TELECOMMUNICATIONS AND ALTERNATIVE WORK SCHEDULES: OPTIONS FOR MANAGING TRANSIT TRAVEL DEMAND*

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ABSTRACT

Transit agencies are currently facing a multitude of problems including declining ridership, reduced government subsidies and increased operating costs. Rather than focus exclusively on investments and options that change the characteristics of transportation system supply, agencies can explore the use of options that change the characteristics of the travel market, then trim service to accommodate the resulting, more efficient, demand patterns. The effects of two demand management options, alternative work schedules and telecommunications systems, are described from the perspective of travel, employer, employee and societal impacts. Recommendations for collaboration between the public and private sector are proposed to stimulate and guide the use of these options.

BIO-SKETCH

Paul P. Jovanis is Assistant Professor of Civil Engineering and Transportation at Northwestern University. His research interests are in the areas of traffic engineering and control and the role of the private sector in urban transportation issues. He has published articles in professional journals dealing with the travel impacts of flexible work hours, models of work schedule choice, and low cost methods for achieving greater productivity from existing streets and highways.

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BACKGROUND

The urban landscape is a constantly changing environment. Skyscrapers and high-rise offices seem to be constantly torn down and built up. In suburban areas, large tracts of underutilized land seem to suddenly become leveled subdivisions of neatly spaced homes. These highly visible changes in the urban scene shape the needs for commute travel as well as the patterns of other travel needs such as shopping, personal business and recreation. In addition to these visible, physical changes, there is another set of less obvious changes, occurring largely in the workplace, that can have enormous effects on travel demand and travel markets. Some of the changes, such as flex-time and staggered work hours, directly influence the time patterns of travel, while other changes, such as the increasing use of telecommunications systems, may alter our fundamental need to travel.

Why are transportation professionals concerned about changes that occur at the workplace? The answer is clear: most urban transportation investments have been dictated in the past by the concern for the journey to work--providing transportation systems that are properly located and of sufficient capacity to move the urban workforce to and from their jobs. Make no mistake, we are paying a heavy price for this need to provide large transportation services during two narrow periods of the day. Miles of lanes of highways that are full in the a.m. and p.m. rush hours are underutilized throughout the day. Hundreds of transit vehicles needed to move employees to and from work sit idle during the

remainder of the day (and weekends). It is clear that concern for work travel has driven much of our urban transportation investment in the past. Likely changes in work travel patterns during the next 5-10 should alter our priorities for investment in the future.

While these workplace changes are evolving due to economic and social forces, transportation professionals should view these changes as options for altering or reshaping the demand for travel. Alternative work schedules and telecommunications systems could reduce the need to provide rush hour peak capacity; transit agencies could thus reduce operating costs by reducing service when peak demand spreads. Agencies, in the long run, may be able to reduce capital expenditures due to a need to supply fewer vehicles. We argue that transit agencies should view these and other tactics as ways to manage their costs. The remainder of the paper discusses other actors in the process and describes how two specific demand management options, alternative work schedules and telecommunications, affect employers, employees and society.

Table 1 briefly describes the characteristics of four different types of alternative work schedules: flexible work hours (flextime), staggered work hours, four day work week, job sharing/part-time work. Employees with flexible work hours actually choose their own work schedule, with some constraints, and are generally allowed some variance in their schedules day to day; employees with staggered hours are assigned schedules by management and may not vary day-to-day; the four day work week eliminates the need to work a fifth day at the expense of extending the work day from 8 to 10 hours; job sharing/part-time work involve working less than 40 hours per week, usually 20 hours.

The second major force in the workplace is the rapidly expanding use of a variety of telecommunication systems that offer the opportunity for human interaction without face-to-face contact (see Table 2). The most common telecommunication system in use today is the telephone; however, its normal use, to connect only two parties via an audio link, is rapidly changing. Telephone conference calls can be arranged to link individuals in diverse locations for an audio "conference". Systems exist to enhance the spoken communication with written material transmitted electronically (called facsimile communication). Finally, the most advanced telecommunication systems are the video systems available through American Bell as well as private companies. The video systems require closed circuit TV cameras and projection screens along with audio communications equipment. The effects of these systems on urban transit and travel patterns is explored in the next section of this paper, what is important to bear in mind is that the new telecommunications systems, born of technological advances in microelectronics, offer businesses the opportunity to alter the way they view travel for communication purposes.

