

Vanpools: Pricing and Market Penetration

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This paper examines the progress of 15 years of formalized vanpooling in developing a market niche. It offers a strategy for achieving vanpooling's market potential through nontraditional financing and fleet management strategies. Two approaches to vanpooling are examined in two case studies: the first using a traditional approach based on capital cost recapture linked to the length of a standard van lease and the second using a capital cost recapture formula based on the actual useful life of a van in mileage. The findings support the premise that capital cost recovery over the useful vehicle life results in significant fare reductions and increased market penetration. The report also concludes that traditional vanpool fleet management approaches frequently result in retiring vans prematurely, leading to higher fares and excluding a large segment of the vanpool market, the 20-to-40 mi per direction commute. It suggests that, where possible, capital cost recovery through fares should be done over the useful van life of from 120,000 to 200,000 mi per unit, or up to 10 years. In addition, the perceived view among vanpool fleet managers that frequent van change-outs are required for customer acceptance, safety, and reliability is unsupported by experience. Although not all programs can use life-cycle capital cost recovery techniques because of the need for capital or borrowing power, those that can will enjoy a significant increase in market share for vanpooling, without subsidization, at reduced rider fares.

Just 15 years ago, in 1973, the concept of "van pooling" originated at the 3-M Company headquarters in Minnesota. Some things have changed since then. The term van pooling has been foreshortened to "vanpooling" and has become part of the transportation lexicon. An entire organization, the National Association of Vanpool Operators, has been created and subsequently subsumed into a yet larger entity known as the Association for Commuter Transportation (ACT).

These are some of the impacts vanpooling has made in its brief tenure—the first truly "new" commute transportation mode of modern times. As with all modes, it has its niche and its limitations. Insurance concerns, unfamiliarity, and financing continue to limit its potential. Yet, it also overcomes many inherent problems of other modes. Its size is ideal for most of the United States' predominant suburban land-use intensities. It overcomes the driver labor cost barrier of transit. It has greater versatility than transit, yet more stability than a carpool. Given these attributes, transportation planners and others have a vested interest in determining and securing the

potential for this mode. It can generally be said that a 5 percent peak-period mode split for transit is quite achievable, and higher market share is attainable under favorable conditions. The point must soon come when a "market share" or "mode split" for vanpools can also be determined on a communitywide basis. Vanpools have yet to achieve visibility among mode-split forecasters. It is still not identified as a mode in planning models; rather, it is frequently lumped with carpools, transit, or paratransit.

This lack of identity places severe limitations on the growth and development of vanpooling, for several reasons. First, the contribution of vanpooling toward peak-period traffic congestion cannot be known and recognized unless its mode split is identified. Second, communities lack comparative data to assess their vanpool efforts and make programmatic adjustments. It follows that, for that which cannot be measured or no goals can be set, little will be achieved. This paper asserts two principles: (a) that the market potential for vanpooling is closely related to pricing mechanisms, and (b) that the market penetration potential for vanpooling is significantly beyond present achievements and that a concerted attempt should be made by transportation demand management and planning professionals to define explicit mode split targets for vanpooling and work for their achievement.

VANPOOL MARKET

It has been suggested in many studies and in practice that the primary target market for vanpooling is the over 20-mi one-way commute trip. At trip distances under 20 mi, time incurred in picking up passengers and the cost of operating a commuter van become major barriers to vanpool formation. In a typical company, the over 20-mi one-way trip market segment represents on the order of 25 percent of all employees.

Fares are a major consideration among prospective vanpoolers. In the next section, a comparison of two vanpool programs, one using a conventional lease period capital cost recovery, and the other using vehicle life-cycle cost recovery, are described and compared.

