situation for the Fredericton area. The model appears to deal with the major variables in sufficient detail to produce dynamic results. In addition, a sensitivity analysis of the major variables and assumptions indicates that the model is producing reasonable estimates of what might be experienced if subscription van service were introduced. These results are encouraging.

Although development of the model itself was tedious, the actual simulation and sensitivity analyses included in this exercise were easily undertaken and could be done so in another application with a minimum of effort. The nature of APL is such that an individual who has little or no programming experience could use this simulation package after only a few hours at the terminal. Furthermore, the actual cost of applying the model to another locale would be minimal. The model could thus be a useful tool for assessing the viability of any proposed subscription van service or analyzing the variables that affect the costs of an existing service in an effort to increase efficiency.

The rather haphazard implementation of transportation services in the past has brought about the demise of many operations and contributed to developing skepticism about innovative transportation systems. In addition, the overall economic decline of transportation services in general dictates that planning decisions in the future must be more management oriented. Though specific applications should be analyzed thoroughly, this research may provide some general insight into the applicability of subscription van services in small urban communities. In fact, the technique used in this research could be applied to an analysis of the effect of implementing or expanding any transportation system.

ACKNOWLEDGMENT

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# Economics of Vanpooling

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**The concept of commuter vanpooling and the incentives that make it financially advantageous to the rider, the driver, and the company are examined. The primary incentive for riders is the money they can save on the commute to and from work. The farther the commute is, the greater are the savings. Convenience and camaraderie are also found to be important inducements for riders. For the driver, the incentives are a free commute to work, the possibility of getting rid of a second automobile, and personal use of the van on weekends. The incentives for 20 Texas firms that are currently operating approximately 310 vanpools are found to vary. Some companies initiated vanpooling to expand their labor market, some as a means of providing an increase in disposable income to employees, and some to save on parking costs. A detailed comparison of commuting and parking costs for automobile and vanpool is presented. Conditions in the state of Texas that have encouraged the use of vanpooling and future prospects for vanpooling in Texas are summarized.**

Commuter vanpooling, as we know it today, was begun by the 3M Company in St. Paul, Minnesota, in 1973 (1). Since that time, vanpooling has generated a great deal of nationwide interest as an alternative mode of transporting people to and from work. Government agencies have focused on vanpooling as a means of reducing air pollution, saving energy, and easing traffic congestion. The 3M Company, however, was motivated by other needs. Specifically, Robert Owens of 3M was looking for a way to reduce parking demand so that the company would not have to build a very expensive parking garage.

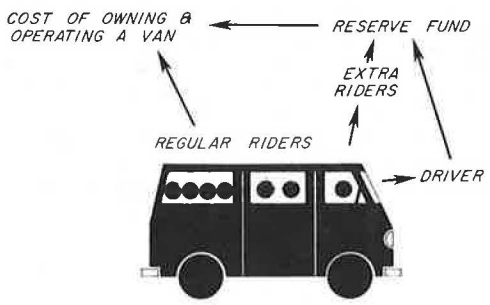
In Texas, vanpooling got its start in early 1975 when the Continental Oil Company initiated a 10-van pilot program in Houston (2). By the end of 1977, there were some 14 programs in Texas and a total of 180 vans on the road (3). Estimates for the beginning of 1979 show about 310 vans in 20 programs across the state. A poll of employers who have initiated vanpooling reveals a number of significant reasons for starting programs, most of which are financial:

1. To provide employees with a "tax-free" fringe benefit that would increase disposable income in lieu of a raise,
2. To reduce the employer's share of parking costs, and
3. To expand the labor market in a region of low unemployment.

Conserving energy, reducing pollution, shifting the balance of payments, reducing traffic congestion, and other such lofty motivations were not among the reasons given for implementing vanpool programs.

The Texas Vanpool-Carpool Program, which is being conducted by the Governor's Office of Energy Resources and funded by the U.S. Department of Energy, seeks to accelerate the growth of vanpooling (and carpooling). The state's goal is to have 1500 vans on the road by the end of 1980. The basic strategy is to sell the state's largest employers on the vanpool concept and to provide

Figure 1. Monthly vanpool cash flow.




technical assistance during implementation. The hope is that these employers, for whatever reasons, will use their own resources to implement in-house programs as quickly as possible.