Perhaps after this brief introduction to the primary topics of concern for this paper, it is best to step back a moment and briefly review what is meant by travel demand and discuss how we propose to manage it. Figure 1 is an overview of some of the factors that shape the needs for urban travel and result in the patterns of travel that we observe. A set of socio-economic, household, workplace, and transportation system factors interact and result in a set of transportation choices which include the choice of time, mode, route, frequency, and

destination of travel. Changes in any of the factors may change one or more of the travel choices.

For years, transportation professionals have been studying travel demand in an attempt to identify policies that can change the demand for travel in positive ways. Some of the factors shaping travel demand, such as changes in national employment and demographic patterns, are not easily influenced by regional scale policies. Others, including supply characteristics and some workplace characteristics may be influenced by regional public and private sector policies.

Figure 2 reviews some of the policies, or options, available to modify the nature or character of travel demand. Many of the pricing, modal and operations management options attempt to influence the choice of mode of travel. Incentives in the form of cost or time savings are offered for more "efficient" modes such as bus, train or carpool, while no incentive is offered for driving alone. Most of these options have been studied during the past five to ten years as part of an overall effort of transportation system management (Roark, 1981; Jones, 1977b; Gakenheimer and Meyer, 1977); one important attribute that they share is that they are perceived as transportation options, advocated for transportation-related reasons by transportation entities.

Adjustments in work schedule and changes in workplace communications technology may be advocated for reasons far removed from transportation by other than transportation entities. Companies may view alternative work schedules as a means to allow employees to better match work needs and demands of home life (Owen, 1979) Telecommunications systems may be viewed as tools that improve the quality and quantity of work

output. From our perspective of identifying policies to influence and manage the use of these tactics, we must be cognizant that their driving forces may lie well outside of transportation. For this reason we seek to identify a broad mix of actors, from both within and outside the transportation community. Since policies will be implemented for non-transportation objectives, it is only reasonable that we place these concerns "up front", to deal with them directly.

Transit agencies are facing numerous threats to their viability. Our urban areas continue to disperse making it more difficult to economically serve a region's travel needs with fixed rail or conventional bus service. Government subsidies for capital acquisition and operating expenses are likely to be increasingly hard to obtain resulting in continued upward pressure on fares (Schofer, 1982). It is our view that transit agencies and public officials must view alternative work schedules, telecommunication systems, and other workplace changes as options that offer the opportunity to reduce operating deficits. The transit operators must understand that they can use these tactics to reshape their systems to operate at lower costs or they face the future of an industry with an increasingly declining market--possible extinction (Schofer, 1982).

TRAVEL IMPACTS OF ALTERNATIVE WORK SCHEDULES AND TELECOMMUNICATIONS SYSTEMS

ALTERNATIVE WORK SCHEDULES

If we focus on the travel choices listed in Figure 1 we can identify which travel decisions are likely to be affected by alternative work schedules. Since the work schedules shift the employee's start and finish times to the offpeak, they clearly directly affect the time of travel. Mode choice may also be affected. The attributes of different modes may change radically during the offpeak. Referring again to Figure 1, travel time by auto would generally decrease during the offpeak while travel time by bus may increase because of the increased waiting times brought about by less frequent offpeak service. Service reliability for transit is likely to improve substantially in the offpeak due to reduced congestion. Travellers perceiving these changes in modal attributes may choose to alter their time and mode of travel.

While transit agencies are primarily concerned about employees leaving transit for carpools or driving alone, they must recognize that these possible mode changes are linked to time shifts as well. For example, a transit rider may want to commute to work early in the morning: he now considers the availability of transit service at this time, as well as auto travel characteristics. If he previously used an express service that is not available during the early AM commute, he must consider a shift to conventional transit or change mode.

A number of recent studies have examined mode changes that have occurred with alternative work schedules (Jovanis, 1981b; Atherton, 1982). Many have tried to link mode changes that occurred with attributes of the work schedule choices to obtain insights into why mode changes occurred.

Findings from San Francisco (Jovanis, 1979b; Jovanis, 1981b), Seattle (Jones, 1982b), and Cambridge (Ott et al., 1980) indicate that flexible work hours do not have an adverse impact on transit ridership--in fact, ridership increased marginally in San Francisco and Seattle among workers with flex-time privileges. The San Francisco and Seattle studies used questionnaires to determine why people made their mode choices. Employees consistently responded that flex-time allowed them to deal more effectively with transit reliability problems (they would not be "late" for work with flex-time) and to travel in the off-peak when seats were more readily available. Shifts to transit from ride-sharing and driving alone occurred most often for individuals from lower income households who used flex-time to rearrange their household, work and travel needs to accommodate transit.