VANPOOL PRICING STRATEGIES

Vanpooling is an extremely cost-effective and energy-efficient mode, yet in the authors' opinion it is significantly underutilized. This is in large part because of conventional pricing techniques rather than technological or other limitations. If

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TABLE 1 VANPOOL LIFE CYCLE COST ANALYSIS, SEPTEMBER 6, 1988

Daily Round Trip Commute Mileage	Annual Vehicle Miles	Useful Life in Years	Annual Depreciation Cost (\$)	Capital Cost Recovery (\$)	
				Per Month Van	Per Month Rider
20	5,040	24	1,050	88	6
40	10,080	12	2,100	175	13
60	15,120	8	3,150	263	19
80	20,160	6	4,200	350	25
100	25,200	5	5,250	438	31

NOTE: Assumed useful life (miles) = 120,000; assumed unit cost = \$25,000; assumed interest = none; depreciation method = straight line; assumed paying passengers = 14.

pricing and cost-recovery techniques are the biggest barrier, and these can be largely overcome, vanpooling can make a more substantial contribution toward relieving traffic congestion. To achieve this, vanpooling must become institutionalized. It deserves to have assigned to it a mode-split target as a discrete mode and a strategy for achieving that mode split. It is in this way that transportation planning goals are achieved.

There are three common approaches to vanpooling today: employee-operated, in which an employee owns or leases a van and provides services for from 6 to 14 others; company-operated; and, finally, commercial vendor-operated. Vanpool mode splits of 15 percent have frequently been achieved in company-sponsored vanpool programs. Yet, vendor-provided vanpools achieve an extremely low market share. For example, in the Southern California market, the average vendor-operated vanpool operates along a 45-mi one-way commute, compared to a 10-mi average commute among all workers. Its market is severely limited by its pricing method. The capital cost of each van is typically recovered from participants over a 3-to-4-year period. In company and employee-operated vanpools, in which the capital cost recovery period can be extended by choice from 4 to as long as 10 years, market penetration soars to 15 percent and greater, with one-way vanpool commutes falling to under 20 mi. It is interesting to note that, under both conditions, full capital cost recovery is achieved. At issue is the length of time allowed for recovery and the length of time a van is maintained in service.

Frequently, attempts to increase vanpool market penetration are made by advancing pricing schemes based on subsidies or less than full capital cost recovery. Such programs are usually severely limited by available funds. Companies are often dissuaded from implementing vanpool programs because of employee resistance to full cost recovery fares based on the customary 3-year vehicle lease. When companies decouple how they choose to pay for a van from how they recover those costs, they can base fares on life-cycle cost recovery principles. Fares can then be brought into a range acceptable to a majority of commuters, and pricing is essentially eliminated as a barrier to capturing full market share.

Life-cycle costing is a principle that considers how long a product will last before it is consumed. Costs are allocated evenly over that "useful life." Among programs using life-cycle costing, evidence indicates that a vanpool has a useful life in excess of 120,000 mi. On this basis, according to Table 1, a vanpool will last for 8 years in a typical 60-mi round-trip commute. At this rate, the monthly per mile depreciation cost of a \$25,000 luxury van is just \$263, or \$19/month for each member of a 14-passenger van (assuming the 15th per-

son, the driver, does not pay, as is typical of a standard vanpool operation).

To implement life-cycle costing, a third party (government agency, company, or individual) purchases a van either as a short-term lease (3 to 5 years) or a cash purchase. Then, the investment is recovered over the "useful life" of the van, depending on its daily mileage, and an assumed mileage life, say 120,000 mi. The cost of funds or interest on funds advanced in this manner is added to the costs recovered. Even with the additional interest, fares are significantly lower than typical vanpool fares, which are based on a loan repayment cycle rather than a vehicle life cycle. In vanpooling, the traditional 3-to-4-year commercial vehicle loan repayment cycle has little correlation to the useful life cycle of the van itself. Life-cycle costing principles for vanpool fleets have been adopted, in whole or in part, by the University of California at Los Angeles, the Aerospace Corporation, and the State of California, among others.

