

Vanpooling in the Mid-Columbia River Gorge

A Feasibility Assessment and Investigation of Employer Preferences



Prepared for the Mid-Columbia Economic Development District
By Nicolas Garcia, MCRP

June 2011



Acknowledgements

I would like to thank my exit project committee – Bob Parker, my chair, and Marc Schlossberg – for all of the guidance and support they've given me. I would also like to thank Scott Turnoy and Amanda Hoey at MCEDD for proposing the project in the first place, for their cooperation and support, and for administering the employer survey. All of these people, as well as many others less directly involved, were critical to making this project a success.

Table of Contents

Executive Summary	1
Background.....	3
Introduction	3
National Context	3
The Mid-Columbia River Gorge.....	3
Vanpooling	5
Project Objectives.....	10
Research Methods	10
Findings	11
Vanpool Feasibility Assessment.....	11
Employer Preferences Survey	18
Discussion and Recommendations	24
References.....	27
Appendix A: Case Studies.....	30

Executive Summary

Vanpooling provides an opportunity to save commuters money and diminish the external costs of an automobile-dominated transportation system. Vanpooling's effectiveness in urban and suburban areas has been established, but its success in rural areas is less well researched. Likewise, employer support is important to the success of vanpooling, but there is little research showing how agencies and non-profit organizations can encourage that support.

A survey of major employers in the Mid-Columbia River Gorge examined the role employers may fill with regard to vanpool administration and the overall feasibility of vanpooling as a transportation option for commuters in the region. Results indicate that the potential for vanpooling in the Gorge is significant but limited to a small percentage of the region's commuters and that vanpooling would be cost-effective but unlikely to yield major changes in travel patterns. Furthermore, survey responses indicate a primary concern among employers with minimizing costs and avoiding new responsibilities. This report presents the implications of survey results and identifies strategies to effectively promote vanpooling in the Gorge.

Vanpool Feasibility Assessment

The vanpool feasibility assessment indicates significant potential for vanpooling in the Gorge among a limited percentage of commuters. Potential adoption levels could vary widely depending on a number of factors. The most optimistic scenario suggests the vanpool mode share in the Gorge could reach 1.2%, which would represent a ten-fold increase over the vanpool commute share in 2000.

Employer Preferences Survey

The employer preferences survey found that employers were primarily concerned with their bottom line. They reported being most willing to provide commuter incentives that were perceived as cost-effective and made use of existing resources and capacities.

There is also evidence of an employer preference for the status quo and against uncertainty or new areas of responsibility. The least popular commuter incentives were not necessarily the most expensive: non-cash incentives, wifi on vans, use of company vehicles for errands, and flexible work hours. Rather, these incentives differ from what the employer typically provides. Meanwhile, almost a quarter of employers said they were "Very Likely" to help cover the costs of vanpooling, even though this money would come straight out of their bottom line. Vanpool promoters should be aware of employer perceptions and emphasize vanpooling as a simple and well-established transportation strategy.

Recommendations and Conclusions

Organizations seeking to encourage vanpooling among commuters in the region should start by working with the largest clusters of employers that expressed interest in vanpooling to set up a vanpool pilot program. Since most employers expressed an unwillingness to operate such a program in-house, it will be important to contract with a third party organization (e.g. VPSI, Inc., Enterprise) or a transit agency to administer the vanpool program. Third party run vanpools already exist in the region. Such contracts

would help to allay employer concerns about cost, liability, and organization time required to operate a vanpool.

A vanpool program in the Mid-Columbia region should leverage proven success factors shown to increase vanpool adoption, including:

- **Financial incentives for first-time vanpoolers** during the first 4-6 months to help form commuter habits.
- **Provision of emergency ride home services** to decrease the perceived barriers to vanpooling.
- Participating employers and program partners actively **educate employees about vanpooling and promote vanpooling as a beneficial ridesharing strategy.**
- **Resource and training assistance to employers** to help them promote vanpooling.
- **Direct follow-up with potential and active vanpoolers** to minimize attrition rates.
- **A fare structure based on distance and gas prices** rather than on the number of people in a van.
- **Promotion of vanpooling and carpooling together** as part of a larger effort to promote ridesharing – vanpooling has a greater impact per rider, but carpooling is more flexible and requires less commitment.

All of these strategies have the potential to increase the number of people vanpooling in the Gorge. Although widespread adoption is far from certain, factors such as rising gas prices and increasing environmental awareness mirror the conditions of the 1970s that gave rise to vanpooling in the first place. If Gorge employers and regional partners can begin to foster vanpooling now, the region will benefit from increased transportation options, reduced vehicle miles traveled, and reduced commuter expenditures on fuel.

