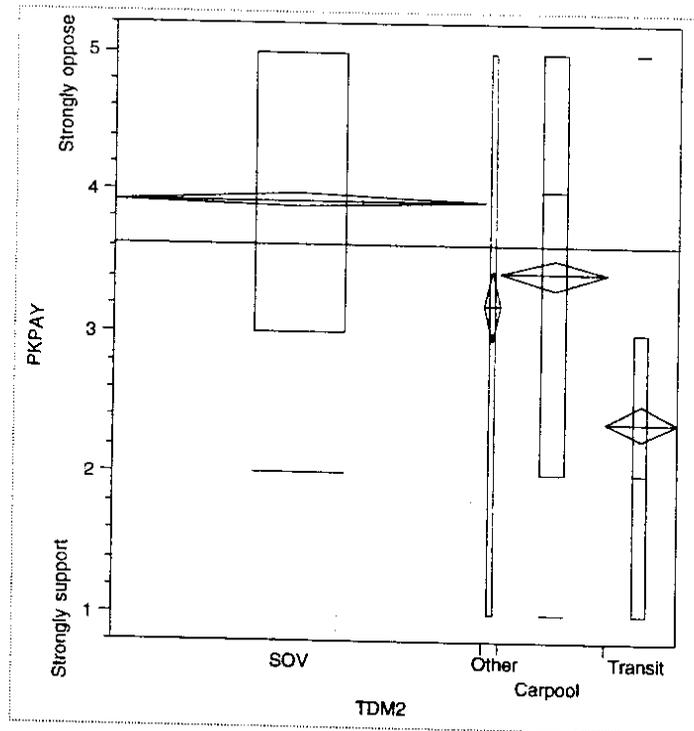


Figure 16. How would you rank your support for charging to park in order to reduce the number of people who drive alone to work?

Support for parking charges was related to support for the idea that all businesses in the local area be required to charge for parking. However, overall support for charging to park was not substantial, and only transit riders supported a requirement that all businesses in a given area charge to park.

Questions about three other somewhat controversial TDM/CTR concepts were also raised. The first concerned the concept of creating market-based incentives out of SOV reduction goals. The Southern California Air Quality Management District has supported a market-based approach to lowering emissions levels from manufacturing sites. It charges a fee for the amount of pollution generated above a specified level and allows companies that produce amounts of pollutants below that level to "sell" their right to produce more pollution to other firms. Similarly, some have suggested that firms whose target levels of SOV drivers were below required levels could likewise "sell" their rights to employ more SOV drivers to firms that were having a harder time meeting their SOV limits. In both cases, the underlying

theory is that lowering the levels of regulated activity (whether emissions generation or SOV driver percentages) may create a valuable commodity to a business if it can be sold. Thus businesses would have a market-based incentive to reach and to exceed their threshold goals. Employees were not supportive of this idea. HOV mode users were more opposed than were SOV drivers.

The second controversial concept is aimed solely at peak-hour congestion and would have direct impact on pollution. Some citizens have proposed that commercial truck traffic be banned, at least from the freeways, during peak hours in the morning and the afternoon. This restriction is thought to have two possible benefits. Although trucks constitute a minority of vehicles on the highway, they take up more room than autos. They also are involved in a larger percentage of accidents. Their removal from the freeways during peak hours is thus seen as a potential means of reducing congestion and traffic incidents without impacting peak-hour work commuters (see Wright, 1992). All groups supported this idea. The auto subgroups—the SOV drivers and carpoolers—were the strongest supporters.

The third controversial concept involves the idea of user fees (also known as tolls) for driving during peak commute times. Figure 17 shows, not surprisingly, that auto modes—SOV drivers and carpoolers—were strongly opposed. Less predictably, those who did not use their autos to commute also displayed a lack of support.

All three of these results suggest that a strong public education program is necessary to pursue these policy alternatives.

The survey asked employees to rate their support for a regional transit system, a combined transit and rail system, more bus service, more freeway and arterial HOV lanes, more bike amenities, and more pedestrian amenities. All groups supported all six items. When a question related directly to a group's existing mode choice (for example, when carpoolers were asked about more HOV lanes), the support was even stronger.

This section of the survey concluded by asking about people's overall perceptions of commuting and mode choice systems. Questions were asked about both local transit systems

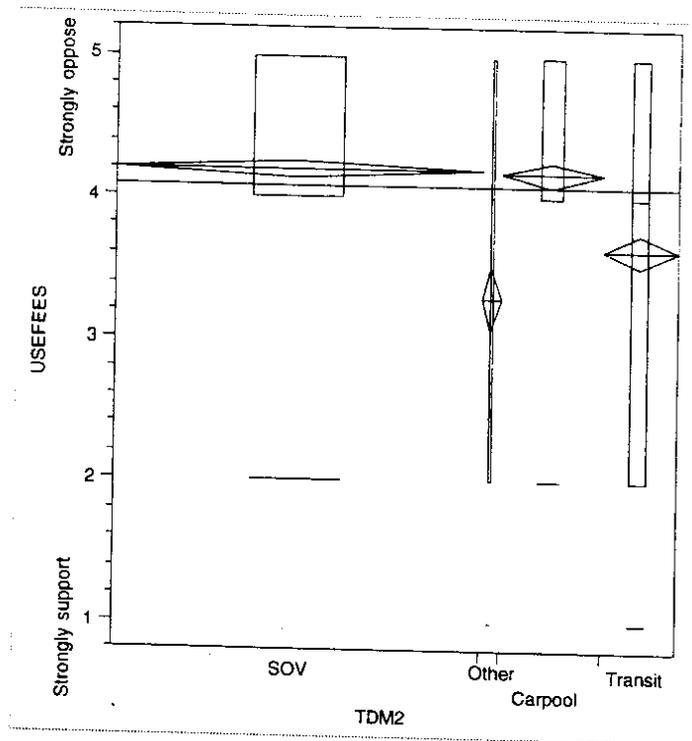


Figure 17. Rank your support for road-use fees

and public transit in the region overall. The questions sought to determine whether people's views about the agency they knew best contrasted with their overall ability to travel by transit.

As shown in Figure 18, those who commuted by auto, whether SOV drivers or carpoolers, had a modest negative feeling toward both local and regional public transit. However, those who actually rode the buses were at least somewhat satisfied.

As for the region's carpool lanes, no group was particularly satisfied with them (see Figure 19). In a trend that may warrant further study, the two groups able to use the carpool lanes, carpoolers and transit riders, showed lower levels of support than the SOV drivers who did not use the lanes.

The study also asked people about their satisfaction with their general mobility, that is, their ability to make non-commute trips. No group was dissatisfied with this, but SOV drivers tended to be more satisfied than those who used an HOV mode.

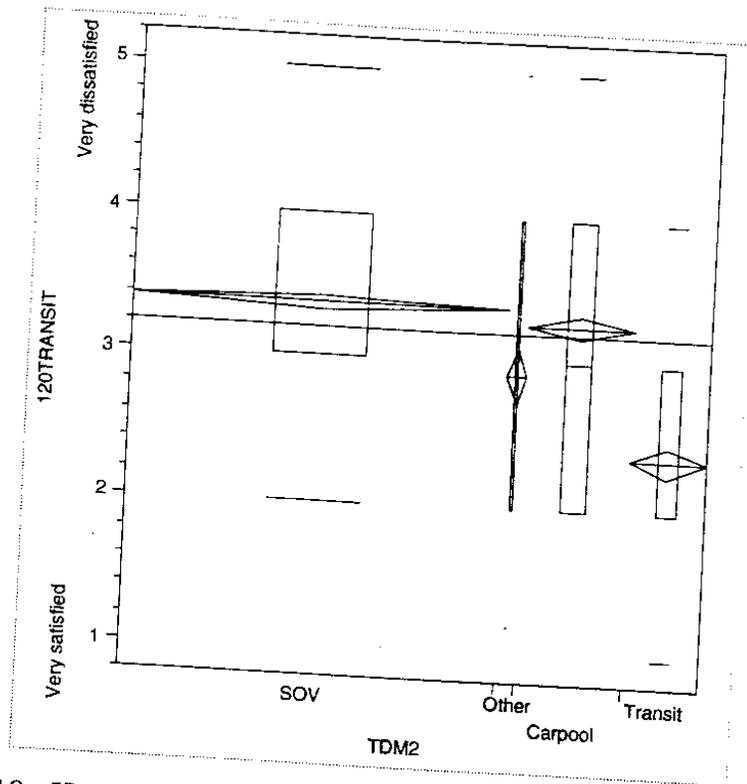


Figure 18. How satisfied are you with your local public transit system?

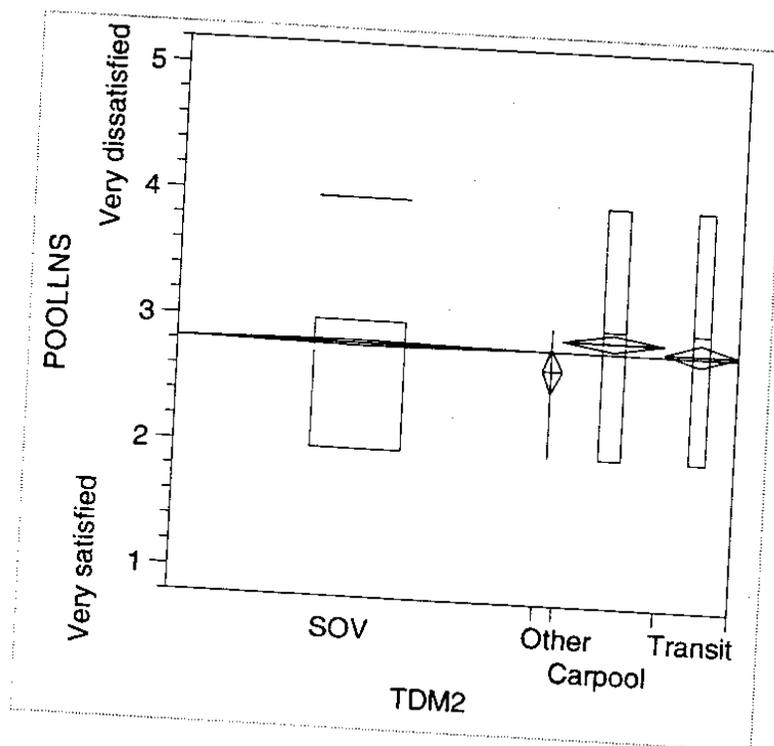


Figure 19. How satisfied are you with the region's carpool lanes?

### **Perceptions of the Organization and Its Culture**

Part two of the survey produced the greatest pattern of overall similarities between the SOV drivers and the HOV users. In the first subsection, the first subgroup of questions investigated employees' perceptions of the organization as a whole. A review of the items individually revealed modest agreement that the organization was quick to use improved work methods, it made decisions at the appropriate levels, and the respondent's work group received adequate information. Carpoolers were the most supportive of the modal groups.

While all groups agreed with the statement, "The organization has a real interest in the welfare and satisfaction of employees," the SOV drivers who were not participating in the organization's TDM program agreed more strongly than did those who were in the program. Figure 20 illustrates that HOV users were as likely as SOV drivers to believe that the organization cared about their work commute or their individual needs.