Interestingly, employees were able to reduce their commuting time by as much as 30 minutes by shifting from peak period auto travel to offpeak transit travel. These individuals would probably have achieved comparable savings by remaining in their auto, but the service-related changes in transit (seat availability, improved reliability, reduced fear of being late) was a sufficient inducement for them to shift to transit.

Some riders did leave transit to join carpools and vanpools, again generally choosing to use the new mode during the offpeak. Very few riders shifted from transit to driving alone; in fact, the number of employees who shifted to transit from driving alone always greatly exceeded the number who shifted to drive alone from transit. These results should help alleviate the fears of some transit advocates who argue that flexible work hours are incompatible with increasing transit ridership.

Staggered work hours studies have revealed virtually no change in mode choice after staggered hours implementation. However, studies in Ottowa (Safavian and McLean, 1975), Toronto (Greenberg and Wright, 1975) and New York City (Port Authority of New York, 1977) have indicated significant changes in peak demands at transit terminals (particularly subway stations). Demands in the peak 15 minutes decreased by 10-20 percent, resulting in much more comfortable commute conditions for those who changed their time of travel as well as those who did not. Transit service can be altered in response to these new travel demands, giving operators the potential for reducing capital and operating expenses.

If large enough numbers of workers have flexible or staggered work hour privileges transit agencies can level service and thus reduce personnel and equipment needs. The GAO, in a recent report of the cost impacts of leveling transit service through alternative work schedules (General Accounting Office, 1983), estimated possible capital cost savings of $4M to $44M over a ten year period and annual labor cost savings of $400,000 for just six transit routes in Philadelphia and Pittsburgh.

The four day work week presents two-fold problems to transit operators: the loss of one day (and revenue) of work trip travel and the spread of the time of travel due to a 10 hour work day. A detailed study of the travel impacts of compressed work schedules in Denver (Atherton et al., 1982) revealed virtually no loss in mode share among compressed work week participants. While the transit operator did receive less revenue from these riders, it was observed that the compressed work week participants would be vacating transit seats during time of crush load conditions on transit vehicles. If these crush

conditions restrict transit ridership then these vacant seats can soon be filled, reducing the loss in revenue. Again, research findings support the conclusion that ridership levels are marginally affected while there remains the potential for cost savings due to peak spreading.

Virtually no in-depth research has been conducted regarding the travel needs of part-time workers and those sharing jobs. One can speculate that peak transit needs may not be substantially affected but it is clear that some off-peak service is needed if the employee works less than an 8 hour work day. If the part-time employee works a full work day for a reduced number of days during the week, few transit impacts will occur. There are no documented studies of the travel needs of these types of workers.

TELECOMMUNICATION SYSTEMS

Use of telecommunication systems affect travel patterns differently than do alternative work schedules. Telecommunications could affect the frequency of travel (number of trips) by eliminating some of the need to travel. Some systems such as audio and video telecommunications are aimed at providing alternative means to conduct business meetings. Business-related travel, either inter-regional or intra-urban are possibly affected. The systems are increasing in popularity because they reduce the out-of-pocket costs of travel as well as increase employee productivity by reducing time spent away from the workplace and eliminating the source of travel fatigue.

Telecommunications also allow some clerical and administrative workers to stay at home (i.e. "telework") and conduct job tasks via computer. A recent experiment with such a system was terminated at

Continental Bank (Corrado, 1982) because working at home did not appear efficient, although details of the experience were not discussed. Clearly, if large numbers of clerical workers are able to work at home (for a few or all days during the week) there is a strong potential for reduced commuting. To the extent that clerical workers represent lower income commuters, these reductions in commute trips may differentially impact transit ridership. If these employees can "work at home", they will ride transit less often (if at all), lowering ridership and increasing deficits if service is not adjusted.

It is important to recognize that utilization of telecommunications equipment, per se, will not result in altered patterns of travel. Employers must allow their employees to work at home rather than at the office. This is a change in management and employee relations that is brought about by a change in technology. Our current experience with teleworking is so limited that we can only speculate on its travel impacts. What is clear is that telecommunications technology can be used to increase work efficiency and effectiveness without allowing employees to work at home. While adoption of telecommunications technology in various forms appears certain, management's reaction to the work-at-home option is certainly less clear, particularly on the broad scale needed to significantly impact transit ridership.

The short term reductions in peak period commuting brought about by teleworking could marginally aid transit performance by reducing highway congestion--thus lowering bus travel times. The longer term changes in commute patterns require more attention to long term planning and investment. If telecommunication systems are used to allow a large number of commuters to telework rather than travel during the next 10 years,

then major new radial rail transit systems are in danger of being under-utilized. Again, transit operating deficits may increase if service is provided or retained at levels that are not justified by the travewl market.