Background

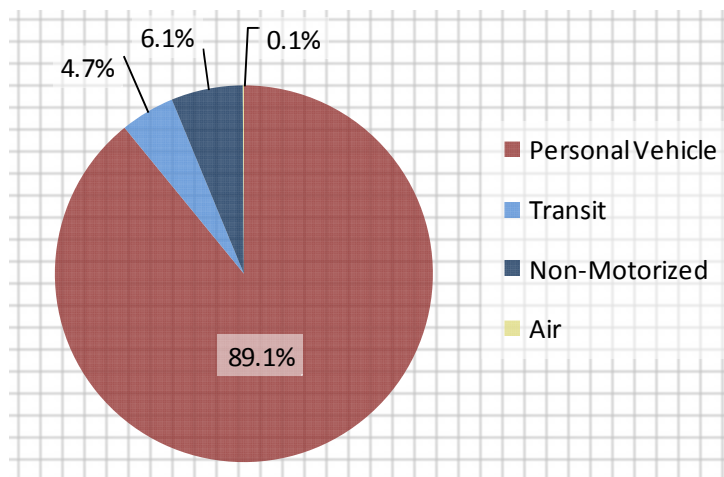
Introduction

Vanpooling provides an opportunity to save commuters money and diminish the external costs of an automobile-dominated transportation system. Vanpooling’s effectiveness in urban and suburban areas has been established, but its success in rural areas is less well researched. Furthermore, employer support is important to the success of vanpooling, but few studies have shown how agencies and non-profits can encourage that support.

National Context

Personal motorized vehicles (cars, vans, SUVs, pickup trucks, etc.) are the primary mode of transportation for U.S. residents, accounting for 89% of all trips (see Figure 1), and 92.5% of trips farther than 1 mile in 1995 (U.S. Bureau of Transportation Statistics 2001). Commuting to work accounts for nearly 15% of all trips, but accounted for a great proportion of total passenger miles traveled in 1995 at 23% (U.S. Bureau of Transportation Statistics 2001, 2009). The U.S. transportation system carries heavy costs, which can be roughly broken into two categories: private costs and public costs.

Figure 1: U.S. Mode Share, All Trips (1995)



Source: U.S. Bureau of Transportation Statistics 1995

Private costs associated with the high percentage of trips made in single occupancy vehicles (SOVs), include fuel, repairs, vehicle depreciation, and insurance premiums, which have been estimated at over \$8,000 for a year of vehicle ownership (AAA 2008). Other cost considerations of SOV use include the opportunity cost of time spent driving (an average of 55 minutes per day per U.S. resident), the risk of collisions, the stress of driving in congested conditions, and the long-term health consequences of a sedentary, automobile-dependent lifestyle. Public costs of SOV use include local pollution, congestion, construction and maintenance of road infrastructure and parking spaces, climate change, injuries and loss of life due to accidents, and national dependence on foreign oil. In total, estimates of the private and public costs of the ubiquitous use of SOVs in the U.S. range from \$183 billion per year to \$1.37 trillion per year (Parry et al. 2007, Delucchi 1998).

The Mid-Columbia River Gorge

The transportation challenges facing the nation are also present in the Mid-Columbia River Gorge. The five-county region includes Klickitat and Skamania counties in southern Washington, and Hood River, Wasco, and Sherman counties in northern Oregon. Almost 81,000 people resided in the Gorge in 2010,

an increase of about 7% from 2000 levels. The Gorge is a predominantly rural area, with an average population density of about 11 people per square mile, well below the U.S. average of 81, the Oregon average of 39 and the Washington average of 94.

Table 1: Mid-Columbia River Gorge Population Characteristics

Geographic Area	Total Population		Pop. Change 2000 to 2010	Land Area (sq mi)	Pop. Density 2010 (ppl/sq mi)
	2000	2010			
United States	281,421,906	308,745,538	9.7%	3,803,290	81.2
Oregon	3,421,399	3,831,074	12.0%	98,381	38.9
Washington	5,894,121	6,724,540	14.1%	71,300	94.3
The Gorge	75,169	80,708	7.4%	7,254	11.1
Hood River County	20,411	22,346	9.5%	522	42.8
Sherman County	1,934	1,765	-8.7%	823	2.1
Wasco County	23,791	25,213	6.0%	2,381	10.6
Klickitat County	19,161	20,318	6.0%	1,872	10.9
Skamania County	9,872	11,066	12.1%	1,656	6.7

Source: U.S. Census 2000, 2010

Gorge counties display similar commute patterns to state and national averages, with a few key differences (see Table 2 below). Transit mode share is less than 1% throughout the region, but regional walk-to-work and work from home mode share is significantly higher than the state and national averages. Coupled with limited transit service in the Gorge, current travel habits present an opportunity for vanpooling to fill transit gaps and provide commuting services to residents of the Gorge.