TWO APPROACHES TO VANPOOL SERVICE DELIVERY AND PRICING

The Aerospace Corporation

The Aerospace Corporation is located in the city of El Segundo, California, "aerospace" employment center south of Los Angeles International Airport. The center includes such major firms as GM/Hughes, Northrop, Rockwell, Xerox, TRW, and Aerospace. Total local employment approaches 100,000. The Aerospace Corporation employs approximately 4,000 predominantly professional people. The company maintains a commuter services office staffed by one full-time coordinator. Because of the company's commitment to ridesharing programs and the traffic congestion problem in El Segundo, Aerospace enjoys a 39 percent employee participation rate in ridesharing. The vanpool program operates over 60 vans, reflecting a vanpool market penetration or mode split of about 15 percent. The company provides adequate free parking to meet its needs, although the ridesharing program is currently needed to maintain a balance between demand and supply.

McDonnell Douglas Corporation

The McDonnell Douglas Corporation is located in nearby Long Beach, California. McDonnell Douglas was also fortunate to have ample parking facilities for its employees in the past. Recently, however, McDonnell Douglas has received

new government contracts and has begun construction on a new aircraft. Present employment is around 35,000 and expanding. Approximately 70 percent of the work force is professional. In the past, McDonnell Douglas saw no need for a ridesharing program because of excellent transportation facilities and ample parking. However, with growth, McDonnell Douglas is now awakening to the fact that the transportation facilities its employees rely on are becoming congested, and the once-huge parking lot is no longer adequate. With no prospects for additional parking lots and with the need to expand, McDonnell Douglas has found itself entering the ridesharing arena. Both Aerospace and McDonnell Douglas have recently come under a new 1988 air quality regulation that requires all firms with over 100 employees at a single work site to achieve a 1.5 average commute vehicle ridership between the peak smog production hours of 6 to 10 a.m.

Aerospace Employee Commuter Profile

In early 1988, Los Angeles-based Ekistic Mobility Consultants completed an extensive employee attitudinal and demographic commuter survey of 15 large El Segundo area technical companies, including the Aerospace Corporation. The survey was directed at residents of the South Bay of Los Angeles; however, a picture of the typical aerospace company employee emerges. The typical employee is a married (survey showed 66 percent) professional (62 percent) with an annual household income over \$50,000 (50 percent). He or she tends to drive to work alone (83 percent) and is generally satisfied with commuting (84 percent). He or she tends to work in one location (89 percent) with few shift changes (93 percent). However, the overtime picture is not as rosy. The survey showed that 77 percent of the employees surveyed worked overtime, with 28 percent of those staying late 3 or more days a week and 38 percent 1 to 2 days a week. Worse yet is the fact that there seldom is advance notice of overtime (30 percent). Of the employees that stated on the survey that they would be interested in frequently using an alternate commuting mode to work (35 percent), 70 percent were male and most were in the 22 to 35 age group (43 to 36 percent were in the next highest age group, 46 to 65).

Although the survey did not include The McDonnell Douglas Corporation of Long Beach, it can be inferred that the employee demographics of McDonnell Douglas closely mirror those of the survey. Many of McDonnell Douglas's employees have worked for other aerospace firms in El Segundo and elsewhere in the past.

Aerospace Vanpool Program

The Aerospace Corporation has since 1975 operated a vanpool program that is available on a voluntary basis to its employees and those of the adjacent Los Angeles Air Force Station (LAAFS), the firm's major customer. The size of the work force at LAAFS is approximately equal to that of Aerospace. The vanpool program is entirely self-supporting and cannot be subsidized in order to permit Air Force personnel to participate in accordance with federal policies prohibiting participation in contractor-subsidized services.

Vanpool drivers and riders are covered under third-party automobile liability insurance purchased by Aerospace. The company is self-insured for comprehensive and collision. Charges for vanpool collision and comprehensive repairs are recovered from the vanpool program. Indirect staff costs to administer and promote the program are not directly charged to the vanpool program because these staff also promote and support other commute modes.