Vanpooling is not a widely known concept outside transportation circles. Therefore, in discussions with employers who could potentially implement vanpool programs, it is essential that the answers to commonly asked questions be available in a single, easy-to-read document. A preliminary version of such a document (4) was developed by the Governor's Office of Energy Resources in the summer of 1978 to serve this purpose. This paper is based on that document and on subsequent data collected during the fall of 1978.

This paper is organized around the four most common questions about vanpooling:

1. What is vanpooling, and how is it different from the carpool program that we tried in 1974?
2. What is the incentive for a person to join a vanpool, and who among my employees might be interested?
3. Why would anyone volunteer to be a driver?
4. How can I offset the administrative cost of operating the program? If there is a financial risk involved, are the savings large enough to make the risk worthwhile?

Other questions concerning organizational and social aspects of vanpooling are also important, but the focus here is primarily on the financial considerations. Other topics are brought in only as they are relevant to the financial analysis.

## VANPOOL CONCEPTS

A good working definition of a vanpool might be a group of from 8 to 12 employees whose residences are geographically clustered and who share the expense of owning and operating a van in which they commute to work. One of the riders serves as a volunteer driver in exchange for a free ride to work and use of the van as a second automobile. A vanpool differs from a carpool in that expenses are shared by an exchange of cash rather than by alternating vehicles.

Although each vanpool program has certain characteristics that make it unique, all vanpools fall into three major classifications:

1. The employer owns and/or leases the vans,
2. The employees own or lease the vans, or
3. A third party (a credit union, for example) owns and/or leases the vans.

The significant differences in the three are in the mode of ownership and the advantages or disadvantages of that type of ownership. Since the majority of vanpool programs use employer-owned vans, the focus of this paper is on this category. In Texas, the 20 programs can be broken down as follows: 18 owned by employers, 1 owned by employees, and 1 third-party program.

In a program in which the vans are employer owned, the vans are essentially "company cars" that are made available to employees for use as commuter vehicles. Since certain tax benefits are available only to employers (the vans become part of the depreciable assets of the company), this type of ownership is the most cost-effective because the tax benefits can substantially reduce the cost of ownership and these savings are then passed on to the riders.

Employee and third-party programs grew out of situations in which employees wanted to participate in a vanpool program but the employer was either unable or unwilling to accept the financial responsibility. For some nonprivate organizations—for example, the federal government and some of its corporate agencies, such as the Tennessee Valley Authority and the U.S. Postal Service—it is illegal to participate financially. The same is true for some state and local governments. In addition, some employers that have too few employees to form effective pools must join together with others to make pooling possible. Still, the company usually gives active administrative support to the program by helping to organize pools, providing parking, and absorbing certain administrative costs generated by the program.

Regardless of the ownership of the van, a vanpool program is operated as a formal business operation in which the participants assume very specific responsibilities. It is this formal organization that distinguishes a vanpool from a typical carpool. Most successful vanpool programs have been organized around a single large employer or work site. Carpools, however, are somewhat less likely to be tied to a single employer. It is worth noting that many social, regulatory, and insurance problems can be circumvented only if a single employer is involved.

As in other successful business operations, a successful vanpool program has a predictable, steady, and positive cash flow (see Figure 1). The main components of the program are as follows:

1. The regular riders, who usually number between 8 and 12, provide the income necessary to underwrite the cost of owning and operating the van (calculations in this paper are based on 8 riders plus the driver). Each rider's share of the cost is one-eighth (or one-twelfth) of the total cost.
2. The driver-coordinator assumes responsibility for the day-to-day operation of the vanpool. In return, he or she receives a free commute to work plus use of the van as a second automobile on weekends, holidays, and after hours for a nominal per-kilometer charge. This "extra" revenue usually goes into a reserve fund.
3. The company usually provides administrative and capital support for the entire operation. Any cost not borne by the regular riders or by the extra revenue is usually "donated" by the company. The size of such donation, which can range from a very small amount to a sizable sum, is usually determined by company policy.
4. The extra seats (the difference between the full capacity of the pool and the regular ridership) may be "sold", thus generating extra revenue for the reserve fund. At the end of the year the surplus in the reserve fund is "rebated" to the riders or given to the company to defray administrative expenses.