Table 2: Mid-Columbia River Gorge Commute Mode Shares

Commute Mode	Geographic Area								
	US	OR	WA	The Gorge	Hood River County	Sherman County	Wasco County	Klickitat County	Skamania County
Drive Alone	75.7%	73.2%	73.3%	73.7%	72.2%	71.6%	75.7%	71.8%	76.0%
Carpool	12.0%	12.1%	12.6%	13.5%	12.2%	8.5%	13.3%	15.3%	14.8%
Vanpool	0.2%	0.1%	0.3%	0.1%	0.2%	0.0%	0.2%	0.1%	0.1%
Public Transit	4.7%	4.2%	4.9%	0.4%	0.4%	0.0%	0.3%	0.7%	0.5%
Walk	2.9%	3.6%	3.2%	5.0%	6.5%	9.8%	4.8%	4.5%	2.3%
Bicycle	0.4%	1.1%	0.6%	0.3%	0.5%	0.3%	0.2%	0.3%	0.1%
Other	0.8%	0.8%	0.9%	0.8%	0.6%	0.4%	0.8%	1.2%	0.6%
Work from Home	3.3%	5.0%	4.3%	6.2%	7.5%	9.5%	4.8%	6.2%	5.7%

Source: U.S. Census 2000

Given its low population density, traffic congestion is not a major concern in the Gorge (Hoey 2010). However, the area has low income levels, as the median income in each of the Gorge counties is lower than the national, Oregon, or Washington median income (U.S. Census 2000). In addition, wage rates were only 64%-83% of the national average in 2007 (MCEDD 2010). The economic and demographic conditions, coupled with the area's low density and limited transit options, result in a relatively high percentage of Gorge residents' income that is likely spent on transportation.

Vanpooling

In response to the high social cost of SOV use, many public agencies, private companies, and non-profit corporations have implemented transportation demand management (TDM) measures aimed at reducing SOV mode share. TDM is an attempt to encourage travelers to switch from SOVs to other modes using incentives, pricing, education, improvement of alternative modes, or a combination of strategies. Vanpooling is one TDM approach.

Vanpooling can be employed to serve a variety of travel needs, but it is “generally defined as 5 to 15 people commuting to and from work together in a van. The vehicle’s capital costs and all related fuel, maintenance, and insurance expenses are paid by the participants,” (Mielke 2006). The practice arose in the 1970s to mitigate the effects of the oil crisis on commuters. In 1973, the 3M Company east of St. Paul, MN initiated what is considered to be the first vanpool program for employees (Evans and Pratt 2005). Vanpool use peaked with between 15,000 and 23,000 vanpools in operation in the late 1970s and early 1980s (Evans and Pratt 2005). Lower gas prices and a booming economy in the 1990s contributed to a drop to about 8,500 vanpools in operation by 1998-99. However, vanpool use has grown in recent years, with an estimated 10,000 operational vanpools by 2005 (Evans and Pratt 2005). The resurgence may be a response to increasing fuel prices, environmental awareness, and government support for vanpooling, and can be expected to continue as fuel prices continue to rise and commuters turn to more thrifty travel options.

Types of Vanpool Programs

Vanpool programs come in many forms. A common way to categorize vanpool programs is by the type of organization or individual responsible for the direct operational costs, organization, and financial risk of running a vanpool program (Evans and Pratt 2005). There are three primary types of ownership strategies:

- **Employer-sponsored Vanpool Programs**
- **Individual Owner-Operator Vanpool Programs**
- **Third-Party Vanpool Programs:**
 - **Public-interest Third-Party Vanpool Programs** (non-profit corporations, public transit agencies, and other public entities)
 - **Private Corporation Third-Party Vanpool Programs**

In the early days of vanpooling, employer-sponsored programs were the most common form of vanpool. Now, third-party programs are much more common, both in the form of privately operated programs and public-interest programs (Evans and Pratt 2005). Among private third-party vanpool operators, the largest company by far is VPSI, Inc., which operates over 5,000 vanpools in the U.S. and Europe (VPSI 2011). VPSI, Inc. and Enterprise Rideshare currently operate vanpools in the Mid-Columbia Gorge region.