Van maintenance and fuel are charged to the vanpool program. Aerospace provides a full-service maintenance shop, including paint and body work, and a fueling station. Fuel attendants and maintenance labor are charged against the program. Instead of "running" the company vanpool program, Aerospace has established a method for the employees to run their own program. Because the program is self-supporting, Aerospace feels that riders and drivers know what is best for "their program." The program is governed by a vanpool Operator/Rider Council, a group of elected vanpool participants that provide policy and guidance for the vanpool program. The group is comprised of 11 operators and 11 riders, the term of office is 2 years, and meetings are held monthly. Issues the council discusses include fares, rider and driver policies, maintenance and safety programs, and vehicle purchase and refurbishment.

The success of the 60-plus-van Aerospace vanpool program lies in company sponsorship, employee participation in program direction, and low rider fares. The employees control "their program" and Aerospace supports the environment for success.

A partial listing of Aerospace's commuter van fares appears in Table 2. The fares listed for the shorter range commuter are under \$50/month, far below comparable vendor-supplied vans for the same mileage. As is shown in Table 3, the per rider fare on a vendor van ranges from \$100 to \$120/month. Up to 150 round-trip mi, the Aerospace program has per rider fares below \$100. Comparison with the McDonnell Douglas program will illustrate that low fares are key to accessing the 20- to 40-mi one-way commute market.

How has Aerospace been able to reduce per rider fares on its vanpools without subsidy, compared to vendor vans? The principal difference is that vendor vans are generally kept in

TABLE 2 COMMUTER VAN FARE TABLE:
AEROSPACE CORPORATION

Daily Round Trip Mileage	Approximate Monthly Per Rider Fare (\$)
30	45.00
40	49.50
50	54.50
60	59.00
70	63.50
80	68.00
90	72.50
100	77.00
110	81.50
120	86.00
130	90.50
140	95.00
150	99.50

NOTE: The above fares include lease interest, capital recovery, insurance, maintenance (labor and parts), fuel/oils, and washes. Prices effective September 1987.

TABLE 3 PRICE COMPARISON OF THREE VENDOR VANPOOLS AND THREE OWNER-OPERATED VANPOOLS (MCDONNELL DOUGLAS CORPORATION)

One-Way Commute Distance	Riders	Rider Fare Per Month (\$)
40 miles		
Vendor lease	8	100
Owner-operated	7	85 20/week
70 miles		
Vendor lease	10	117
Owner-operated	9	92
120 miles		
Vendor lease	14	120
Owner-operated	14	148 35/week

service by the vendor for a maximum of 4 years or 80,000 mi. Once a van reaches either limit, it is replaced with a new van and the old one is sold. In contrast, the Aerospace program keeps vans in service for much longer periods. For example, several 1979-vintage vans were recently "retired" after 250,000 mi and 10 years of revenue service. It is important to note that safety remains a paramount consideration within the Aerospace program. Each van receives frequent safety checks and preventative maintenance. The oldest van currently in the fleet is a 1975 model with over 160,000 revenue service mi. At appropriate intervals, usually around 120,000 mi, interiors are refurbished and engines are rebuilt, and the van continues to roll. By keeping older vans on the road through an excellent maintenance program, the capital cost of the vehicle can be amortized over a greater number of years. The single most costly item for a vanpool program is the purchase of new vehicles. Such costs include higher interest rates, more costly units, dealer preparation costs, sales taxes, and increased vehicle registration and insurance fees associated with new vehicles. These costs can be deferred or avoided through an extended vehicle retention program. By delaying the purchase of new vehicles and making old ones last longer, a program can reduce rider fares and penetrate shorter range van commute markets.