Regardless of who owns the van, the before-tax cash flow must reflect a break-even operation (or a slight loss) to avoid regulatory or income tax problems. In a company or third-party operation in which each van is

accounted for within an operational structure, this is not usually difficult to prove. To prove that the vanpool is not a profit-making enterprise, the owner-driver must keep accurate records. Otherwise, the vanpool may be subject to taxation or come under state regulation as a common carrier.

Within these guidelines, vanpooling appears to be one of those rare situations in which everyone wins. One way to see if this is really true is to take a closer look at the benefits received—and the costs incurred—by the riders, the driver, and the company.

## INCENTIVES TO THE RIDER

The key to the success of any vanpool program is its riders. If the program cannot attract enough riders to generate the cash flow necessary to support the program, there will be no program. This very simple point is often overlooked by those without first-hand knowledge of vanpooling. The fundamental issue, then, is this: Why do people sign up as vanpool riders, or why do they choose not to?

If you talk to the most experienced managers of the most successful company vanpool programs, they will tell you something like this: People get into vanpooling because of the money they save; they stay in because of the convenience and the camaraderie. What this statement really says is that people become vanpool riders if the economic incentive is great enough to overcome the social barriers. Once they get used to the idea and vanpooling becomes "ritualized", the social barriers disappear. Proof of this observation is the fact that, although it takes a great deal of effort to get vanpool programs under way, they seldom fail once they are established.

The financial incentive to the rider is the difference between his or her share of the expense of owning and operating the van (usually one-eighth) and what it costs to commute by other means. The most common other means is by private automobile or, in fewer instances, transit or carpool. The actual dollars and cents are fairly easy to calculate because there are rather complete data readily available on the cost of ownership. The real problem is in calculating the perceived cost so that the perceived incentive can be determined.

A good estimate of the perceived costs of commuting to and from work is the actual out-of-pocket expenses of making the trip. Although the costs of automobile ownership (such expenses as insurance and payments on an automobile) should be included, most commuters do not perceive these as part of the commuting costs because they "have to own the automobile anyway." Thus, commuting costs are thought of as simply the cost of fuel, oil, lubrication, tires, tune-ups, and other similar expenses. This conservative approach to costs is used in Table 1 (2), which gives the costs of various distances of round-trip commutes.

The costs of making the same trip in a vanpool are given in Table 2 (2). These costs include both the cost of operation and the cost of ownership; they are calculated on the assumption that each rider pays a one-eighth share.

The cost estimates contained in Table 2 and Figure 2 assume a 21-workday month, gasoline at $0.16/L ($0.60/gal), and fuel consumption at 3.8 km/L (9 miles/gal). Lubrication and oil and filter change are figured at 6450 km (4000 miles), with fluid changes at 56 300 km (35 000 miles). New tires are purchased every 48 300 km (30 000 miles). Maintenance per 19 300 km (12 000 miles) is $80 for an automobile and $135 for a van. Annual taxes for the van come to $60, and insurance is estimated at $600 annually.

Figure 2 shows plots of round-trip commuting costs by automobile and by vanpool. This figure illustrates two important points: (a) For long-distance commuting, vanpool costs are significantly cheaper than the costs of driving alone, and (b) if money is to be saved through vanpooling, the shortest allowable daily round-trip commute distance is about 48 km (30 miles).

It should be noted that a 48-km commute by automobile is actually shorter than a 48-km trip by van because of the extra driving that is necessary to pick up the vanpool riders. A good rule of thumb is that picking up riders should not increase the length of the trip by more than 15 percent. Thus, a 48-km commute by automobile is roughly equal to a 56-km (35-mile) commute by van.

**Table 1. Average monthly cost of driving alone.**

| Distance Traveled per Day (km) | Fuel ($) | Lubricating Oil ($) | Tires ($) | Maintenance ($) | Total ($) |
|---|---|---|---|---|---|
| 32 | 21.00 | 0.79 | 2.52 | 2.80 | 27.11 |
| 48 | 31.50 | 1.18 | 3.78 | 4.20 | 40.66 |
| 64 | 42.00 | 1.58 | 5.04 | 5.80 | 54.22 |
| 80 | 52.50 | 1.99 | 6.30 | 7.00 | 67.79 |
| 96 | 63.00 | 2.36 | 7.56 | 8.40 | 81.83 |
| 113 | 73.50 | 2.76 | 8.82 | 10.80 | 94.88 |

Note: 1 km = 0.62 mile.