Among public interest vanpool operators, transit agencies have become the most common, increasing from operating 447 vanpools in 1984 to almost 4,000 by 2001 (Wambalaba 2004). About 40% of the transit agency sponsored vanpool programs in the U.S. are in the Puget Sound region, largely because of public policies that support vanpooling in the Seattle metro area.

Vanpool programs vary in terms of the incentives offered by operators to commuters, or by governments and non-profits to participating employers.

Common incentives offered by vanpool operators to encourage vanpooling

- **Direct financial incentives**, through which the vanpool operator helps employees cover the cost of vanpooling, either as an incentive for signing up or on a continuing basis. Up to \$230/month of this sort of expenditure can be tax-free under the Federal Commuter Choice Program.
- **Parking incentives**, in the form of more convenient and cheaper (or free) parking for vanpool vans or an increase in the cost of parking for SOVs.
- **Non-cash incentives**, whereby employees who participate in vanpooling are recognized or rewarded in the form of gift cards, raffle tickets, discounts at local stores, etc.
- **Driver incentives** in the form of rewards to the vanpool driver or backup driver, such as free rides, cash compensation, and personal use of the van on weekends.
- **Flexibility strategies** that mitigate the inflexibility of vanpooling relative to driving alone. These include Emergency Ride Home (ERH) services (often in the form of subsidized taxi fares) for employees who miss their scheduled vanpool ride home or who experience a family emergency, mid-day shuttle service allowing employees to run errands during their lunch hour, and flexible work hours to make it easier to find a vanpool schedule that works for all participants.
- **Convenience strategies** that improve the relative convenience of vanpooling through services such as door-to-door pick-up/drop-off and wifi on vans.
- **Organizational support** such as hosting a ride-matching service to make it easier for employees find others who live nearby, and to help determine the most convenient vanpool route.
- **Outreach, education, and promotional** efforts advertising vanpool services to commuters and providing them with informational materials.

Incentives provided by governments or non-profits to employers

- **Direct subsidies** in the form of cash grants, tax breaks on vanpool support costs through the Federal Commuter Choice Program, interest-free vehicle loans, or covering the cost of empty seats in a vanpool which is actively seeking new members.
- **Commute time/cost strategies** such as High Occupancy Vehicle (HOV) lanes and preferential tolling structures at highways and bridges.
- **Organizational support strategies** such as resources, training, and/or informational materials that are provided free of charge to help employer staff organize or promote a vanpool program, or ride-matching and routing services that are provided free of charge.
- **Employer promotion strategies** such as offering space for advertisements on vans or some form of positive public recognition of employer participation in the vanpool program. (Ungemah 2009, Evans and Pratt 2005)

Potential Benefits and Drawbacks of Vanpooling

Commuters choose to vanpool, and governments, nonprofits, and employers choose to support vanpooling because of the many benefits it can offer, from cost savings to better air quality to a more relaxing commute. However, many people choose to drive alone rather than use vanpooling. The primary reasons for SOV use include the relative inconvenience, inflexibility, and increased travel time of vanpooling compared to driving alone, on average 10-12 minutes more each way than SOV commuting (Evans and Pratt 2005, CTAA 2008). Table 3 below outlines the potential benefits and drawbacks of vanpooling to each associated entity.

Table 3: Benefits and Drawbacks of Vanpooling

	Benefits	Drawbacks
To Commuters	<ul style="list-style-type: none"> • Reduced commute cost • More relaxing commute • Possibility of doing work during commute • Knowledge of reduced environmental impact • Financial benefit from pre-tax vanpool credit (up to \$230/month) • Program-specific benefits and incentives 	<ul style="list-style-type: none"> • Less flexibility in commuting • Less ability to run errands during or immediately after work • Lack of privacy during commute • Slightly longer commute times • Time needed to find and/or organize a vanpool
To Employers and Vanpool Operators	<ul style="list-style-type: none"> • Improved recruitment and retention of employees • Decreased need to construct, rent, or maintain costly parking spaces • Free up parking spaces for customers and visitors • Better employee on-time performance • Financial benefit from pre-tax vanpool credit (up to \$230/month) 	<ul style="list-style-type: none"> • Staff time needed to promote and/or organize a vanpool • Cost of subsidies or incentives • Up-front capital cost of vans • Maintenance costs of running the vanpool program • Decreased opportunity for employee overtime work
To Governments, Non-Profits, Society at Large	<ul style="list-style-type: none"> • Reduced congestion • Reduced local pollution • Reduced carbon emissions • Less traffic leading to need for costly infrastructure repair or expansion • Reduced dependence on foreign oil • Reduced likelihood of automobile collisions 	<ul style="list-style-type: none"> • Vanpools cause the same external costs as SOVs, but at a reduced level