In the longer term, the changes in telecommunications systems may stimulate altered location choices for businesses and households (Nilles, 1982). Corporate headquarters, located in the CBD to facilitate face-to-face meetings for executives, may have a new structure. Much of the clerical function can be moved to cheaper land outside the business district; telecommunications can be used to maintain close ties to executive needs. We may already be seeing some of this behavior in the banking industry: banks are able to open smaller satellite offices closer to their customers, linked to a central headquarters via telecommunications. These migration patterns portend a shift from radial patterns of commuting well-served by transit (particularly rail) to a more diverse pattern that is more difficult to serve efficiently with conventional services.

BEHAVIORAL IMPLICATIONS - BENEFITS AND COSTS TO EMPLOYEES, EMPLOYERS AND SOCIETY

Demand management options are not strictly transportation tactics; their benefits and costs are complex to assess and sometimes difficult to measure. Interestingly, from the perspective of the individual, travel changes may be one of the least important benefits derived from these options. Firms also tend to focus on labor, management and productivity issues, not travel commute problems. This section discusses details of the benefits and costs of demand management options--from the perspective of the employee, the employer, and society.

BENEFITS AND COSTS TO EMPLOYEES

Alternative work schedules, particularly flex-time, offer substantial benefits to individual employees. As discussed earlier, flex-time allows the individual to facilitate commuting by reducing travel time (through off peak travel) and easing coordination between work schedules and carpool or transit schedules.

Additionally, flex-time offers the overall benefit of allowing the individual to mesh office responsibilities with personal and family needs and desires. Empirical results from San Francisco (Jovanis, 1979) suggest that employees use flex-time to adjust work schedules to spend more time with family, attend to family needs, avoid commute rush hours and coordinate work schedules to the schedules of family members. Family-related factors were particularly important to females. Employees can use flex-time to shop during an extended lunch or visit the doctor without taking an entire day off. Most individuals respond to flex-time by arriving at and leaving work earlier.

Not surprisingly, employees have very positive attitudes about flex-time (Golembiewski and Proehl, 1978). Flex-time support is particularly strong among front line supervisors, females, lower job classes, and organization "winners" who have been recently promoted (Golembiewski, 1982). The support makes it difficult for corporate decisionmakers to eliminate flex-time programs once they are initiated. These positive employee attitudes wane only slightly with time: follow-up studies five years after implementation show continued strong employee support for flex-time although increasing concern was expressed for individuals who were violating work rules and core time requirements (Golembiewski, 1982).

Staggered work hours offer the prospect of reduced commute times during off-peak travel. There is some adjustment to family needs but this is severely limited by the fact that employees do not choose new schedules with staggered hours, the new work schedules are dictated by management.

The scale of time shifts that are feasible with staggered hours is much less than with flex-time. Surveys from New York City (Phillips, 1971) revealed that employees would resist staggering of work schedules greater than ± one half hour. These smaller time shifts limit the scale of travel time savings and the ability to adjust work schedules to other needs. By comparison, shifts in work schedule of 1.5 hours are not unusual with flex-time (Moore et al., 1983). Finally, staggered hours do not permit daily variation in work schedules so midday shopping and other errands are much more problematic. In fact, after a five-year study of staggered hours and a brief flex-time experiment the Port Authority of New York and New Jersey concluded (Port Authority of New York, 1977), "The concept of flexible work hours appears to be superior to staggered work hours and the four-day week, particularly in the area of reduced transportation congestion and improved employee attitude."

Research has revealed some rather interesting impacts of the compressed work week on families and individuals. A study of primarily blue collar workers (Maklan, 1977) found increasing stress in many families because one household worker (usually the breadwinner) was on a four-day week, while the remainder of the household members was on a five day week--additional household workers and school children included. Unions have also been reluctant to move to four ten hours days because of their long struggle to win overtime pay after 8 hours of

daily work and because they fear fatigue may lead to greater accident risk. While the travel cost savings are obvious, the sociological and labor problems associated with the compressed work week make it comparatively less attractive than flex-time or staggered hours.

Part-time work and job sharing offer employment prospects to individuals who cannot work an entire work week. For single parents and two worker households this offers much better prospects for an individual to find meaningful employment. Once again, family needs play an important role in determining which schedule of part-time or job sharing activity is compatible with individual needs.