The second subgroup of questions looked specifically at the way in which the employees' perceived their immediate supervisors. These responses were not similar to the responses regarding organizational variables. This finding supports conclusions from previous research that attitudes about immediate supervisors are independent of attitudes about the organization itself. An examination of the group responses to the four questions indicated that overall, almost all employees felt good about their immediate supervisors (see Figure 21). In fact, they felt more positive about their supervisors than they did about the organization itself.

The third subgroup of questions examined employees' attitudes about their own work groups. The responses were similar to the responses regarding the immediate supervisor. This similarity was predicted by the Survey of Organizations, which found that immediate supervisors were a primary influence on the attitudes and norms within the immediate work group. Once again, these results were not similar to the results for the organizational

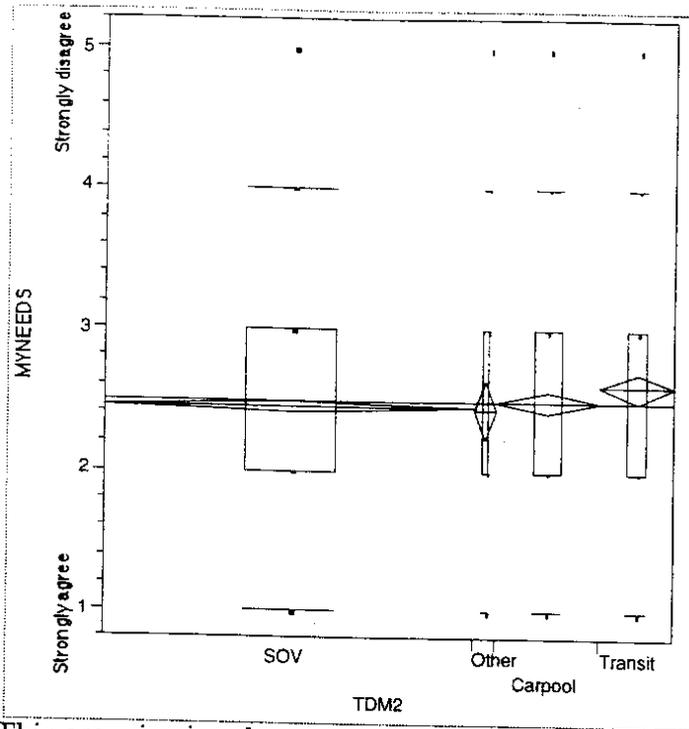


Figure 20. This organization does a good job of meeting my needs as an individual.

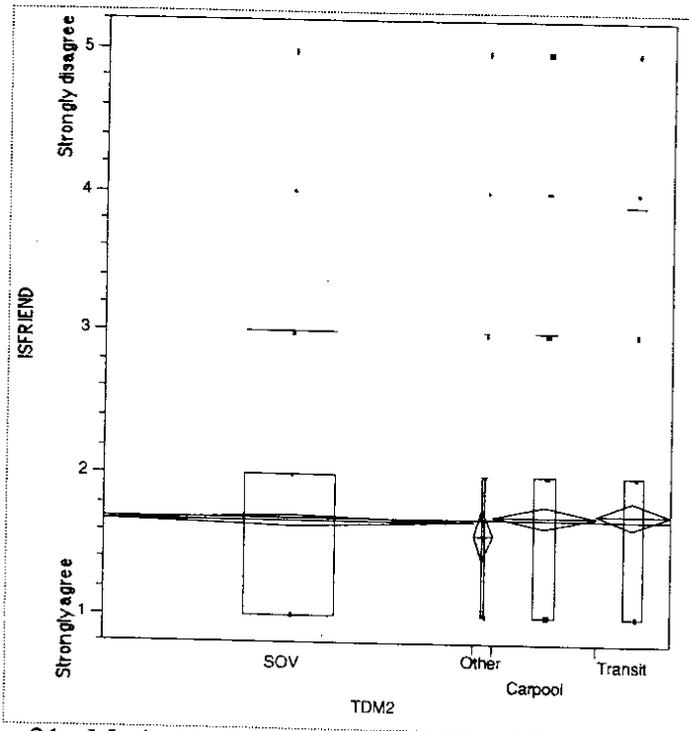


Figure 21. My immediate supervisor is friendly and easy to approach.

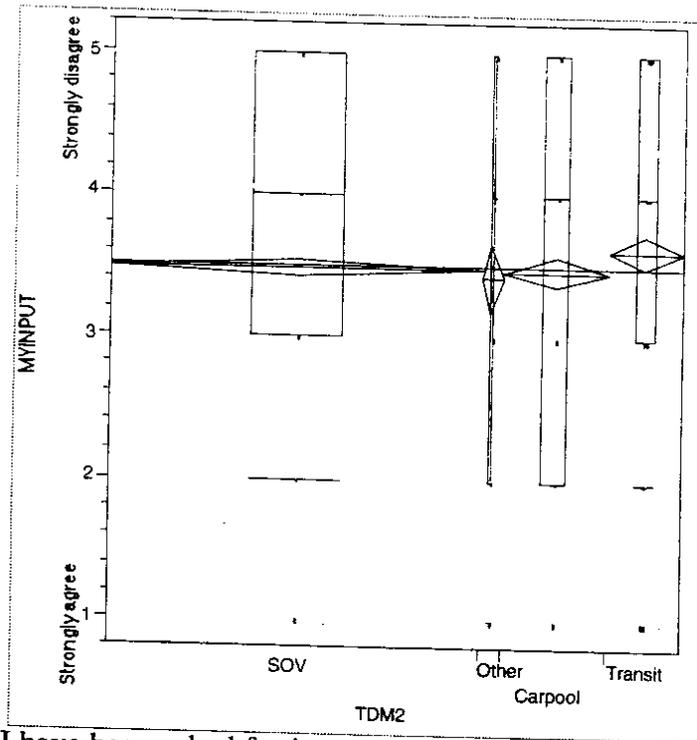


Figure 22. I have been asked for input on how to improve my own or other workers' daily commute to work.

variables, supporting previous research findings that attitudes about immediate supervisors and work groups are independent of attitudes about the organization itself.

Relatively small differences existed among the modal group responses to the six questions on attitudes about the work group. All group attitudes were positive, but they were less positive than the corresponding attitudes toward the immediate supervisor. This result may be due to the greater range of feelings, both positive and negative, generated by the diverse people in a work group.

The fourth subgroup of questions investigated employees' direct interactions with the organization. The responses were isolated and independent of each other and of the other subsections. One important finding related to whether employees had been included in decisions about the TDM programs. Researchers have long known that people's support for a program increases when they believe that their input has been sought, considered, and possibly adopted. Figure 22 reflects the fact that, unfortunately, in most of the organizations, TDM programs had been implemented from the top, and employees had been told, not asked.

The fifth subgroup of questions examined employees' attitudes about their own work and their position in the organization. These responses were relatively similar to the responses about the immediate supervisor and the work group. These variables showed that, across the modal groups, employees were very satisfied with their jobs and enjoyed the work they were doing.

### **Perceptions of the Organization and Its TDM Efforts**

The second subsection of Part two provided the most direct observations of the employees' perceptions of their organizations' TDM efforts. Paralleling the previous subsection, questions were designed in subgroups, but these subgroups were issue oriented, cutting across the organization, management, the immediate supervisor, the work group, and the overall program.

The first subgroup of questions concerned the organizational and managerial norms for commuting. Both SOV drivers and HOV users agreed that efforts to manage or change their commuting behaviors had not originated with their immediate supervisors but with upper management (transit riders had a different perspective). While neither SOV drivers nor HOV users felt the organization placed much emphasis on whether they commuted alone, HOV groups perceived a stronger emphasis than did SOV drivers. Both groups agreed that, if emphasis was placed on alternative commute modes, it came from the top of the organization rather than from immediate supervisors.

SOV drivers disagreed more than HOV users that immediate supervisors emphasized the use of alternative modes (see Figure 23). This result may be both cause and effect, as active supervisors are more likely to encourage such behaviors and, once such behaviors have begun, to support and help maintain them.

Perhaps these perceptions arose from a lack of information or unclear information about TDM or individual expectations. Four questions were created to investigate this possibility.

As we have seen in previous responses, HOV users were more likely to be aware of their organizations' TDM programs than were SOV drivers; transit riders were the most

aware of all. The pattern held true for respondents' perception of other employees' level of awareness. All modal groups believed that more employees knew about the program than did not know, but this belief was not strong.

Unfortunately, no group thought that information about the TDM program was necessarily easy to find or available. This result supported the low profile the programs and their goals seemed to have for most employees.

A comparison of the responses to "How I am expected to commute" and "I am clear about what is expected of me" showed that people felt clear about others' expectations of them, and those expectations were not necessarily to use an alternative mode (see Figure 24).

The next subgroup of questions was created to gauge levels of support, in word and deed, for the TDM program. Questions were asked across levels of management, as well as to the work group. Figure 25 shows that, across the organizational groups, people did not

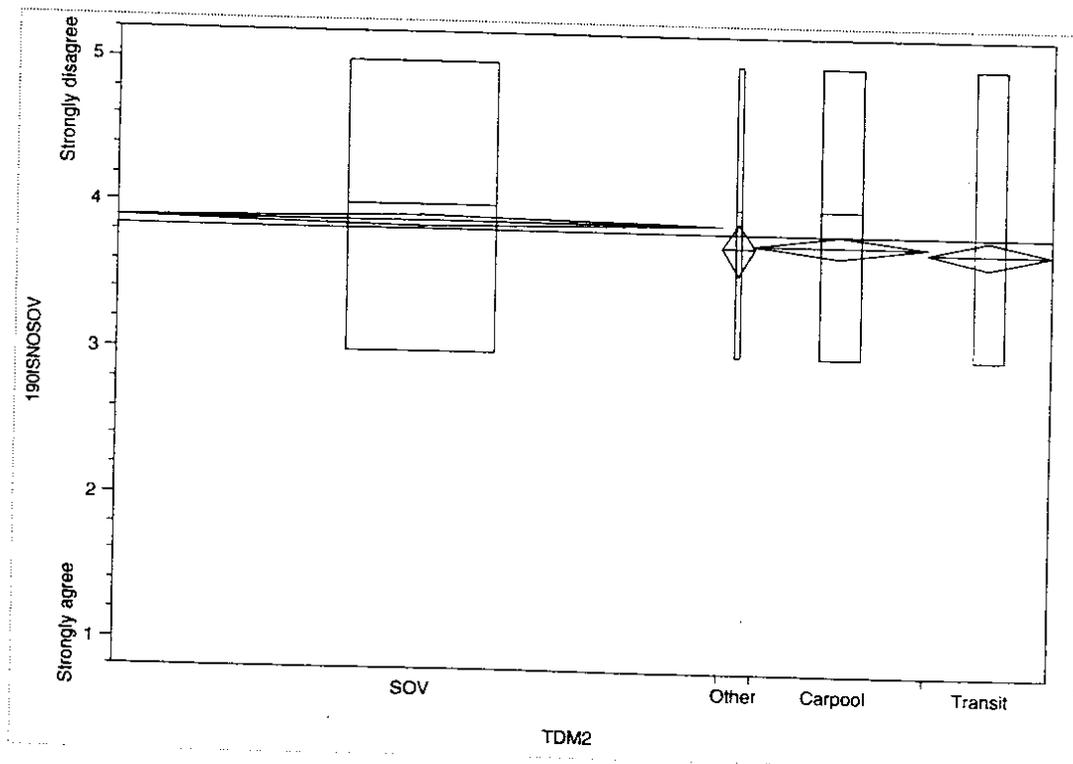


Figure 23. My immediate supervisor places emphasis on my not driving alone.