Source: Evans and Praff 2005, CTAA 2008

Vanpool Program Success Factors and Best Practices

Despite all of its potential benefits, vanpooling accounts for only 0.2% - 0.5% of commute trips nationwide (US Census 2000). However, within employment sites that have implemented vanpool programs, mode share regularly accounts for 5% of employees' commute trips, and sometimes over 20% of commute trips (Wegmann 1989).

Many factors affect a vanpool program's success or failure in attracting commuters. Perhaps most important is the structural context in which the vanpool operates. The relative location of employment centers and employee residences, the capacity and design of the road network, the legal environment surrounding vanpooling, and the price of fuel all have profound effects on the success of a vanpool program. Additionally, the organization of the vanpool program itself has important effects on its chance for success. A survey of the literature on vanpooling resulted in the following conclusions about the effects of certain factors on vanpool success:

- **Commute distance:** Many vanpool studies cite commute distance as an important factor in vanpool success, with longer commutes being more conducive to vanpooling. The minimum optimal one-way distance for a vanpool trip is usually cited as 15 or 20 miles (Maxwell and McIntyre 1979, Wiersig 1981, Torluemke and Roseman 1989). The observed average trip length for vanpool programs ranges from 24 to 54 miles (Evans and Pratt 2005).
- **Employer size:** The more employees at a site, the greater the potential for vanpooling. However, there does not appear to be a significant correlation between employer size and the percent of employees participating in vanpooling (Wegmann 1989).
- **Vanpool fare:** Many different fare elasticity of demand* values have been calculated, but most settle on the -0.65 to -0.95 range (Evans and Pratt 2005, Wambalaba 2004). Vanpool commuters respond well to a simple and stable fare structure. A number of programs have implemented a "flat rate" fare system, wherein the fare is based on distance traveled, not on the number of people in the van (Ungemah 2005). The Pace VIP program in Chicago is a good example of a successful flat rate system (see Appendix A: Case Studies).
- **Subsidy effect:** When a subsidy is provided to encourage vanpool ridership, the effect can range from small but significant, i.e. commuters are 8.9% more likely to join with the subsidy than without, to fairly major, with 79% more likely to join (Wambalaba 2004). Subsidies to new vanpoolers are particularly cost effective. For example, interest-free loans to potential operators led to the formation of 63 new vanpool groups in Connecticut, and four months of subsidization was sufficient to form a habit among participants in the Ventura Vanpool program (Barone and Jain 1986, Kodoma 1991).

* Fare elasticity of demand is the amount of change in demand for a given change in price. For a vanpool fare elasticity of demand of -0.8, every 10% increase in the cost of vanpooling will correspond to an 8% decrease in the number of people vanpooling. This means that a vanpool operation can likely increase its revenue by increasing fares.

- **Emergency ride home (ERH):** The effectiveness of providing emergency ride home services (ERH) to increase vanpooling is uncertain. An ERH program increased High Occupancy Vehicle mode share among a small group of participants in Bellevue, WA (Kadesh and Elder 1989). However, Polena and Glazer (1991) found no significant correlation between ERH and ridesharing, although almost all program coordinators in their study cited ERH service as important to their programs' success.
- **Outreach and employer support:** Outreach, education, and employer support all help a vanpool program achieve success. Active employer promotion of ridesharing helps ensure long-term success, particularly when combined with wider promotional efforts by government or nonprofits (Chun 1993). Additionally, direct follow-up calls to vanpool participants, though labor-intensive, have proved to be an effective way to lower membership attrition rates (Hershey and Hekimian 1983, Chambers 1981).

Aside from commute distances and employer size, government agencies or non-profits interested in promoting vanpooling would likely be able to address most of the above factors, such as vanpool fares, subsidization, and the presence or absence of ERH services. However, gaining employer support can be more complicated. Employer buy-in is very important to the success of a vanpool program, but often it is not clear what a government or non-profit can do to ensure active employer support. Although there is some research on the relative attractiveness of different types of vanpool programs to commuters, previous studies have not addressed what makes a vanpool program more or less attractive to the employers who must support it with their staff time and resources.