Telecommunications systems offer benefits for the individuals participating in the use of teleconferencing systems as well as those who telework. Personal benefits from the decreased time spent traveling due to teleconference systems include decreased travel fatigue and an increase in time spent with family. This is particularly true since much business travel occurs outside of the normal business day impinging on time normally spent at home. While potential uses of these systems have been studied since the mid 1970's (Kollen and Garwood, 1975; Dickson and Bowers, 1974) there has been limited implementation, due in part to companies' reluctance to invest the large capital funds needed to undertake the venture on the broad scale necessary to achieve significant utilization (Moore and Jovanis, 1983).

Individuals who participate in teleworking situations are able to retain or undertake a job while retaining close ties to homelife. While this is a major benefit for some, there is a fear that the lack of separation of work and home may result in increased stress due to "workaholic" problems. Routine family activities may also result in in-

creased stress if they occur during a time when "telework" is being performed (Nilles, 1982).

Teleworking has major equity implications in that clerical and other low status workers are the most likely participants. They will receive substantial benefits from reduced commuting and may be able to forego the ownership of an additional car. Interestingly, some of these benefits may not be realized if employers choose to use the systems under more restrictive conditions: requiring the employees to arrive at work each day, but just use more modern equipment.

BENEFITS AMD COSTS TO EMPLOYERS

Just as flexible work hours imply substantial benefits to employees, they also imply varying benefits and risks to the firm. Studies of flex-time implementation have shown increases in employee morale, reduced absenteeism and use of sick leave, and increases in employee productivity (Golembiewski and Proehl, 1978). In the short term, increases in morale and worker attitude contribute to measurable productivity gains. In circumstances in which companies have punitive policies toward tardiness (e.g. loss of pay) flex-time can reduce the use of sick time to avoid pay loss. Employees at a San Francisco firm frequently called in sick rather than lose an hour or two of pay due to tardiness. When flex-time was introduced sick time use fell by more than 50%.

Employers may also view flex-time with less altruistic objectives. Many management consultants that promote flex-time also sell time clock accumulator devices which are specifically designed to record total hours worked during a pay period. Employers can introduce these devices under the cover of flex-time, seeking more control and accountability from employees rather than more autonomy.

The management literature indicates that flex-time is not for every company--the program should fit well with the general work climate (Golembiewski, 1982). Management at all levels should be comfortable with the program otherwise arbitrary constraints can be imposed on employee choices to meet "office needs". In firms with successful programs, these "needs" are negotiated between employees and supervisors. It is clearly to the employees advantage to arrange for suitable work unit coverage because flex-time benefits are so substantial. There are some indications that flex-time increases prospects for employee retention--some individual's grow so accustomed to flex-time's freedoms that they find it difficult to move to a non-flex-time environment.

If the benefits of flex-time for employers are substantial, the risks are also high. Line supervisors fear loss of employee control and work flow causing some supervisors to work everyday during the entire flexible period (e.g. 7:00 a.m. to 6:30 p.m.) (Golembiewski, 1982). Most guides to flex-time promotion suggest that firms move cautiously with implementation carefully tailoring flex-time program design to company goals and objectives (Jones, 1982a).

The employer-based benefits of staggered work hours occur largely through the reduction in tardiness that result from unexpected traffic delays (most severe in peak period). These reductions in tardiness should reduce employee anxiety and marginally aid productivity.

Employers express frequent concerns for employee fatigue when considering adoption of a compressed work week. Even the productivity of non-physical labor appears to drop off during the ninth and tenth hour of work. When combined with general opposition from most labor unions, these fatigue problems argue against a strong advocacy of the compressed work week as a transportation demand management tactic.

Part-time work and job sharing can create managerial problems for firms: the supervisor must manage additional employees; benefits and other indirect costs may increase; space requirements may also increase if work schedules are not coordinated. The major advantage to employers is access to skilled staff that may otherwise be off the job market. Employers may be able to negotiate wage rates at lower than normal amounts if opportunities for part-time work or job sharing are limited.

Just as alternative work schedules offer substantial benefits to employers, so do telecommunication systems. Firms can reduce the travel needs of their supervisors and managers by allowing teleconferencing (either video, audio or facsimile) rather than face-to-face communications. Managers can thus spend more time managing and less time traveling. While many productivity discussions focus on the performance of line employees, senior executives are also concerned with how to improve management productivity--teleconferencing offers one opportunity.

Employers may view telecommunications technology as a means to allow more flexible work scheduling while retaining some control and accountability over employees. Individuals may spend part of the day at home working via computer terminal and part of the day in the office, or alternate entire days at home and at the workplace. The computer could keep track of individual worker activity, providing the supervisor with a measure of productivity. Employees would benefit through easier commuting (at least one commute trip during the offpeak) and possibly easier and more satisfactory arrangements for child care. Thus, there is at least the potential for blending telecommunication technology with concepts of work rescheduling.