**Figure 2. Comparison of vanpool and automobile commuting.**

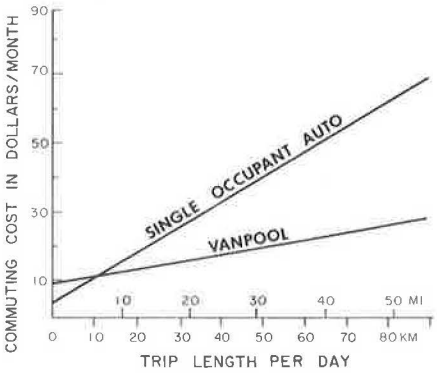



**Table 2. Average monthly vanpool cost.**

| Distance Traveled per Day (km) | Operating Costs ($) | | | | | Ownership Costs ($) | | |
|---|---|---|---|---|---|---|---|---|
| | Fuel | Lubricating Oil, Wash, and Miscellaneous | Maintenance | Tires | Amortization | Insurance | Total | One-Eighth Share |
| 32 | 28.00 | 7.19 | 8.29 | 4.58 | 66.00 | 55.00 | 165.00 | 21.00 |
| 48 | 42.00 | 7.92 | 9.65 | 4.58 | 66.00 | 55.00 | 186.00 | 23.00 |
| 64 | 56.00 | 9.69 | 11.00 | 4.58 | 66.00 | 55.00 | 203.00 | 25.00 |
| 80 | 70.00 | 10.83 | 12.35 | 4.58 | 66.00 | 55.00 | 220.00 | 27.00 |
| 96 | 84.00 | 11.48 | 13.21 | 9.17 | 66.00 | 55.00 | 240.00 | 30.00 |
| 113 | 98.00 | 13.02 | 15.06 | 9.17 | 66.00 | 55.00 | 257.00 | 32.00 |

Note: 1 km = 0.62 mile.

Table 3. After-tax cost of van ownership.

| Year | Before-Tax Cash Flow ($) | Straight-Line Depreciation ($) | Taxable Income ($) | Tax Credit ($) | After-Tax Cash Flow ($) | Monthly Amortization ($) |
|---|---|---|---|---|---|---|
| 0 | 9500 | - | - | 950 | 8550 | - |
| 1 | - | 950 | 950 | 475 | 475 | 66 |
| 2 | - | 950 | 950 | 475 | 475 | 66 |
| 3 | - | 950 | 950 | 475 | 475 | 66 |
| 4 | - | 950 | 950 | 475 | 475 | 66 |
| | 5700 | | | | 5700 | |
| Net | 3800 | 3800 | 3800 | 2850 | 950 | 3170 |

The extra 8 km (5 miles) or so added to the trip is apparently less important to the vanpool riders than is the extra time required to pick up all of the riders.

Any other costs applied to the vehicle, such as parking fees or tolls, increase the advantage to the van because, whereas the automobile driver must carry the full cost burden, the vanpool rider pays only a share. For example, a $20 parking fee reduces the minimum distance from 48 to 32 km (from 30 to 20 miles). Therefore, companies whose employees must pay a parking fee can usually organize vanpools that make shorter trips than those of companies that provide "free" parking.

Vanpooling really begins to pay off for the commuter who lives 24 km (15 miles) or more from work, especially if it enables the rider to get rid of a second automobile that was being used for commuting. Financial incentives become most persuasive in the longer commutes. The money saved in a 130-km (80-mile) two-way commute—about $75/month—is usually enough to counteract a long list of excuses for not wanting to pool. Pilot programs should therefore begin with the longest (most favorable) commutes. As the operation catches on and vanpooling becomes established, round-trip distances as short as 24 km become economically sound. The maximum reasonable distance seems to be about 240 km (150 miles).

## INCENTIVES TO THE DRIVER

Drivers are responsible for picking up the riders, driving them to work, and returning them home at the end of the day. Usually, though not always, they are also responsible for collecting each rider's monthly share of the fee, maintaining the vehicle, keeping the pool filled, and taking care of other day-to-day chores. These responsibilities will vary from program to program depending on the policy of each company.