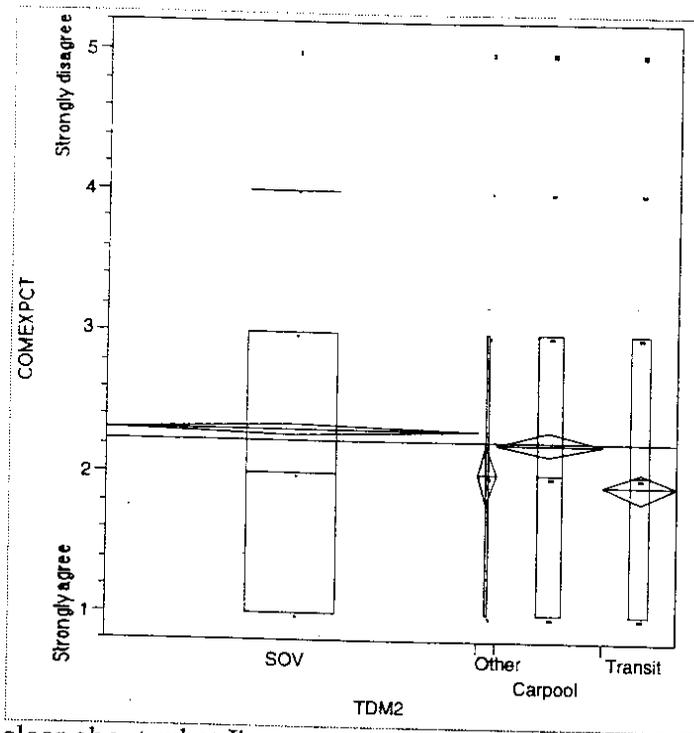


Figure 24. I'm clear about what I'm expected to do in commuting to work each day.

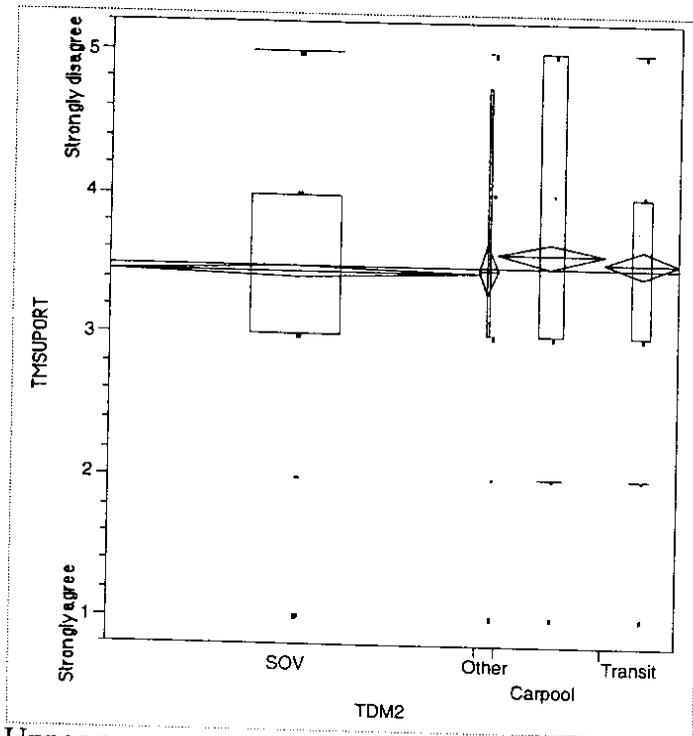


Figure 25. Upper management personally supports TDM efforts through their own commuting behavior.

believe that members of top management personally used an HOV mode, nor had many ever seen them do so. HOV users were more negative about top management's activities than were SOV drivers. In this sense, top management was more a part of the problem than a part of the solution.

For HOV users, personal satisfaction with the organization's TDM efforts was most closely linked with support for TDM from work group members and from immediate supervisors. SOV drivers reported the same. On the average, all modal groups believed that immediate supervisors were supportive of TDM efforts. However, HOV users thought them more supportive than did SOV drivers. At the same time, immediate supervisors were not perceived to participate in the programs. SOV drivers felt more strongly this way than did HOV users.

Similarly, immediate supervisors were not likely to have been seen actually using an alternative mode, especially not by SOV drivers (see Figure 26). The SOV drivers' responses to this question ranged from negative to neutral at best, while the HOV groups' responses ranged from negative to moderately positive. This indicates that people who used HOV modes were more likely to have an immediate supervisor who was a program participant.

Both the organizations and immediate supervisors were given positive ratings for supporting commuting issues, but immediate supervisors were seen as more supportive than the organizations. Transit riders, who may make some of the greatest demands on their supervisors and organizations because of the relative inflexibility of their schedules, had the most praise for the support they were receiving (see Figure 27).

Results regarding the work group showed that more HOV users than SOV drivers believed their colleagues were supportive of TDM. Figure 28 shows that HOV users were more likely to see others in their work group using an alternative mode, and more likely to see their colleagues, rather than their supervisors, using such a mode. Interestingly, SOV drivers were more likely to perceive more people in their work group using an alternative mode than they were actually doing so.

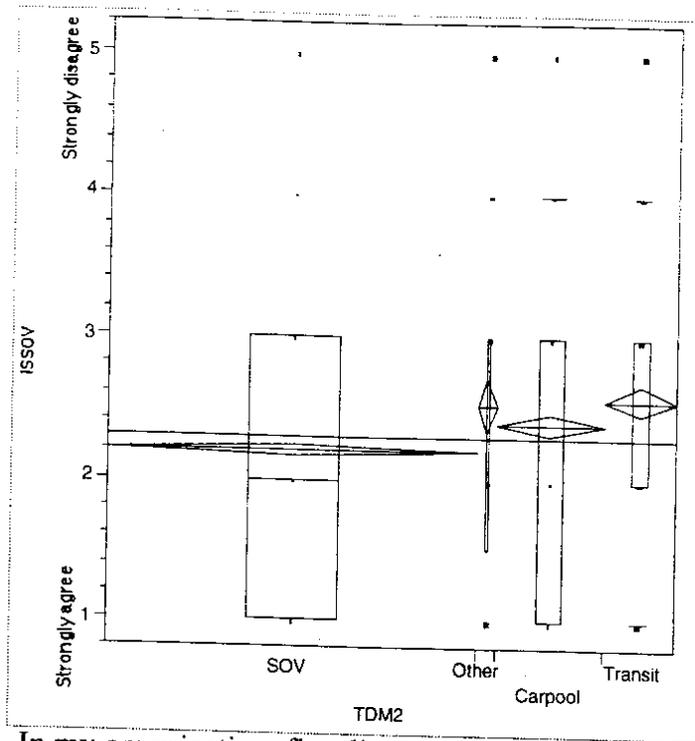


Figure 26. In my organization, first-line supervisors usually commute by driving alone to work each day.

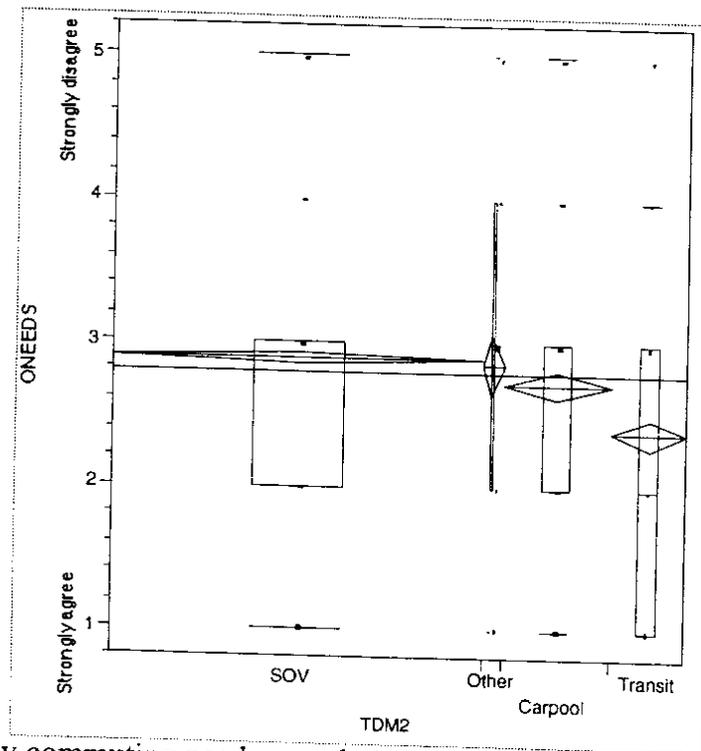


Figure 27. My commuting needs are adequately considered and supported by my organization

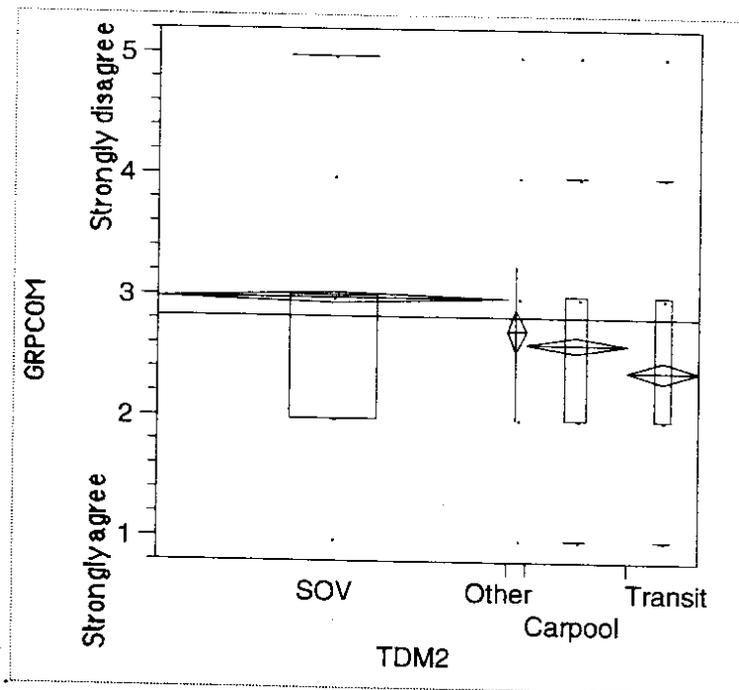


Figure 28. People in my work group personally support TDM efforts through their own commuting behavior.

A couple issues arose in the focus groups involving fairness. Some employees perceived that their organization's professed goals for reducing SOV driving rates were only paper goals and that the real goal was to create the appearance of making changes, rather than actually making them. One question addressed this situation directly. The responses by modal group averaged relatively close to the "neither agree nor disagree" mid-point. However, this result is hardly reason for organizational congratulations. An organization to which integrity was important would hope for a much more positive response.

Another fairness issue was the uneven application of TDM behavioral change goals. Comments during both focus groups and interviews suggested that pockets of individuals across organizational levels perceived that TDM programs were being directed at lower level employees, excluding managers and other "important" people. The study did not reveal a strong perception of bias in the way that the programs were being implemented; however, neither did it reveal a strong belief that programs were implemented equitably.