A fear that some firms have concerning teleconferencing is invasion of privacy or exposure to business theft. A meeting held in the confines of a company office, face-to-face, seems more secure than one conducted electronically. Just as technological development allowed teleconferencing to evolve, so can industrial espionage use the same technology to "steal" company correspondence (Dickson and Bowers, 1974). The risk of information theft may be an additional factor inhibiting the diffusion of teleconferencing systems.

Similar fears are expressed for teleworking--the information sent to the office from the employee's home might be electronically intercepted. While the content of the information may be more routine, it may nonetheless be potentially sensitive to the employer.

While individuals who require teleworking to enter the workforce perceive obvious benefits, employers fear lack of employee control and potentially low productivity. Lack of contact with fellow employees may cause a loss of company loyalty resulting in increased susceptability to divulge sensitive information. Despite these fears, companies may adopt teleworking to attract qualified employees who would otherwise be unavailable.

BENEFITS AND COSTS TO SOCIETY

Interestingly, the benefits of these demand management options to society are largely derived through changes in travel patterns and modes. Reduced peaking at transit stations and in vehicles, achievable through flexible and staggered work hours, allow for briefer and more comfortable travel for others. Simulation studies conducted recently (Jovanis, 1981a) for the Oakland Bay Bridge indicate that a 10% participation of downtown San Francisco workers in a flex-time program would

result in reduced travel times for some non-flex-time travelers of between 10% and 25% depending on when during the peak period the traveller arrived at the bridge. Overall travel time would be reduced by 8%.

Implementation experience in Toronto (Greenberg and Wright, 1975) and New York (Port Authority of New York, 1977) have confirmed the changes in transit station peaking and passenger crowding. Attempts to evaluate traffic impacts through field measurement (Safavian and McLean, 1975), however, were unable to differentiate changes in traffic patterns due to alternative work schedules from seasonal variation in flows. This finding from Ottowa suggests that traffic improvements may be very small for automobile commuters without alternative work schedules.

It is extremely difficult to assess the societal benefits and costs of widespread use of telecommunications systems. To the extent that any of the range of systems allows for a substitution or modification of travel needs, it is clear that travel patterns will be different. Some (Nilles, 1982) have suggested that longer term changes in regional office and household location decisions will lead to a future pattern of land use that is less energy intensive: employees will commute less frequently and, when they do travel, shorter distances. Support for this projection is slim, however. Many alternative regional forms are possible; at this stage we know too little about how firms and individuals react to telecommunications systems to be able to firmly predict their impacts.

The strong transportation risk attendant with teleworking is the prospect for reduced transit ridership due to more dispersed travel patterns. This may jeopardize the financial position of some operators as well as marginally increase air pollution and energy consumption

through increased auto use. The subject of how transit agencies and other regional actors can and should respond the these options is the subject of the concluding section.

TOWARD A RATIONAL POLICY OF DEMAND MANAGEMENT

What does all this discussion of demand management imply for major metropolitan regions? What policies can and should be adopted by different actors in the process? What studies need to be conducted to continue to support the development of sound transportation policies? This concluding section attempts to address these issues.

THE ROLE OF TRANSIT AGENCIES AND THE BUSINESS COMMUNITY IN ALTERNATIVE WORK SCHEDULES

The discussion of demand management options has focused on the important differences that characterize their transportation, individual, employer and societal impacts. Because our ultimate concern is transportation, it is clear that transit agencies have an important role to play in demand management. Alternative work schedules, flex-time in particular, offer significant opportunities to increase or retain ridership. If transit schedules are adjusted to match the unpeaked demands caused by alternative work schedules, operating costs can be reduced and, in the longer run, capital costs for new equipment, as well. Adjusting service in this way allows the agency to focus on improving utilization of existing capital stock and infrastructure, not expanding service. Demand management can be used to sustain ridership and revenues as the nature of the transit travel market evolves.

To some extent this strategy runs counter to the legacy of transportation projects in many cities (e.g. Chicago): investment in high

visibility (brick and mortar) projects that put people to work. Yet, given the direction of current Federal subsidy policy, it seems wise to not provide additional service which may be excessively costly to operate.