In exchange for these duties, the driver receives a free commute to work. The value of this, which depends on the length of the trip, can be determined from Figure 2. As a rule, the driver is allowed to use the van after hours and on weekends and holidays at a nominal charge—usually 6 cents/km (10 cents/mile)—and/or a nominal "free" distance [say, 322 km/month (200 miles/month)]. This can even allow the driver to sell his or her second automobile and thus save the ownership cost of that vehicle as well.

In some of the early programs (such as the one at 3M), the driver also received income from so-called "incentive fares"; that is, the driver "sold" the extra seats and pocketed the money as income. It was possible to generate up to $100/month of taxable income in this manner. This practice is currently being phased out of most programs because of the problems it creates. The main problem is apparently a tendency to oversell seats (as is done on the airlines), a practice that irritates the regular riders. A good alternative is to offer an "incentive distance" for free use of the van.

Still, the financial incentive to be a driver, exclusive of incentive fares, can often run as high as several hundred dollars a month. For example, a 96-km (60-mile) commute would amount to some $80/month in free rides plus the savings realized through not having to buy an equivalent $9500 vehicle. Such incentives usually mean that there are more candidates for drivers than there are vans. This seller's market allows the company to be quite selective in choosing drivers, which further strengthens the program.

## INCENTIVES TO THE COMPANY

As the administrator or financial backer of a vanpool program, the company is expected to absorb the organizational and administrative costs, assume financial responsibility for the program, and furnish the "up-front" money to purchase or lease the vans. These costs can be nominal or substantial depending on the size of the program. For example, a full-time administrator may be required for a program that uses 80 or more vans. The financial risk of such a program can be substantial. So why would any company consider taking such a risk with no hope of turning a profit?

Nationwide, more than 100 companies are involved in vanpooling; 20 of them are in Texas. These companies have cited a number of ways in which they have benefited from their vanpool programs:

1. Vanpooling saves parking costs, makes space available for expansion, satisfies zoning requirements, and reduces congestion.
2. A number of individuals and companies have received nationwide publicity for their programs.
3. A number of firms have expanded their labor market or eased the shock of relocation.

Whatever the reason for starting a vanpool program, company management obviously believed the benefits outweighed the risks and the costs.

Although it is certainly possible to attach a value to the goodwill generated by the last two categories cited above, the real financial payoffs are in the tax shelter provided by ownership of the vans and in the savings generated by the reduction in parking requirements. In fact, the reason most often given for beginning a vanpool program is that the company, for one reason or another, had to make a considerable reduction in parking requirements. Such reductions can be accomplished through some form of agressive ride-sharing program—either carpools, vanpools, or subscription buses. The parking savings are the same regardless of the mode of ride sharing, but carpools, leased vans, and buses do not provide a tax shelter.

## TAX SHELTER

For a better understanding of the financial incentives for vanpooling, the tax shelter generated by ownership of the vans should be examined in detail (5). Table 3 gives a typical example. Assuming that a van can be purchased for $9500, that the "blue book" wholesale value of a four-year-old van is 60 percent of the original list price (6), and that the riders generate the cash flow to offset all

**Table 4. Cost of surface automobile parking.**

| Land ($) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Per Square Meter | Per Stall | Construction ($) | Annual Amortization ($) | Annual Taxes ($) | Annual Maintenance ($) | Cost per Stall ($) | |
| | | | | | | Per Year | Per Month |
| 11 | 300 | 330 | 70 | 20 | 20 | 110 | 10 |
| 22 | 660 | 330 | 100 | 30 | 20 | 150 | 15 |
| 54 | 1650 | 330 | 200 | 60 | 20 | 280 | 25 |
| 108 | 3300 | 330 | 360 | 110 | 20 | 490 | 40 |
| 161 | 4950 | 330 | 530 | 160 | 20 | 710 | 60 |
| 215 | 6600 | 330 | 690 | 210 | 20 | 920 | 75 |
| 323 | 9900 | 330 | 1020 | 300 | 20 | 1350 | 115 |