The study survey concluded by examining employee perceptions of the success of the programs and the relationship between commuting and work efficiency.

Transit riders were the most likely to believe that their organizations were effective in persuading people to not drive alone. SOV drivers were neutral to pessimistic, while carpoolers were in between. While it is not surprising that program participants had higher opinions of their programs' effectiveness than did non-participants, the response was a bit underwhelming.

These perceptions of organizational effectiveness were reinforced by the results of a subsequent question. While transit riders were satisfied with the efforts of their organization, carpoolers were no more likely to be satisfied than were SOV drivers (see Figure 29). People who used other modes were dissatisfied. The researchers conclude that if organizations wish to improve their employees' perceptions of their TDM programs, many who are currently participating need to receive additional help and support before the opinion of non-participants can be improved.

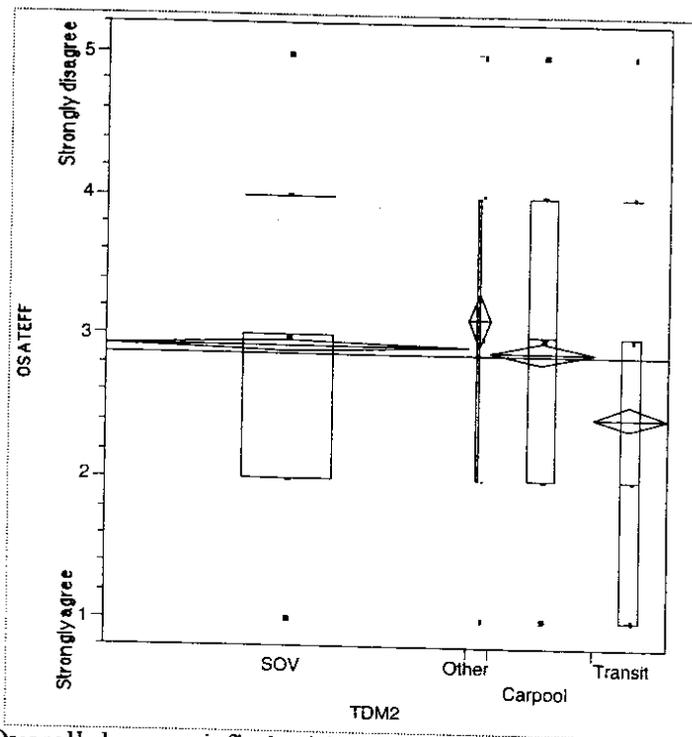


Figure 29. Overall, I am satisfied with the effort taken by this organization to help me in commuting to work each day.

One other finding concerned public transit. As Figure 30 shows, individuals who rode buses were more satisfied with the efforts of transit agencies than those who did not. When support is needed for regional transit issues, the modestly negative attitudes that non-riders have toward transit agencies should not be overlooked.

A concern that both employers and employees shared is that, as people switch from SOV driving to other modes of travel, unknown drawbacks associated with HOV modes will negatively impact people's job performance. A question on this issue showed that this is not the case. No HOV users reported that their commute mode had negatively affected their work. In fact, there were no differences among the responses of SOV drivers, people who used other modes, or those who rode transit. Only carpoolers were somewhat less positive, an understandable response given the greater complexities and personal interactions of their commutes.

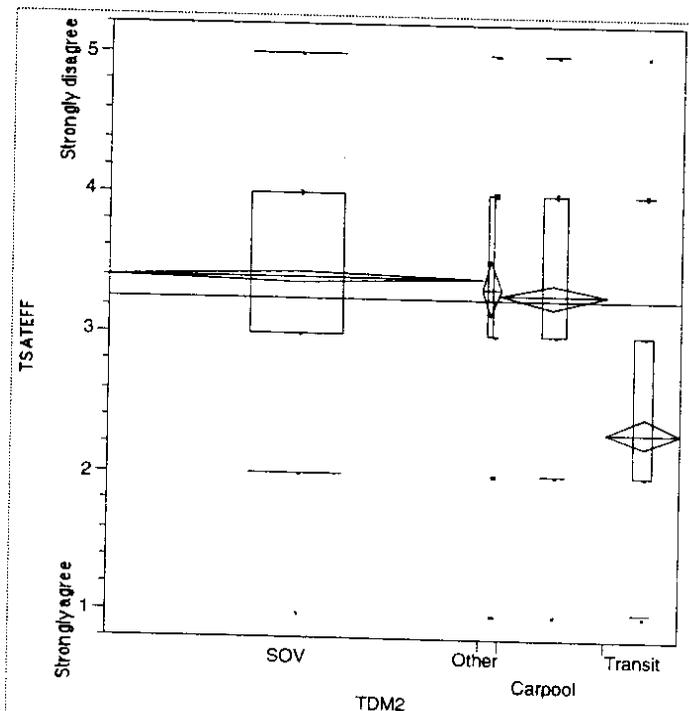


Figure 30. Overall, I am satisfied with the efforts taken by outside agencies (such as public transit) to help me in commuting to work each day.

## QUALITATIVE DATA

To supplement the data gathered from the employee questionnaires, a series of qualitative interviews were conducted with a cross-section of employees at the organizations. The purpose of these interviews was twofold. First, the researchers wished to use the results of the interviews to cross-check the results of the surveys. Interview responses provided an opportunity to see whether the responses in the surveys matched individuals' comments in person. Indeed, the interviews did paint a picture that matched the survey data.

The second reason for the interviews was to enhance and clarify the survey results, to perhaps gain insights that could not be gleaned from the surveys. In this regard, the interviews were also successful. Two main themes arose in the interviews that were not readily apparent from the survey data alone. These have been labeled "The Worker Bee Syndrome" and "It Really Is OK!" These are both described below.

### "The Worker Bee Syndrome"

In talks with managers, one theme arose consistently. Managers, particularly those in the highest echelons, saw the use of an alternative commute mode as acceptable only for employees in the lower organizational levels, especially those with lower incomes.

A good example of this attitude is the statement by a senior vice-president, who said, *"Carpooling or riding the bus is OK for the 'worker bees,' the people on 8 to 5 salaries like the secretaries, clerks, or others who work around the edges, but we have to keep our 'important people' happy. Driving a nice car, having a close, protected place to park it, these are the kinds of things they expect. We aren't going to risk upsetting or losing them over something like how they get to work."*

The tone of these remarks was echoed by different managers in other organizations who talked about the problem of having to leave at a set time to catch a bus or a carpool. For example, *"At a meeting once, X got up and said he needed to leave to catch his carpool. The room went dead silent as he picked up his things and left. It was the last time he did that, and he dropped out of the carpool shortly after."*

Even the "worker bees" may experience problems with alternative mode choices. Non-management employees in focus groups mentioned the difference between paper and practical support. Many people related experiences in which their supervisors hindered their implementation of alternative modes. For example, one worker experienced trouble in getting approval to flex her work schedule by 7 minutes to meet a bus schedule. *"He [her boss] seemed to feel that my trying to switch to riding the bus was like a personal favor to me, rather than like something I was doing to benefit [the organization] and the environment."*

One important implication of this mentality is that, in reaching the current plateaus of HOV usage, TDM efforts may have been preaching only to the already converted. That is, the individuals who have selected an alternative mode are the ones who already had some natural inclination to do so. Given the existence of a program and modest support, or at least the absence of obstructions, these people have selected alternative modes for at least some of their commutes.

For most organizations to reach the next level of SOV reduction goals, current SOV drivers will have to make a mode shift. If an organization conveys the attitude that using HOV modes is not appropriate for "important" people, then the people who see themselves as important (or who hope to be promoted to such a spot) will most strongly resist changing their SOV behaviors for strictly non-commute reasons. Even the SOV "worker bees" who might be motivated to switch will not do so given a lack of support and the absence of alternative commute behavior models among their "important" bosses.

### **It Really Is OK!**

The researchers did find one organization whose employees communicated in all face to face interviews that using alternative modes was acceptable. In fact, one first line supervisor said, *"It really is OK!"*

The organization was a larger, potentially bureaucratic one. It charged for parking, but people who wanted a space could get one. Transit access was good, but service was fair. All typical program components were in place. In short, on the outside, nothing

distinguished this organization from any of the others. However, its overall HOV rates were significantly better than those for the area.

The factor that distinguished this firm from the others was the attitude conveyed in the interviews. For example, no one made "worker bee" comments. Unlike most other organizations, everyone knew about upper managers who occasionally carpooled or rode the bus. These people had been regularly "seen in the act."

Organizational policies had been gradually aligning themselves over the past years. Managers no longer received company cars or free parking. Other modes were supported, as were flex-time, compressed work weeks, and telecommuting. Examples were known and given about people from the bottom to the top who had adjusted their schedules, or left meetings, to accommodate alternative mode necessities. Communications about TDM were regular and well known. And the organization inspired a belief in the employees that the organization "*really cared about being 'green' even before it was popular to do so.*"

Interviews also revealed a rather singular perspective on the relationship between the internal and external forces affecting mode choice in the organization. In an interview with upper management, someone said it this way: "*People here really know that driving alone to work is not good for the environment, is not good for society and our quality of life, is not even good for [the organization]. We have the policies that we do to help people with their commute and stay out of their way, not to bribe or threaten or force them.*" In short, employees were positive about alternative modes, and the external factors of organizational policies and environmental resources supported them.

There is one problem with this picture. If anything, TDM was too popular. With a stronger effort to push the program, SOV rates for the organization could likely drop to as low as 30 percent, less than half the 1995 area reduction goal of a 75 percent SOV rate! In a sentiment echoed by more than one organization's ETC, because of direct budget costs for transit subsidies, carpool parking, and the like, many firms, including this one, have been downplaying, if not resisting TDM to keep costs down.

Given current tax policies, companies have no economic incentive, and even some disincentives, to spend money on TDM efforts, especially efforts that reduce SOV rates below the levels required by law. This situation is reinforced by CTR laws that do not penalize actual failures to achieve goals and thus reward companies more for having a good paper plan than for having a well implemented or successful one. In addition, on the personal level, a number of economic subsidies serve to make driving alone appear less expensive than it actually is, in comparison with alternative modes.

## RECOMMENDATIONS

The findings of this study led to several conclusions and recommendations regarding the ways that TDM policies can be reformulated to better accomplish their desired goals. Six specific recommendations arose from a combination of survey, interview, and program review findings.

### RECOMMENDATIONS

- 1) **Jurisdictions and organizations must first identify all policies that relate to the targeted behavioral changes and then make those policies consistent in their support of the change goals.**

One of the most basic components of a policy that is successful at creating and maintaining lasting behavioral changes is one that links all related rules and policies so that employers can create both intra- and inter-organizational supports for the new programs.

The elements that must be synchronized include but are not limited to money (such as tax codes), regulations, and enforcement. Behavioral change strategies can only become fully effective when all parts of the public and private sectors are pulling in the same direction.

At the public policy level, organizational managers were well aware of the dual messages that various public policies were sending. For example, congestion is growing primarily in areas where population or the number of jobs is increasing rapidly. In response to this congestion (and its related effects), many local and county governments have tried to slow, contain, block, or redirect growth through growth management plans. At the same time, other policies have encouraged the same firms to expand their work forces so that the (congested) jurisdictions may reap the tax benefits from local successful businesses. The dual messages are that the regions want the tax benefits that arise from a growing tax base, but they do not want any of the drawbacks that are associated with growth, such as congestion, a loss of open spaces, or higher densities.