It is frequently perceived that older vans are unreliable and that riders insist on riding new vans. Performing routine maintenance and replacing old parts before they break have kept the Aerospace "old" fleet on the road with a minimum of breakdowns. Careful attention is also paid to maintaining appearance, with body work and new paint used to instill pride in the fleet and not draw attention to the age of the units. Van design has changed minimally over the years—a 1979 model in good condition looks similar to a 1989 model. There is little embarrassment in riding in an older van because all vans look similar. Riders also get attached to a van. Once they have ridden in it for a number of months they frequently resist a replacement. They get accustomed to minor imperfections and prefer lower costs to new vans. The frequently-held perception of requiring new vans for customer acceptance, safety, and reliability has not been substantiated by the Aerospace experience.

Impact on fares of additional interest costs with life-cycle costing approach

The additional interest cost between traditional lease cost recovery and life-cycle cost recovery schemes is an important consideration. In the Aerospace case, the traditional lease already includes the normal interest charge for the amortized capital loan and is recovered through fares. Aerospace management has elected not to charge its vanpool program interest for the extended portion of capital cost recovery beyond the lease expiration. However, the potential impact on Aerospace vanpool fares for the additional interest can be estimated. Assuming that Aerospace advances an estimated \$10,000 per unit to offset the difference between its monthly lease payments and the amount it collects from riders over that same period, the approximate additional carrying cost in interest cost is \$60,000/year for 60 vans at 10 percent per year. Assuming 11 paying riders per vanpool, this amounts to about \$1,000 per van annually, or about \$8 per rider per month. The median fare is approximately \$70. Thus, the interest recovery impact of life-cycle cost recovery would increase average fares by approximately 11 percent. These fares are still substantially lower than those under conventional capital cost recovery schemes.

McDonnell Douglas Vanpool Program

Until November 1986, The McDonnell Douglas Corporation had no official ridesharing program. In November, a new position of employee transportation coordinator (ETC) was created, accompanied by a modest budget. An initial "ride-matching" survey got an encouraging 47 percent return. Obviously, McDonnell Douglas employees were ready for something new. While company management reviews the option of company-sponsored vans, McDonnell Douglas employees, hampered by a modest program budget, currently access vans through two options: vendor vans and owner-operated vans.

McDonnell Douglas's vanpool program now has 19 vans and 6 in the process of forming. One vendor provides a representative on site 2 days a week to help the ETC form vanpools. McDonnell Douglas has made rapid progress in building the young van fleet over a 6-month period. Initially, some employees were turned off by the prospect of dealing with a van vendor and assuming much of the responsibility and administration of a van. Still others attempted forming vans, only to find that the costs per rider were too high to attract riders. One 40-mi one-way van recently disbanded because rider fares were too high to maintain ridership. (Subsequent to this paper, the McDonnell Douglas management approved a company-sponsored vanpool fleet at its Long Beach operations. The company has a long association with vanpooling, dating back to 1980 at its St. Louis, Missouri, area program. The St. Louis operation is the largest in Missouri, with over 100 vans in operation as early as 1981.)

As shown in Table 3, vendor per rider costs including fuel exceed \$100/month independent of trip length. With a fare that high, commuters in the shorter-range markets resist the price; the convenience of the personal automobile and free

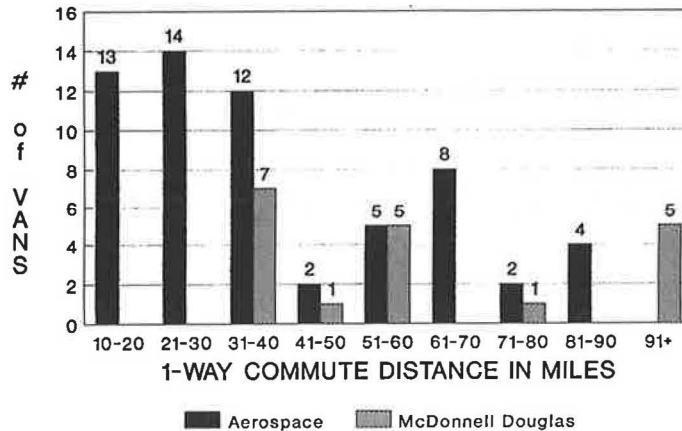


FIGURE 1 Vanpool market penetration.

parking become powerful deterrents. People at greater distances, however, will accept a higher fare because of the mileage involved and the higher costs of solo commuting (physical as well as economical).