Promoting flexible and staggered work schedules may also help regional transit agencies to overcome the "negative image" resulting from fare increases, service reductions and continuing subsidy controversies. The benefits of flex-time and staggered work hours to the employee can be used as part of a promotion campaign to boost transit's image. Experience with flex-time promotion campaigns in other cities (Port Authority of New York, 1977; Jones, 1982a) indicate that coordination with the business community is a more successful promotion strategy than direct appeals to the workforce; nevertheless, a description of the benefits of alternative schedules, and transit's support of them, is bound to be a positive image boost. Rather than promoting transit because it's good for everyone else, one can tie flex-time to easier transit use and argue that it directly benefits the rider. One may even capitalize on the strong income effect observed in mode changes in San Francisco (Jovanis, 1981b) to argue that flex-time particularly aids low-income workers in dealing with transit scheduling and overcrowding.

One of the most difficult aspects of an alternative work schedule promotion is to decide on a theme for the campaign. Because the benefits to users lie substantially outside transportation concerns, the promotion should not be limited to appeals to mitigate congestion. In fact, a promotion effort geared in this direction failed completely in Vancouver (Project Turn Down, 1977). The campaigns in San Francisco and Seattle focused on "quality of life" issues: the former argued that

flex-time could mitigate negative impacts of intense downtown development, while the latter argued that flex-time could help forestall planned highway expansion and its concommitant impact on Seattle's environment.

While such a broad based promotion issue may not exist in other regions, it may be that transit operating difficulties are a sufficient "cause" to kickoff and support a campaign. What is additionally problematic in many regions is that there is no obvious "lead agency" for such a campaign. While the regional transit authorities are a casual first choice, it appears that alternative work schedules are well outside the "normal business" of these agencies. What is needed is a joint transportation-business community venture to support alternative schedules. Perhaps regional conferences such as the Conference on Mass Transit in the Chicago Region sponsored by the Northwestern University Transportation Center, can serve to stimulate a constructive dialogue.

One of the topics for discussion should be the development of private sector and public sector goals and objectives that are reinforcing not conflicting. The business community could perceive flex-time as a risk to profitability, especially through loss of employee supervision. Identification of and open discussion with companies that have successful flex-time programs (regional success stories) can help allay these fears. Further, city, county and state government can take the lead in adopting flex-time, at least on a pilot basis. This would assure private industry that they will not "go it alone".

While these are difficult times for public transit, they have also been challenging for private industry. Many large national firms have only been able to weather the recession of 1982-83 by negotiating cuts

or freezes in wages and benefits for their employees. Given this retrenchment on employee compensation, it does not seem likely that these firms will be anxious to become involved in employee commute decisions.

Others (Pikarsky, 1983) have argued that the social contract for transportation is changing. Under the existing social contract the public sector built roads and heavily subsidized public transportation systems. The private sector employers provided parking facilities and/or located near public transportation. The private citizen assumed responsibility for getting to and from work by residing near public transportation or by buying an automobile. Now, however, fiscal pressures are forcing transit agencies to alter service, pricing and management policies at the same time that alternatives to public transportation such as carpool, vanpool and subscription bus are cutting into transit's ridership base. These forces are viewed as forging a new social contract in which transportation will become an employee benefit and companies will thus be motivated to help their employees travel to and from work.

As mentioned earlier, expanding employer-based support for employee commuting travel seems to run counter to recent trends of major U.S. businesses to reduce fringe benefits and wages to combat inflation in the short term and gain competitive market advantage in the longer term. Alternative work schedules could provide easier commuting for employees and productivity increases for employers (particularly with flex-time). As long as employers view alternative work schedules as a "benefit", the competitiveness of current industrial markets will argue against their adoption. If viewed as ways to increase productivity and retain skilled employees, the chances of implementation are better.

REGIONAL ROLES REGARDING TELECOMMUNICATION SYSTEMS

The role of regional actors concerning telecommunications systems should focus more strongly on examining existing usage and identifying emerging system trends. The diffusion of telecommunications technology has been sufficiently limited that very little guidance can be given concerning the effects of implementation. Earlier studies have explored many alternative futures (Harkness, 1977) for telecommunications; what is needed now is an exploration of which of the futures is evolving.

Once again, the choice of a lead agency to monitor telecommunications activities is not obvious. It appears that either the local transit operator or regional transit agency should head up the regional transportation perspective. Because of the potential impact of telecommunications on urban growth and spatial patterns, regional planning agencies are a logical coordinator for a regional planning perspective. Private industry should also be represented: both telecommunications suppliers (American Bell and others) and potential users (large corporations). These actors, possibly including business associations such as chambers of commerce, could participate in a steering committee charged with monitoring the diffusion of telecommunication systems and their impacts throughout the region. At the end of one to two years the committee would then be in the position to develop a set of policies to deal with telecommunications in the region. One possible option is to subsidize several telework experiments to monitor travel changes and individual benefits that occur. A broader scale experiment, perhaps in a city or county agency, may then be advisable.