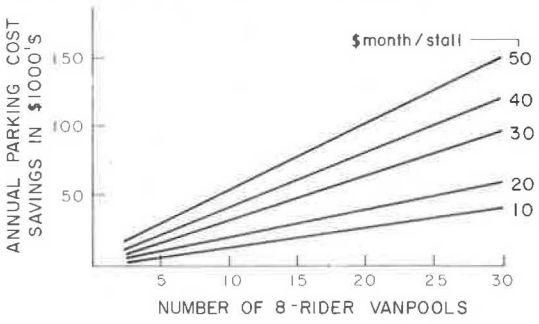
Note: 1 $m^2$ = 10.76 $ft^2$

**Table 5. Cost of five-level structure for automobile parking.**

| Land ($) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Per Square Meter | Per Stall | Construction ($) | Annual Amortization ($) | Annual Taxes ($) | Annual Maintenance ($) | Cost per Stall ($) | |
| | | | | | | Per Year | Per Month |
| 108/10 | 720 | 3600 | 430 | 130 | 36 | 600 | 50 |
| 269/25 | 1 800 | 3600 | 540 | 160 | 36 | 740 | 60 |
| 538/50 | 3 600 | 3600 | 720 | 215 | 36 | 970 | 80 |
| 807/75 | 5 400 | 3600 | 900 | 270 | 36 | 1210 | 100 |
| 1076/100 | 7 200 | 3600 | 1080 | 325 | 36 | 1440 | 120 |
| 1345/125 | 9 000 | 3600 | 1260 | 380 | 36 | 1675 | 140 |
| 1615/150 | 10 800 | 3600 | 1440 | 430 | 36 | 1910 | 160 |

Note: 1 $m^2$ = 10.76 $ft^2$.

**Figure 3. Savings in parking cost for vanpool.**




operating and maintenance expenses, the before-tax cash flow represents a break-even operation, exclusive of the depreciation of the van. If one uses straight-line depreciation (the most conservative) and takes advantage of the 10 percent investment tax credit (7), the tax shelter generates $2850 in tax credits over the four-year period. This reduces the company's out-of-pocket expense for the van from $3800 to $950.

There are two ways of looking at the cost of ownership: (a) ignore the cost of interest for four years on the up-front money (the $9500) or (b) take it into account and add it to the operating cost of the van. Either way, the actual cost of ownership (represented by the after-tax cash flow) is included in each rider's share of the expenses. If the cost of money at 9 percent interest is accounted for, the monthly cost is $66, which comes to $8.25/rider for an eight-rider van. If, however, the company absorbs the interest cost, the monthly charge for each rider is $2.50.

## PARKING COSTS

There is no such thing as free parking. Someone has to absorb the cost, and that someone is usually the employer. If a company leases a facility, the parking costs are often hidden in the basic lease. Only when parking stalls are leased by the month or the year are the costs obvious. It is necessary to examine how a company calculates what free parking really costs to see what savings are possible through an aggressive vanpool program.

The first step in determining the cost of employee parking is to determine what a parking stall (or space for one automobile) costs in various situations. Perhaps the best way to do this is by using two typical examples: surface parking and a five-level parking structure (8). Both examples assume park-and-lock operation.

For the first example, assume a land value of $54/$m^2$ ($5/$ft^2$) and 30 $m^2$ (330 $ft^2$) required for each stall, including aisles and landscaped areas. This, of course, will vary somewhat, but the typical design standard calls for 30-31 $m^2$ (320-330 $ft^2$). The land cost is $1650/stall; paving, striping, bumper blocks, lighting, and landscaping add an additional $330 in construction costs. Amortization on the total ($1650 + $330 = $1980) at 10 percent runs $200/year. Property taxes on the total run about $60 (25 percent assessed valuation and a tax rate of 12 percent of assessed value). Maintenance expenses such as sweeping, plowing, repairing, restriping, lighting, and insurance come to about $20/stall. The total of these annual costs is $80. Dividing by 12 gives the owner a monthly cost of $25/stall. Table 4 gives the cost per stall for surface parking at various land values.