A second example of such dual messages involves the full marginal costs of free parking for employees. While one set of policies has directed organizations to reduce drive-alone commuters, current tax policies allow all employers to deduct the expenses up to \$155 per month for providing free parking spaces for drive-alone commuters, including capital and operating expenses for building and maintaining the spaces. Furthermore, any travel allowance over \$60 per month provided to employees as an encouragement to change from an SOV mode is treated as taxable income, and travel costs such as parking fees or transit fares generally cannot be deducted from personal income as business expenses.

This same recommendation is also applicable at the organizational level, where incongruous policies can also be found. For example, at the same time that one organization was encouraging a group of employees to carpool or ride transit, it also notified them that they would no longer have access to company vehicles during the work day. Travel to customers' offices during business hours was a very real and necessary part of this group's work. They were told, in effect, "Please ride the bus or carpool to work, but you must have your own car available each day should you need to go to a customer's work site." Within a week after losing access to company cars, virtually all employees ceased transit and carpool commuting.

Information provided to employees about organizational norms and culture should also reflect a unified, consistent picture of the desired behavior. New employees at orientation should be given a specific message about and support for non-SOV commuting to work. Policies that tie company success and prestige to SOV driving, such as preferential parking, and company cars for top management need to be eliminated. Policies that support non-SOV behaviors need to exist (e.g., guaranteed ride home, flextime, and company cars/motor pools for necessary day trips).

The proximity of the worksite to employees' homes is another area that should be more consistent. Because positions are filled in isolation from each other, there is no relationship between where people work and where they live. The result is that over time, when the same job exists in an organization at more than one site, people with the same

position may not work at the site closest to their homes, and indeed, may cross paths to reach work sites farther from their homes. One study of a moderately large financial services firm found that the average office support worker commuted past seven other company worksites daily.

To combat this inefficiency and inconsistency, proximate commuting policies, which inherently support TDM goals, should be established. Proximate commuting is an innovative, employment-based commute reduction strategy that offers multi-site employers (e.g., banks, retail chains, manufacturers, governmental agencies) an opportunity to significantly reduce commute-related vehicle miles traveled. A proximate commuting policy systematically assesses employee commute patterns, identifies commuters who could potentially work in the same position at an employer work site that is closer to their homes, and facilitates reallocation of personnel to the alternative, shorter commute work sites.

Another common organizational conflict concerns the relatively inflexible nature of transit or carpool riding. Both transit and carpools run on relatively fixed schedules. The study's surveys showed that while employees were encouraged to use such commute modes, in many cases their supervisors (or the organizational culture) did not support their needs to flex their work times slightly around the 8:00 to 5:00 core work period. In other cases, the organization discouraged them by not accepting their need to leave a meeting to catch a carpool or bus.

- 2) **The primary means of communication about an organization's TDM program efforts should be informational sessions provided in work group settings.**

Changes are needed in the communication strategies organizations use to inform and educate employees about their TDM program efforts. The study's surveys found that information about the existence of the organizations' TDM programs was not as widespread as would be expected from a set of established, "model" programs.

The surveys revealed that approximately 30 percent of all employees were unaware that their organization had a TDM program. One possible explanation is that employees were aware of programmatic components such as ridematching without being aware of a

formal TDM program. This possibility was examined in a survey question that asked people whether they knew about any TDM-related actions their organization was taking. The results were that, even among those who rode public transit to approximately 8 percent did not know that they could receive some form of reimbursement/subsidy from their employers for their HOV commuting behavior.

Organizations' primary communication approach has been broad based, typified by the management memo and employee newsletter. The survey data showed that this approach was missing nearly half of the employees, who had first heard about their organizations' efforts through some form of interpersonal communication.

Data collected from the interviews supported the literature, which indicated that self-discovery techniques work best to inform people about their own actions and to influence changes in attitudes toward their behaviors. One way to help commuters accomplish this self-discovery is to persuade them to keep a travel diary for a week. At the end of the week, their actual travel behaviors can then be computed and translated into pollution generated, money spent, commuting time, and other factors.

To persuade most people to agree to keep a diary requires a shift from a broad to a personal focus. People's immediate work groups are valued instruments for behavioral monitoring. Employees listen to and are supported by their immediate co-workers. For example, alternative mode users felt that the people in their work groups were more supportive and communicative about each others' use of alternatives than were SOV drivers. Thus, information and specific requests for action commitments should be presented to meetings of these groups instead of through the generic broadcast methods now used.

**3) Extensive, specific "how-to" information on selecting and utilizing HOV commute modes should be provided to all employees.**

The survey data showed that all organizations conveyed a great deal of information about the needs and goals for reducing the number of SOV commuters. They also were clear about their desire for employees to switch to an HOV commute mode. However, accompanying "how-to" information was missing.

It is not enough to tell employees what they should do. Organizations must educate people about how to accomplish the new behaviors, especially when these behaviors are viewed as potentially difficult or frightening. This means actively training and role playing or modeling new behaviors. None of the organizations in this study provided much of any such training or help.

At work group meetings, including an employee of similar status and job duties who is a TDM participant can be very beneficial. This was one of the most popular and useful strategies that arose from the focus groups.

In the focus groups, practical questions about the realities of using an HOV mode were of tremendous interest to SOV drivers as they interacted with transit riders and carpoolers. Questions about transit may typically include the following:

- How and where do I get a transit schedule?
- How do I plan my route?
- How do I purchase my ticket/pass?
- How do I actually pay?
- How do I ask for and make transfers?
- What kind of clothing or equipment should I have?
- What is it really like to ride the bus in terms of safety, crowding, and waiting?

For those considering carpooling, questions may concern logistical and interpersonal issues in forming or joining a carpool:

- How do I form a carpool?
- What kinds of questions do I ask a potential carpool partner?
- How do I deal with problems like someone who is late or forgetful?
- How do I end a carpool relationship if it doesn't work out?

Without the answers to these questions and more, a potential transit rider or carpooler is unlikely to risk ridesharing to work even as a one-day trial.

Meeting people with whom employees can identify and who can answer questions from their own experience and serve as a role model may help SOV drivers overcome the

many reservations they may have about their ability to use an alternative mode. Although this "how-to" information can and should be provided in the more traditional newsletter formats, these should serve to supplement and support interpersonal, work group communication.

**4) Behavioral change goals should be graduated and public.**

This recommendation arises from lessons learned in previous research, which were confirmed in this study's interviews and focus group sessions. First, behavioral change goals should be graduated.

Although the language we use to analyze and describe commuters' mode choices is based upon categorical absolutes (i.e., by using some formula such as "4 days out of 5" or "65 percent of the weekly trips" classify people into distinct mode choice categories), the reality is that as much as 18 percent of the time people use modes other than their "usual" mode to get to work (see Ulberg, 1994). The focus groups and the interviews revealed that individuals also thought of and labeled themselves as "an X mode" type of commuter. As a result, people whose usual means of commuting was SOV driving typically envisioned that changing modes meant an absolute, 100 percent change to an alternative mode. However, not only would such an extreme switch be programmatically undesirable (or impossible), it is not required.

Rather than communicating, or creating the perception of, a request such as, "Would you permanently stop driving alone and start riding the bus each day instead?" organizations should begin with small goals such as, "Would you ride the bus to work one day per two-week pay period for the next two months?"

In programmatic terms, the latter goal is to reduce SOV usage by 10 percent, not 100 percent. With effective interpersonal monitoring of such an initial trial goal, the gradual escalation of such new behavior to a higher level, such as 20 percent (one day per week) or more, is much more realistic and probable.

The second part of this recommendation is that the goal be public. This is true in two senses. In the most general sense, committing to such a modest trial change publicly, that is,

in front of one's peers in a small work group setting, is the same as making New Year's Day resolutions known to family and friends. People are most likely to make a change if they know that others are aware of their goals. A number of people in the interviews and the focus groups described how their colleagues monitored their behavior and good naturedly challenged them and encouraged them to meet their goals, all of which were powerful motivators for them.

The second sense of the "public" nature of the goals is related to recommendation number five.

**5) Program efforts should include public monitoring and specific feedback regarding behavioral change goal attainment.**

Data collected from the organizational literature and procedures, which were confirmed in the interviews, showed a problem pattern. Many supervisors and employees, upon hearing their organization's programs and goals, set out to create individual goals and to change commuting behaviors. Unfortunately, while much attention and hoopla are attached to the communication and establishment of goals, much less attention is paid to attainment (or failure to attain) the goals. In the words of one supervisor, "We all worked very hard on this, and when it was all over, no one really seemed to care that we had [reached our TDM SOV reduction goal]."

Thus, the goals that people and organizational units set should be made public, even displayed in the same way that contribution drives create visual displays (e.g., with giant thermometers) to show the target goal, progress toward the goal, and final achievements. Rewards for achieving such goals should also be explicit and public.

Cash rewards for achieving TDM goals may be difficult to implement, but other possibilities exist. One popular alternative has been to provide paid time off, such as one day per six-month period, to those who set and achieve specific SOV reduction goals.

At the supervisory level, another type of monitoring can be important. In interviews, supervisors commented on the frequent messages they received from their organization about new goals for themselves and their employees. In sorting out which of these goals were

"real" or "important," one benchmark was whether they, as supervisors, were formally monitored on a given goal.

For example, all too commonly, TDM goals are relegated to a line in an annual report prepared by the organization's employee transportation coordinator. However, including a department's SOV reduction goal in the annual supervisor evaluation and formally incorporating it in the criteria for evaluation and promotion send a very clear message that such a goal is important to the organization. It also increases the likelihood that such a goal will receive time and attention from the supervisor.

It is worth stating that behavioral change goals should be created in terms of "changes in behavior" not in "attempts to change behavior." In many public policy settings, although TDM program goals are created to change SOV commuting behavior, monitoring and penalties for failing to achieve these goals are framed in terms of having a plan to do so. The outcome of such contradictory messages is predictable. When the goal is to change behavior, but monitoring and evaluating relate to the creation of plans, the creation of plans is more likely than a change in behavior.

**6) Supervisors and managers should be encouraged or required to model and reinforce the importance of HOV commuting by doing so themselves.**

The final recommendation relates to the behaviors of management. Supervisors at all levels play a crucial role in creating and maintaining organizational norms. People look to their immediate supervisors for feedback about their professional progress and growth. In this sense, they look to their supervisors to model expected behaviors, both in current situations and at higher levels in the organization.

The survey shows that employees were very aware of their supervisors' commuting behaviors. When asked, employees had no trouble answering whether they had seen or heard of upper managers in their organization carpooling or using non-SOV means of commuting. Overwhelmingly, they had not, because generally such behaviors did not occur. Unfortunately, this form of management is highly unlikely to persuade people to change their behavior.

Supervisors know that behavioral changes are valued by the company when their own bosses model the behaviors and those bosses recognize and reward the supervisors for their groups' compliance with these new behaviors. Thus it goes, all the way to the top.

Using an HOV mode is also likely to produce some secondary benefits. Supervisors who have first-hand experience with the use of HOV modes are more likely to understand and support their employees should they require some organizational flexibility in dealing with transit or carpool schedules. This benefit was reflected in the finding that supervisors who were known to use an alternative mode were rated more supportive of their employees' alternative commuting behaviors.