The average mileage driven by the McDonnell Douglas vendor vans is 65 mi one-way, or 130 mi round-trip, far in excess of the 20 mi/day driven by the average commuter and far greater than the 35 one-way mileage average for Aerospace vans. As evidenced in this study and confirmed in other company programs, without subsidies the vendor van program has not proven to be able to service the substantial 20-to-40-mi one-way trip market. This means that the 25 percent "vanpool market" of commuters residing over 20 mi as discussed earlier is reduced by per rider fares to perhaps a 5 to 10 percent market. A point of interest is that the shortest van trip for McDonnell Douglas is 40 mi one-way, 80 mi round-trip, whereas the Aerospace Corporation vanpool program has vans traveling as few as 15 mi each way (see Figure 1).

Aerospace is able to penetrate the under-20-mi one-way commuter market by per rider cost reduction. Since neither program is directly company subsidized, the reduction in per rider fares attributable to the Aerospace program is realized primarily by eliminating vendor profit and by longer van retention and extended capital cost recovery.

Another interesting phenomenon is that the McDonnell Douglas program has twice as many owner-operated vans as Aerospace's program, despite its smaller overall fleet size. Over 31 percent of McDonnell Douglas's program is owner operated compared to just 5 percent for Aerospace's program. By comparing per rider costs of owner-operated vans to vendor-supplied vans (Table 3), it can be seen that the owner-operated option can provide lower per rider fares. The reduced per rider cost suggests why there is an abundance of owner-operated vans in the McDonnell Douglas program. However, by comparing the owner-operated fares for each distance to Aerospace's fares in Table 2, the additional savings of longer fleet vehicle retention can be illustrated. For example, for a 40-mi round trip the vendor per rider fare is around \$120/month, whereas the owner-operated per rider fare is only \$85. The Aerospace fare for that same 80-mi round trip is only \$68. The company program has the potential to trim per rider fares further than an owner-operated van program.

CONCLUSIONS

Although The Aerospace Corporation has only 4,000 employees and The McDonnell Douglas Corporation over 35,000, Aerospace has been able to operate over 60 vans, with many penetrating short-distance commute markets of under 20 mi one-way, by reducing its per rider fares. McDonnell Douglas, although serving a potential market four times as large, has been only able to reach the over-40-mi one-way trip market with fewer than 20 vans through a vendor- and owner-operated van program.

Vendor-operated programs result in fares in the \$100 to \$120 range. A \$120/month fare is acceptable in the long-distance commute market (even Aerospace's fare can reach \$114/month) but cannot compete in the larger medium- and short-range markets. The McDonnell Douglas program, relying primarily on vendor vans, has been unable to penetrate the under-40-mi market and only a limited portion of the over-40-mi one-way trip market, typical for a vendor program. In response to the high per rider fares of the McDonnell Douglas program, a substantial owner-operated fleet is emerging. Owner-operated vans have the potential to have fares below the \$100/month floor of vendor vans and could tap into markets under 40 mi one-way.

A company-sponsored program such as Aerospace's, through fleet purchasing, economies of scale, and extended vehicle life, has the potential to reduce per rider fares to a level of \$50/month or lower, and access the 20-to-40-mi one-way trip market. Of Aerospace's 61 operating vans, 18, or 30 percent, serve the below-40-mi one-way market. By maintaining low fares, Aerospace has been able to penetrate additional markets unreachable by unsubsidized vanpool programs.

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