A SET OF PROPOSED ACTIONS

The continuing emergence of alternative work schedules and telecommunications systems argues for decisive action towards policy development. The following recommendations are posed for regions that wish to adopt a strong position regarding transit demand management:

1. Identify responsible agency/actor for transportation/work place issues.
2. Initiate a study of alternative work schedules in the region. The study would start with an inventory of existing work schedules to determine what is already implemented and assess what the potential benefits might be.
3. Conduct a set of closely monitored "experiments" with companies initiating alternative work schedules. Emphasis should be placed on flex-time, based upon the experiences of previous researchers. The experiments would include an assessment of employee and supervisor's attitudes, effects on company operations, and transportation impacts. These studies would allow an assessment of regional work schedule effects.
4. Based upon the results of activities 2 and 3, make a recommendation concerning the advisability of an alternative work schedule promotion campaign. Both initial activities must be undertaken; an inventory of existing work schedules is insufficient for policy formulation if we don't understand the effects of alternative work schedules on travel, employees, employers and society.
5. Select a few firms with telecommunication systems, secure their cooperation, and monitor travel changes that occur. Assess the impact of these changes on transit, other travel markets, and re-

gional growth patterns. Move toward the development of policies concerning government support or subsidy of such systems.

All of these recommendations seek to anticipate not react to changing events. It is clear that the demand management options discussed in this paper will be with us in the future. Their impacts on transit and transportation may be beneficial of deleterious; to a great extent, the outcome is within our means to shape and control.

Table 1

DEFINITION OF ALTERNATIVE WORK SCHEDULES

1. Flexible Work Hours - a work schedule system in which the employee chooses his or her schedule, within some constraints; employee may be free to vary the schedule daily, vary the lunch hour, or "bank" hours from one day to the next or one pay period to the next, depending on the design of the program. All employees are required to be at work five days per week during designated core periods (typically 9:30 a.m. to 3:30 p.m.), but may otherwise arrange their work schedules within the constraints imposed by the particular program. Allowable start times are typically 7:00 - 9:30 a.m.; typical finish times are 3:30 - 6:30 p.m.

2. Staggered Work Hours - the employee works a five-day week, but start and end times are deliberately spread or staggered to distribute work schedules over a wider time period. (Note: employees generally do not choose their schedules, but are assigned to a schedule by management.)

3. Four-Day Work Week - rather than work five days per week, the employee works the same number of hours over a four-day period, either rotating different days off during different weeks or retaining the same day off every week (also called compressed work week).

4. Job Sharing/Part-Time Work - the employee works less than the standard work week; accomplished by working a standard work day for less than 5 days or a reduced work day each day. Job sharing implies that more than one person share office space and work responsibility.

Table 2

SUMMARY OF TELECOMMUNICATION OPTIONS

TYPE OF SERVICE

Access	Users retrieve information from data bases. e.g. Use of data base information for reporting or presentation.
Transactional	Users change and update information in data bases. e.g. Teleworking--work at home via computer terminal: write lettes, update accounts, correspondance and information files.
Interactive	Users communicate to each other directly or by sharing a common data base e.g. Teleconferencing--the interaction of individuals at diverse spatial locations through the use of various media or combinations of media.

MEDIA	INTERPERSONAL COMMUNICATION
Computer Teleconference	Written
Audio Teleconference	Voice
Video Teleconfernce	Visual

Figure 1

OVERALL PERSPECTIVE OF DEMAND FOR TRAVEL

SOCIOECONOMIC FACTORS	WORKPLACE FACTORS	TRANSPORTATION SYSTEM FACTORS
Family Structure	Location	For Each Available Mode:
Household Location	Industrial Classification	Travel Time
Auto Ownership	Work Schedule	Travel Cost
Income		Safety
Occupation of Household Workers		Reliability
		Accessibility

TRAVEL CHOICES

Time

Mode

Route

Frequency

Destination

Figure 2

MENU OF OPTIONS RELATED TO DEMAND MANAGEMENT

Pricing

- Tolls
- Fares
- Fees (Parking, Vehicle Registration, etc.)

Operations Management

- Priority Operations
- Congestion "Neglect"

Modal Management

- Ridesharing Promotion
- Subscription Bus

Work Schedule Adjustments

- Flexible Work Hours
- Staggered Work Hours
- 4 Day Work Week (Compressed Work Schedules)
- Job Sharing/Part Time Work

Technological Changes in Workplace

- Teleworking
- Teleconferencing

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