### **OBSERVATIONS**

A pair of general observations should be made. First, in interviews and meetings with program initiators or implementors, a common question asked of the researchers was, "What size, or which, carrots and sticks will cause employees to change their commute modes and thus help the organization comply with the SOV target goals?" This is the wrong focus for effecting the lasting changes that the organizations desire and that public policies require. Rather, the focus of targeted behavioral change rules and recommendations, which may contain various external incentives and disincentives, should be to foster and maintain internally oriented changes, not externally oriented ones.

Appendix C discusses external versus internal behavioral change strategies. External strategies seek to bring about a behavioral change by altering individuals' external environment and/or their choices. Paying someone to carpool, charging them for driving alone, or even outlawing SOV commuting are all examples of external strategies. Internal strategies attempt to bring about behavioral changes by focusing on individuals' internal beliefs and attitudes. Lowering energy consumption by convincing people that insulating their homes is the right thing to do (rather than by paying them to do so) is an example of an internally oriented strategy. The literature shows that internally based strategies lead to the most persistent and dependable behavioral changes. A review of organizational materials

## **FUTURE INVESTIGATIONS AND A FINAL LOOK BACK**

This study was an initial look at how we cause and maintain behavioral changes in organizations, especially changes resulting from public policies. Continued research on changes resulting from public policies in other areas is needed. At the same time, longitudinal work is needed to follow up the findings uncovered to date, with the addition of organizations that are just now creating and implementing TDM behavioral change programs.

In the main, the organizations that participated in the study should be commended. In the beginning, almost all organizations contacted were enthusiastic about participating. As they saw that the research would provide a picture of how their employees felt about the organization and management, many dropped by the wayside. The reason is likely their desire to avoid any negative results that they would have trouble ignoring. While this "ostrich effect" was discussed before the study began, no one connected with the project foresaw how widespread and deeply ingrained this response would be in so many organizations, public and private.

Finally, on a practical note, the results of this work have contributed to an openness to examining the state's TDM efforts and the reasons for them. The reviews of the literature, the focus groups, the surveys, the interviews, and all the other information gathered showed that the recommended strategies, implemented in a positive policy atmosphere, offer the best prognosis for successful, persistent changes.

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**APPENDIX A**  
**TRAC TRANSPORTATION QUESTIONNAIRE**





Last week, what type of transportation did you use Monday through Friday to commute TO your usual work location? (fill in ONLY ONE type of transportation per day.)

| M | T | W | Th | F |                                    |
|---|---|---|----|---|------------------------------------|
| M | T | W | Th | F | Drove alone                        |
| M | T | W | Th | F | Carpool (2 or more people)         |
| M | T | W | Th | F | Vanpool                            |
| M | T | W | Th | F | Motorcycle/Moped                   |
| M | T | W | Th | F | Bus/Transit                        |
| M | T | W | Th | F | Bicycled                           |
| M | T | W | Th | F | Walked                             |
| M | T | W | Th | F | Telecommuted                       |
| M | T | W | Th | F | Other: _____                       |
| M | T | W | Th | F | Did not work (day off, sick, etc.) |

B.4. For your normal commute, how many minutes does it take you to get?

| a. To Work         | b. Home            |
|--------------------|--------------------|
| Number of minutes: | Number of minutes: |
| 0 - 5              | 0 - 5              |
| 6 - 10             | 6 - 10             |
| 11 - 15            | 11 - 15            |
| 16 - 20            | 16 - 20            |
| 21 - 30            | 21 - 30            |
| 31 - 40            | 31 - 40            |
| >40                | >40                |

B.5. a. If and when you carpool or vanpool, how many adults (including the driver) are usually in the vehicle?

|   |    |
|---|----|
| 2 | 4  |
| 3 | 5+ |

b. If and when you carpool or vanpool, how many children are usually in the vehicle?

|   |    |
|---|----|
| 1 | 3  |
| 2 | 4+ |

B.6. What time of day do you usually leave work to begin your home commute?

|        |        |       |
|--------|--------|-------|
| 12 - 3 | 6 - 9  | AM or |
| 3 - 6  | 9 - 12 | PM    |

Last week, which days did you leave work during this period? (fill in all that apply)

|    |     |
|----|-----|
| M  | F   |
| T  | S   |
| W  | Sun |
| Th |     |

B.7. Do you use park-and-ride lots in your commute?

Yes  
No

B.8. How many miles is the distance one way from your home to work?

|         |         |
|---------|---------|
| 0 - 5   | 30 - 40 |
| 5 - 10  | 40 - 50 |
| 10 - 20 | over 50 |
| 20 - 30 |         |

B.9. How many additional miles do you normally travel commuting from home to work (for errands, etc.) on an average day?

|         |         |
|---------|---------|
| 1 - 3   | 20 - 30 |
| 3 - 6   | 30 - 40 |
| 6 - 10  | over 40 |
| 10 - 20 |         |

B.10. How many additional miles do you normally travel commuting from work to home (for errands, etc.) on an average day?

|         |         |
|---------|---------|
| 1 - 3   | 20 - 30 |
| 3 - 6   | 30 - 40 |
| 6 - 10  | over 40 |
| 10 - 20 |         |

B.11. What are these distances based on?

a measurement (an odometer reading, etc.)  
an estimate you are sure of  
an estimate you are not sure of

B.12. What percentage of your work commute mileage is on:

| Freeways: | Surface Streets: |
|-----------|------------------|
| 0 - 10    | 0 - 10           |
| 10 - 20   | 10 - 20          |
| 20 - 40   | 20 - 40          |
| 40 - 60   | 40 - 60          |
| 60 - 80   | 60 - 80          |
| 80 - 100% | 80 - 100%        |

B.13. How much money do you think you spend on commuting to and from work each week?

|   |   |   |     |
|---|---|---|-----|
| 0 | 0 | 0 | .00 |
| 1 | 1 | 1 |     |
| 2 | 2 | 2 |     |
| 3 | 3 | 3 |     |
| 4 | 4 | 4 |     |
| 5 | 5 | 5 |     |
| 6 | 6 | 6 |     |
| 7 | 7 | 7 |     |
| 8 | 8 | 8 |     |
| 9 | 9 | 9 |     |

B.14. Was last week a typical work week for commuting?

Yes  
No

B.15. If you had to start getting to work by a different means than you use now, which would be your most likely choice?

Drive Alone  
Car/Van Pool  
Public Transit  
Bicycle  
Walk  
Other \_\_\_\_\_

B.16. What do you think would be the difference in the length of time in your normal commute from home to work using this alternative?

20 min. less                      11 - 19 min. more  
11 - 19 min. less                20 - 30 min. more  
1 - 10 min. less                 31 - 60 min. more  
The same                         >60 min. more  
1 - 10 min. more

B.17. In your commute to work, how frequently do you make stops (e.g., at day care, schools, restaurants, gas stations, other personal business stops)?

Always  
Not always, but a lot of times  
Sometimes  
Sometimes, but rarely  
Seldom, if ever  
Please describe your typical stops: \_\_\_\_\_

B.18. In your commute home, how frequently do you make stops?

Always  
Not always, but a lot of times  
Sometimes  
Sometimes, but rarely  
Seldom, if ever  
Please describe your typical stops: \_\_\_\_\_

If you usually drive alone or car pool to work, please answer the following questions. If not, please go to question B.25.

**B.19. How much of a problem is finding a close, convenient parking space?**

No problem 1 2 3 4 5 Large problem

**B.20. Do you have an available parking space at work?**

Yes  
No

**B.21. Do you pay for your parking space?**

Yes  
No

**B.22. If so, how much do you pay per month? (in \$)**

|   |   |   |     |
|---|---|---|-----|
| 0 | 0 | 0 | .00 |
| 1 | 1 | 1 |     |
| 2 | 2 | 2 |     |
| 3 | 3 | 3 |     |
| 4 | 4 | 4 |     |
| 5 | 5 | 5 |     |
| 6 | 6 | 6 |     |
| 7 | 7 | 7 |     |
| 8 | 8 | 8 |     |
| 9 | 9 | 9 |     |

**B.23. Does your employer pay any portion of the parking cost?**

Yes  
No

**B.24. Is so, how much?**

1 - 25% 51 - 75%  
26 - 50% 76 - 100%

**B.25. How satisfied are you with your commute to and from work?**

Very satisfied 1 2 3 4 5 Very dissatisfied

**B.26. a. How many motor vehicles do you have at home?**

0 3  
1 4  
2 5 or more

**b. For each of your vehicles, please list how old it is (in years):**

|               |     |     |     |     |      |  |  |  |                |
|---------------|-----|-----|-----|-----|------|--|--|--|----------------|
|               |     |     |     |     |      |  |  |  |                |
|               |     |     |     |     |      |  |  |  | Which is your  |
|               |     |     |     |     |      |  |  |  | Over main work |
|               |     |     |     |     |      |  |  |  | 10 commute     |
|               |     | 0-3 | 3-5 | 5-7 | 7-10 |  |  |  | yrs. vehicle?  |
| Vehicle One   | ... |     |     |     |      |  |  |  |                |
| Vehicle Two   | ... |     |     |     |      |  |  |  |                |
| Vehicle Three | ... |     |     |     |      |  |  |  |                |
| Vehicle Four  | ... |     |     |     |      |  |  |  |                |

**B.27. Approximately how long do you think it would take you to walk from your home to the nearest bus stop you could use to get to work?**

0 - 5 11 - 20  
6 - 10 >20 minutes

**B.28. Approximately how long would it take you to walk from your office to the bus stop nearest your office?**

0 - 5 11 - 20  
6 - 10 >20 minutes

**YOUR ORGANIZATION'S PROGRAM**

**C.1. The Commute Trip Reduction Law sets a goal of reducing drive-alone vehicles for each employer by 35 percent below current levels by 1999. What do you think should be the goal amount (fill in one)?**

0% 40%  
10% 50%  
20% 60%  
30% 70% or more  
35%

Transportation demand management (TDM) programs include incentives (and disincentives) to encourage employees to not drive alone to work. They typically include bus fare subsidies, van pools, carpools, ride-matching, preferential carpool parking, parking charges for drive-alone vehicles, etc.

**C.2. How satisfied are you with the concept of TDM programs as a way to improve regional:**

|                    |                |                   |
|--------------------|----------------|-------------------|
|                    | Very satisfied | Very dissatisfied |
| Air quality        | 1 2 3 4 5      | 1 2 3 4 5         |
| Traffic congestion | 1 2 3 4 5      | 1 2 3 4 5         |

**C.3. In your opinion, who do you think benefits the most from a TDM program?**

Employers Employees Society

**C.4. In your opinion, who do you think pays the most for a TDM program?**

Employers Employees Society

**C.5. Are you aware of your organization's existing TDM program?**

Yes No

If you are aware of your organizations programs, please answer the following questions. If not, please go to question C.8.