For a second example, assume valuable downtown real estate at $1076/$m^2$ ($100/$ft^2$) on which a five-level parking ramp is to be constructed. Design standards call for a minimum of 33.4 $m^2$/automobile (360 $ft^2$/automobile) because of stairs, columns, ramps, and so on. The land cost is 33.4 $m^2$ × $1076/$m^2$ ÷ 5 levels = $7200/stall. Construction of parking ramps typically runs $3600/stall, including elevators, stairs, bumper blocks, and so on. Amortization at 10 percent gives an annual cost of $1080. Property taxes (at the same rate as in the first example) are $325/year. Depreciation, maintenance, and insurance run $36 annually. The total cost is $1441/stall, or $120/month. Table 5 gives corresponding values for various values of raw land.

The parking costs given in Tables 4 and 5 are average figures. But they are accurate enough for determining approximate savings from the elimination of parking requirements. To use Figure 3, follow the diagonal line that corresponds to the monthly parking cost, and find the position on that line that corresponds with the number of vans in the program by reading up from the horizontal axis. Then determine the savings by reading the corresponding number from the vertical axis on the left. For example, at $20/stall/month, a 20-van pro-

gram will result in an annual savings of $38 400. This table is based on a pool of eight riders; to adjust for another number of riders, divide the annual savings by 8 and multiply by the number of riders.

From the foregoing, it should be evident that the tax shelter provided by ownership of the vans and the savings that are realized from the reduction of parking requirements will ensure that a company can afford the administrative cost and financial risks of implementing a vanpool program. In fact, it would seem that a downtown employer who must purchase or lease expensive parking stalls can hardly afford not to implement an aggressive ride-sharing program.

So, in addition to the obvious public relations advantage and employee benefits, there are substantial financial incentives for a company to implement a vanpool program. The tax shelter provided by ownership of the vans reduces the actual cost of ownership to an amount easily borne by the van riders. Reduction of parking requirements can save the company a significant amount in parking costs, enough to provide a substantial reduction in overhead.

## CONCLUSIONS AND RECOMMENDATIONS

The number of vanpools on the road in Texas increased by 80 percent (from 180 to 310 vans) during 1978. This rapid increase is evidence of much hard work and a willingness to take a risk on the part of approximately 20 program managers and their organizations. So far, all of the vanpooling in Texas has been done by private industry. Why is the private sector willing to get involved in vanpooling whereas the public sector is unwilling to participate?

We feel that, with few exceptions, the answer lies in the economic advantage that some firms can realize by implementing a program. If they do not believe that the financial risk or the cost can be economically justified, they will not implement a program. It is as simple as that. Agencies in the public sector, on the other hand, do not have the same financial incentives, and simply a desire to do the right thing does not seem to be sufficient motivation.

What are some of the conditions in Texas that have been conducive to implementation? In central Texas the skilled labor market is very sparse. Unemployment is running at about 2 percent. There is an effort to import workers from surrounding rural communities—some from as far away as 80 km (50 miles). The shared expense (sometimes referred to as "co-op" transportation) gives the employer who has a vanpool program an edge over employers who have no program. The tax shelter makes the program feasible for the employer; reduction in parking costs makes it more attractive.

For large employers in the major metropolitan areas, major concerns are parking costs and the need to offer a fringe benefit to employees. In Houston, the "hassle-free ride" is also a selling point. The reduction in parking demand often can pay for the program; the tax shelter reduces the cost even more so that daily commutes of less than 48 km (30 miles) become feasible.

In Dallas-Fort Worth, Houston, and San Antonio, large firms are under pressure to show a "good faith effort" in ride sharing to satisfy Environmental Protection Agency (EPA) clean-air regulations. Such pressure may not be sufficient reason to start a program, but the tax shelter and reduction in parking costs can make the program attractive enough to motivate these employers.

Texas employers have found that employees will become vanpool riders or drivers if they can save a significant amount of money by doing so. The 24-km (15-mile) one-way trip, though only an approximate figure, does appear to be the lower economic limit. This minimum distance, however, is not the main problem. Frequently, the problem is that the "draw" from a single location for any company may not be enough to fill up a van. In that case a smaller vehicle could be used.

We expect to see the number of vans on Texas roads continue to increase. The increase will not be a result of EPA pollution regulations or the balance-of-payments problem. New vanpool programs will be initiated as companies seek to broaden their labor market, solve parking problems, or realize economic advantages.

## ACKNOWLEDGMENT

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