**C.6. How did you first hear about it?**

New employee orientation  
From my supervisor  
From a co-worker  
From newsletter/brochure  
From program coordinator  
Other \_\_\_\_\_

**C.7. How satisfied are you with your employer's TDM program?**

Very satisfied 1 2 3 4 5 Very dissatisfied

**C.8. Do you believe that most employees in the organization know about the TDM program?**

Yes No

If no, why not? \_\_\_\_\_  
\_\_\_\_\_

**C.9. What could the organization do to improve communications about its TDM program?**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

DO NOT WRITE IN THIS AREA



Strongly oppose  
Moderately oppose  
Neither support nor oppose  
Moderately support  
Strongly support

- D.20. Restricting commercial truck traffic during morning and evening commute periods ..... 1 2 3 4 5
- D.21. More dedicated bicycle paths and facilities ..... 1 2 3 4 5
- D.22. More dedicated pedestrian amenities ..... 1 2 3 4 5

Please use the following scale to answer questions D.23 through D.25.

Very dissatisfied  
Somewhat dissatisfied  
Neither satisfied nor dissatisfied  
Somewhat satisfied  
Very satisfied

- How satisfied are you with:
- D.23. Your ability to get to and from other places (non-commute trips)? ..... 1 2 3 4 5
- D.24. The region's carpool lanes? ..... 1 2 3 4 5
- D.25. Your local public transit system? ..... 1 2 3 4 5
- D.26. The Puget Sound region's public transit system overall? ..... 1 2 3 4 5

**YOURSELF** [REDACTED]

E.1. What year were you born?

|    |   |   |
|----|---|---|
| 19 |   |   |
|    | 0 | 0 |
|    | 1 | 1 |
|    | 2 | 2 |
|    | 3 | 3 |
|    | 4 | 4 |
|    | 5 | 5 |
|    | 6 | 6 |
|    | 7 | 7 |
|    | 8 | 8 |
|    | 9 | 9 |

E.2. Gender  
Male \_\_\_\_\_ Female \_\_\_\_\_

E.3. Primary Ethnicity (select one)  
Asian \_\_\_\_\_  
Pacific Islander \_\_\_\_\_  
Native American \_\_\_\_\_  
African American (not of Hispanic origin) \_\_\_\_\_  
White (not of Hispanic origin) \_\_\_\_\_  
Hispanic \_\_\_\_\_  
Other \_\_\_\_\_

E.4. Marital Status (select one)  
Single \_\_\_\_\_  
Married \_\_\_\_\_  
Divorced \_\_\_\_\_

E.5. Number of children living at home?

| Age    | Number of Children |   |   |    |
|--------|--------------------|---|---|----|
| 0 - 5  | 0                  | 1 | 2 | 3+ |
| 6 - 15 | 0                  | 1 | 2 | 3+ |
| 16+    | 0                  | 1 | 2 | 3+ |

E.6. How many licensed drivers live at your home?  
0 \_\_\_\_\_  
1 \_\_\_\_\_  
2 \_\_\_\_\_  
3 \_\_\_\_\_  
4+ \_\_\_\_\_

E.7. How many family members living at home are employed?

| Hours/Week | Number of Family Members |   |   |    |
|------------|--------------------------|---|---|----|
| 1 - 20     | 0                        | 1 | 2 | 3+ |
| 21 - 35    | 0                        | 1 | 2 | 3+ |
| ≥36        | 0                        | 1 | 2 | 3+ |

E.8. What is your average annual household gross income (rounded to the nearest \$1,000)?  
11 - 30,000 \_\_\_\_\_  
31 - 50,000 \_\_\_\_\_  
51 - 70,000 \_\_\_\_\_  
71 - 90,000 \_\_\_\_\_  
>91,000 \_\_\_\_\_

E.9. What is your home zipcode?

|   |   |   |   |   |   |
|---|---|---|---|---|---|
|   |   |   |   |   |   |
| 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1 | 1 | 1 | 1 | 1 |
| 2 | 2 | 2 | 2 | 2 | 2 |
| 3 | 3 | 3 | 3 | 3 | 3 |
| 4 | 4 | 4 | 4 | 4 | 4 |
| 5 | 5 | 5 | 5 | 5 | 5 |
| 6 | 6 | 6 | 6 | 6 | 6 |
| 7 | 7 | 7 | 7 | 7 | 7 |
| 8 | 8 | 8 | 8 | 8 | 8 |
| 9 | 9 | 9 | 9 | 9 | 9 |

**NOW, PLEASE COMPLETE SECTION TWO**

**SECTION TWO**

We would like to know your feelings about a number of issues relating to:

**YOUR ORGANIZATION**

|  | Strongly disagree | Somewhat disagree | Neither agree nor disagree | Somewhat agree | Strongly agree |  |  | Strongly disagree | Somewhat disagree | Neither agree nor disagree | Somewhat agree | Strongly agree |
|--|-------------------|-------------------|----------------------------|----------------|----------------|--|--|-------------------|-------------------|----------------------------|----------------|----------------|
| A.1. This organization is quick to use improved work methods   | 1                 | 2                 | 3                          | 4              | 5              |  | A.16. My job lets me use my skills and abilities—lets me do the things I do best                         | 1                 | 2                 | 3                          | 4              | 5              |
| A.2. Decisions are made at the levels where the most adequate and accurate information is available            | 1                 | 2                 | 3                          | 4              | 5              |  | A.17. I am usually clear about what people expect me to do on my job                                     | 1                 | 2                 | 3                          | 4              | 5              |
| A.3. My work group gets adequate information about what is going on throughout the organization                | 1                 | 2                 | 3                          | 4              | 5              |  | A.18. My immediate supervisor is friendly and easy to approach   | 1                 | 2                 | 3                          | 4              | 5              |
| A.4. The organization has a real interest in the welfare and overall satisfaction of those who work here       | 1                 | 2                 | 3                          | 4              | 5              |  | A.19. My immediate supervisor encourages people who work in the group to work as a team                  | 1                 | 2                 | 3                          | 4              | 5              |
| A.5. The organization tries hard to improve working conditions   | 1                 | 2                 | 3                          | 4              | 5              |  | A.20. My immediate supervisor encourages people who work in the group to exchange ideas and opinions     | 1                 | 2                 | 3                          | 4              | 5              |
| A.6. The organization truly cares about quality of life issues such as congestion and air pollution            | 1                 | 2                 | 3                          | 4              | 5              |  | A.21. My immediate supervisor encourages people to give their best effort                                | 1                 | 2                 | 3                          | 4              | 5              |
| A.7. The organization truly cares about me and my problems in commuting to work each day                       | 1                 | 2                 | 3                          | 4              | 5              |  | A.22. The people in my work group are friendly and easy to approach                                      | 1                 | 2                 | 3                          | 4              | 5              |
| A.8. The employees affected by decisions are asked for their ideas   | 1                 | 2                 | 3                          | 4              | 5              |  | A.23. People in my work group encourage each other to work as a team                                     | 1                 | 2                 | 3                          | 4              | 5              |
| A.9. Employees who make decisions have access to the information they need from all levels of the organization | 1                 | 2                 | 3                          | 4              | 5              |  | A.24. People in my group emphasize team, not individual, goals   | 1                 | 2                 | 3                          | 4              | 5              |
| A.10. I have been asked for input on how to improve my own or other workers' daily commute to work             | 1                 | 2                 | 3                          | 4              | 5              |  | A.25. People in my work group help me find better ways to do a better job                                | 1                 | 2                 | 3                          | 4              | 5              |
| A.11. When I or others have been asked for input, my/their ideas have been used                                | 1                 | 2                 | 3                          | 4              | 5              |  | A.26. People in my work group provide the information or help I need so that I can plan ahead            | 1                 | 2                 | 3                          | 4              | 5              |
| A.12. First-line supervisors have influence on what goes on in my department                                   | 1                 | 2                 | 3                          | 4              | 5              |  | A.27. People in my work group offer new ideas for solving job-related problems                           | 1                 | 2                 | 3                          | 4              | 5              |
| A.13. I have to go through a lot of "red tape" to get things done  | 1                 | 2                 | 3                          | 4              | 5              |  | A.28. Overall, I am satisfied with my job  | 1                 | 2                 | 3                          | 4              | 5              |
| A.14. Different departments plan together and coordinate their efforts   | 1                 | 2                 | 3                          | 4              | 5              |  | A.29. Overall, I am satisfied with this organization   | 1                 | 2                 | 3                          | 4              | 5              |
| A.15. I enjoy performing the day-to-day activities that make up my job   | 1                 | 2                 | 3                          | 4              | 5              |  | A.30. This organization is effective in getting me to meet its needs and contribute to its effectiveness | 1                 | 2                 | 3                          | 4              | 5              |
|  |                   |                   |                            |                |                |  | A.31. This organization does a good job of meeting my needs as an individual                             | 1                 | 2                 | 3                          | 4              | 5              |



DO NOT WRITE IN THIS AREA

**YOUR ORGANIZATION'S PROGRAM**

- |  |  |
|--|--|
|  | Strongly disagree<br>Somewhat disagree<br>Neither agree nor disagree<br>Somewhat agree<br>Strongly agree |
|--|--|
- B.1. I am aware of my organization's Transportation Demand Management (TDM) program to support employees in getting to work in a mode other than driving alone (single occupant vehicle) ..... 1 2 3 4 5
  - B.2. My organization's TDM program is well known to most employees ..... 1 2 3 4 5
  - B.3. Efforts to manage my commuting behavior come mainly from my direct supervisor ..... 1 2 3 4 5
  - B.4. Efforts to manage my commuting behavior come mainly from middle managers ..... 1 2 3 4 5
  - B.5. Efforts to manage my commuting behavior come mainly from top management ..... 1 2 3 4 5
  - B.6. When I need specific information or other TDM materials, they are easy to find and obtain ..... 1 2 3 4 5
  - B.7. All of the people/departments that should coordinate their efforts to maximize the organization's TDM efforts are doing so ..... 1 2 3 4 5
  - B.8. My current commute detracts from my ability to perform at my best by the time I get to work ..... 1 2 3 4 5
  - B.9. I am clear about what I am expected to do in commuting to work each day ..... 1 2 3 4 5
  - B.10. My commuting needs are adequately considered and supported by my immediate supervisor ..... 1 2 3 4 5
  - B.11. My commuting needs are adequately considered and supported by my organization ..... 1 2 3 4 5
  - B.12. My immediate supervisor supports TDM efforts by employees ..... 1 2 3 4 5
  - B.13. My immediate supervisor personally supports TDM efforts through her/his own commuting behavior ..... 1 2 3 4 5
  - B.14. Upper management personally supports TDM efforts through their own commuting behavior ..... 1 2 3 4 5
  - B.15. People in my work group support TDM efforts by other employees ..... 1 2 3 4 5

- |  |  |
|--|--|
|  | Strongly disagree<br>Somewhat disagree<br>Neither agree nor disagree<br>Somewhat agree<br>Strongly agree |
|--|--|
- B.16. People in my work group personally support TDM efforts through their own commuting behavior ..... 1 2 3 4 5
  - B.17. People in my work group support each other's commuting needs through personal efforts such as carpooling or ride sharing ..... 1 2 3 4 5
  - B.18. I have regularly seen my immediate supervisor carpooling or otherwise using alternatives to driving to work alone ..... 1 2 3 4 5
  - B.19. I have regularly seen or heard of upper managers in my organization carpooling or otherwise using alternatives to driving to work alone ..... 1 2 3 4 5
  - B.20. In my organization, first-line supervisors usually commute by driving alone to work each day ..... 1 2 3 4 5
  - B.21. In my organization, upper managers usually commute by driving alone to work each day ..... 1 2 3 4 5
  - B.22. In my organization, my peers and I are expected not to commute to work each day by driving alone ..... 1 2 3 4 5
  - B.23. Overall, I am satisfied with the efforts taken by this organization to help me in commuting to work each day ..... 1 2 3 4 5
  - B.24. Overall, I am satisfied with the efforts taken by outside agencies (such as public transit) to help me in commuting to work each day ..... 1 2 3 4 5
  - B.25. My immediate supervisor places emphasis on my not driving alone ..... 1 2 3 4 5
  - B.26. Upper management places emphasis on my not driving alone ..... 1 2 3 4 5
  - B.27. This organization's "on paper" goals for how I commute to work each day are the same as its "real" goals ..... 1 2 3 4 5
  - B.28. This organization's goals for TDM behavior (carpooling, transit use, etc.) apply to all workers fairly and evenly, not just to those at the lower ends of the organization ..... 1 2 3 4 5
  - B.29. This organization's goals for TDM behavior (carpooling, transit use, etc.) are effective in getting people not to drive to work alone ..... 1 2 3 4 5

**SECTION THREE**

Please take a few minutes to tell us in more detail what you think about the following:

1. For most of the people you know who are currently driving alone, what would it really take to get them to not drive to work alone?

---

---

2. If you are currently driving alone, what would it really take to get you to not drive to work alone?

---

---

3. If applicable, when, how, and which employees does this organization reward for driving alone to work each day?

---

---

4. What is the best thing (if any) that your immediate supervisor is currently doing to help you have the best possible work commute each day?

---

---

5. What is the one thing (if any) your immediate supervisor is currently doing that prevents you from having the best possible work commute each day?

---

---

6. What is the best thing (if any) that your organization is doing to help you have the best possible work commute each day?

---

---

7. What is the one thing (if any) your organization is doing that prevents you from having the best possible work commute each day?

---

---

8. What is the best thing (if any) that outside agencies (such as public transit) are doing to help you have the best possible work commute each day?

---

---

9. What is the one thing (if any) that outside agencies (such as public transit) are doing that prevents you from having the best possible work commute each day?

---

---

10. What can your organization do to reduce the number of drive alone vehicles?

---

---

11. What can your organization do to improve your commute?

---

---

|                          |                           |
|--------------------------|---------------------------|
| <input type="checkbox"/> | DO NOT WRITE IN THIS AREA |
|--------------------------|---------------------------|

**APPENDIX B**

**EMPLOYEE INTERVIEW GUIDELINES**



## INTERVIEW GUIDES

In general, all questions asked of the ETC, supervisors, and senior management are the same. What changes between the interviews is the primary focus or, the area of importance. It is expected that the ETC will be the primary source for information on the history of the program. For the supervisors, questions have a dual nature of both organization wide and specific to their work group. Senior management can speak to the official position of the firms.

All responses are totally confidential and will not be reported individually to the organization.

### INTERVIEW WITH:

#### Program Questions for ETC's/1st-Line Supervisors/Executives

"To the best of your knowledge.."

#### A. Project initiation

1. How and when did the TDM program get started?

**RESPONSE:**

2. Who initiated it and why? (e.g. status, prestige, environmental concerns, outside pressure)

**RESPONSE:**

3. What, if any, is the relationship between the organizations TDM program and the CTR law (or other local CTR laws)? (Influences, origins, etc?)

**RESPONSE:**

#### B. Components, Goals [Current program emphasis]

4. Could you briefly describe the organization's TDM program.

- \* What does it involve?
- \* Who is involved in carrying it out?
- \* What resources do you receive to carry it out? (yearly budget, determined how, by who?)
- \* Has it always been run/organized/staffed in this way?

**RESPONSE:**

5. What were the program's original goals? (Generally and specifically, what was it intended to accomplish?)

- \* How specific do you think the programs' goals were in the beginning?
- \* How and by whom were the programs' accomplishments measured?
- \* What data do you have on the programs' effectiveness to date?

**RESPONSE:**

6. For each of the specific components of the TDM program, how do they work and why would/do they have the desired impact on employees' commuting behavior?

**RESPONSE:**

Any of these questions could lead to issues and questions from implementation section D

**C. Project Planning, Mobilization of Support**

7. What activities went into getting the project underway?
- \* For example, what kind of planning, if any, was involved? By whom?
  - \* What training was provided to who, by who? When? What were they designed to accomplish?

**RESPONSE:**

8. What support or cooperation did you need to get the program going?
- \* e.g. middle managers, supervisors, employees?
  - \* Did you feel the program got adequate support from all groups?

**RESPONSE:**

9. Did anyone assess the programs' likely effects on other activities in the organization? (Who? What were they?)

**RESPONSE:**

10. Is there anything you think should have been done differently at the beginning of the program? (What? Why?)

**RESPONSE:**

**D. Project Implementation**

11. How difficult has this program been to implement?
- \* What kinds of problems did you encounter?
  - \* Why?

**RESPONSE:**

12. Would you say that this program has changed at all over time--either in its' goals or the kinds of activities or people involved? (Why? What led to the changes?)

**RESPONSE:**

13. When changes were made in the program, how did they get decided?
- \* Who participated in decisions regarding changes in the program? How were they made?

**RESPONSE:**

14. Do you feel you have enough authority to make needed changes/supervise the program? (Why/why not?)

**RESPONSE:**

15. Do you feel that you have sufficient resources to implement the program effectively? (Why/why not?)

**RESPONSE:**

16. How would you rate the senior level program manager, first line supervisors', employees', commitment to the program at the beginning--generally enthusiastic, neutral, or opposed? Why?

- \* How do you think they feel now?
- \* What accounts for the change?

**RESPONSE:**

17. How do you normally commute to work each day?

**RESPONSE:**

18. How would you characterize the CEO's support for the program?

- \* Does he/she take an active interest? (Why/why not?)
- \* How do they normally commute?
- \* Do you think they genuinely support the program, are indifferent to the program, or genuinely don't support it? (Why?)
- \* What do you think are their personal goals for the program?

**RESPONSE:**

E. Program Outcomes - Work Groups

Looking at the individual employees and employee work groups, what (if any) have been the impacts of the TDM/CTR program on:

19. Individual's time management abilities

**RESPONSE:**

20. Employee's Absenteeism and attendance

**RESPONSE:**

21. Employee moral

**RESPONSE:**

22. Employee recruitment and retention

**RESPONSE:**

23. Work scheduling and productivity

**RESPONSE:**

24. Departmental budgetary matters

**RESPONSE:**

25. What changes have occurred in supervisors in terms of processes and attitudes due to TDM/CTR and issues of commuting?

**RESPONSE:**

26. How are supervisors monitored and evaluated on their efforts to increase MOV behavior and how are they rewarded for successful improvements?

**RESPONSE:**

**F. Program Outcomes - Organization**

27. Overall, when you take into account the goals the program started with and the resources it had, how successful would you say it has been so far--very successful, moderately successful, not at all successful?

- \* What factors do you think have contributed to its failure/success?
- \* How would you compare it with other TDM programs in the region?

**RESPONSE:**

28. Specifically, what do you think the program has achieved?

- \* Has it altered employee/management behaviors in any way?
- \* Has it altered employee/management attitudes in any way?
- \* Are employees aware of the program and its' efforts?

**RESPONSE:**

29. Is TDM/MOV behavior (carpooling etc..) behavior an acceptable part of the organizational culture? Why/why not?

**RESPONSE:**

30. Do you think support for this program will increase/decrease/stay the same in the future? (Why?)

**RESPONSE:**

31. What changes do you foresee in the future? (Why?)

**RESPONSE:**

32. If the organization had it to do over, what would they change about the program, its resources, implementation, goals..?

**RESPONSE:**

33. If the organization were free to choose without governmental intervention or pressure, would they choose to have a TDM program or not? (Why?)

**RESPONSE:**

**APPENDIX C**

**BEHAVIORAL CHANGE STRATEGIES**



### Behavioral Change Matrix

| Focus/ Type           | Informational/ Educational (IE)  | Incentive/ Motivational (IM)   | Disincentive/ Controlling (DC)   |
|-----------------------|--|--|--|
| Internal/ Self        | <ul style="list-style-type: none"> <li>• Direct experience</li> <li>• Personal insight</li> <li>• Self-monitored feedback</li> </ul>   | <ul style="list-style-type: none"> <li>• Intrinsic satisfactions</li> <li>• Sense of competence</li> <li>• Sense of confidence</li> <li>• Commitment to goal attainment</li> </ul> | <ul style="list-style-type: none"> <li>• Sense of guilt</li> <li>• Sense of remorse</li> </ul>                                   |
| External/ Environment | <ul style="list-style-type: none"> <li>• Declarative knowledge</li> <li>• Procedural knowledge</li> <li>• Feedback, Informational Modeling</li> <li>• Prompting (Media)</li> </ul> | <ul style="list-style-type: none"> <li>• Material incentives/ rewards</li> <li>• Social supports, modeling</li> </ul>  | <ul style="list-style-type: none"> <li>• Material disincentives</li> <li>• Legal mandates</li> <li>• Social pressures</li> </ul> |

## Behavioral Change Strategies

|                                   | Goals   | Assumptions  | Methods  |
|-----------------------------------|---|--|--|
| Information/<br>Educational (IE)  | <ul style="list-style-type: none"> <li>• Understand nature of problem</li> <li>• Learn needed behavioral changes required to solve problem</li> <li>• Learn steps required to carry out new behavior</li> </ul> | Once people understand problem and what is needed, they will change their behaviors as needed  | <ul style="list-style-type: none"> <li>• Education and modeling of needed changes</li> <li>• Self-discovery of needs leading to a change in behaviors</li> <li>• Direct experiences such as field exercises and trial periods</li> </ul> |
| Incentive/ Motivational (IM)      | People's attention must be drawn to current behaviors while showing them the link between behavioral change and tangible or intangible rewards/gains  | Behavioral theory of positive feedback—there is an increase in the likelihood a behavior will recur if a reward is provided as a consequence of the behavior | <ul style="list-style-type: none"> <li>• Tangible: Money, publicity...</li> <li>• Intangible: Social reinforcement, duty, commitment, self-esteem, duty...</li> </ul>  |
| Disincentive/<br>Controlling (DC) | Constrain people's choices either perceptually or physically to limit their behaviors to those desired  | Behavioral theory of negative feedback—decrease in likelihood behavior will recur if punishment is provided as consequence of behavior                       | <ul style="list-style-type: none"> <li>• Tangible: Monetary (taxes, fines)</li> <li>• Intangible: Social (norms, peer pressure), fear (ad campaigns), guilt...</li> </ul>  |

### Appraisal of Behavioral Change Strategies

|                         | Prompts   | Material Incentives | Social Pressure | Material Disincentives | Commitment |
|-------------------------|-----------|---------------------|-----------------|------------------------|------------|
| Dependability           | -         | +                   | Mixed           | Mixed                  | High       |
| Pace of Change          | Immediate | Rapid               | Moderate        | Rapid                  | Moderate   |
| Generalization to Self  | ∅         | Low                 | Moderate        | Moderate               | Moderate   |
| Generalization to Other | ∅         | High                | ∅               | High                   | Moderate   |
| Persistence             | ∅         | Very low            | Moderate        | Low                    | High       |
| Universality            | Moderate  | High                | Mixed           | Mixed                  | High       |
| Focus of Control        | External  | External            | External        | External               | Internal   |