Project Objectives

Based on the current state of the transportation system in the Mid-Columbia River Gorge, and the identified gaps in the research surrounding vanpooling, this study aims to do two things:

1. **Assess the viability of vanpooling as a commute option for residents of the Gorge**, in order to mitigate the private costs and external costs of SOV use.
2. **Meet the need for research on how to encourage employer support of vanpool programs** by surveying major Gorge employers about the specific vanpool program incentives and design elements which would be most attractive to them.

Research Methods

This study includes a vanpool feasibility assessment for the Mid-Columbia River Gorge area, and a survey of employer preferences for that area. The vanpool feasibility assessment and the employer preferences survey were both based on data gathered in an online survey of major employers in the Gorge. The survey was sent to 41 employers with at least 80 employees.

The vanpool feasibility assessment consisted of four interrelated analyses:

1. **Market Analysis**, estimating the range of potential vanpool adoption in the Gorge.
2. **GIS Spatial Analysis**, refining the market analysis by identifying high-potential target areas.
3. **Financial Feasibility Assessment** detailing the financial cost of maintaining a vanpool program.
4. **Benefit-Cost Analysis**, estimating the total potential social costs and benefits of vanpooling the Gorge based on the previous analyses.

The employer preferences survey aimed to determine how employers can be encouraged to support vanpooling. Survey questions addressed the following subjects: benefits of vanpooling, concerns about vanpooling, vanpool program organizational structures, incentives to encourage employer promotion of vanpooling, and incentives to encourage commuter participation in vanpooling.

Findings

In the Mid-Columbia River Gorge, there is significant potential for vanpooling among a limited percentage of the commuting population. Responses to the employer preferences survey show that employers tend to value elements of vanpooling that reduce or minimize their own costs, or at least maintain the status quo in terms of employer responsibilities. Employers value the benefits of vanpooling to their employees, but the benefits tend to be of secondary importance to program costs.

This chapter presents the findings from the vanpool feasibility assessment for the Mid-Columbia River Gorge (Gorge) and describes the employer preferences survey results and data analysis related to perceptions of vanpooling program structures and incentives.

Vanpool Feasibility Assessment

The vanpool feasibility assessment attempts to measure the potential for vanpool adoption in the Gorge. The assessment includes a vanpool market analysis of the Gorge, a GIS analysis of suitable employment clusters in the area, a financial feasibility assessment, and a benefit-cost analysis of vanpooling in the Gorge.

Market Analysis

The techniques used for the market analysis were modeled on those used in past vanpool feasibility assessments and used existing data on vanpool adoption rates to estimate the potential market size and adoption rate for vanpooling in the Gorge (iTrans 2007, Bailey 1983). The analysis focused on three primary success factors to estimate vanpool market size: large concentrations of workers, long-distance commute patterns (>15 miles), and employer support for vanpooling. Other possible success factors, including high fuel prices, a lack of reasonable transit options, and dense residential clusters, were excluded from this portion of the analysis either because data were unavailable or because the effect of these factors on vanpool adoption has not been measured.

Figure 2: Employer Response to “Would you support vanpooling?”

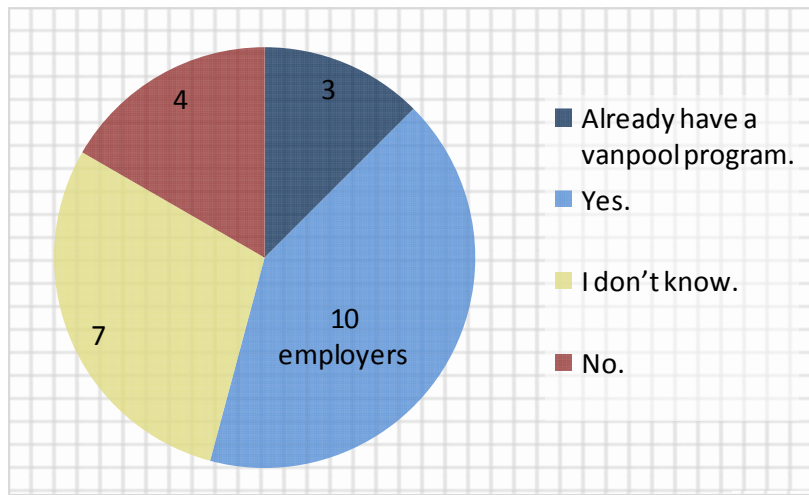


Figure 2 above illustrates the proportion of employers surveyed who would support vanpooling. Beyond the three employers with existing vanpool programs, 10 employers (representing 1,785 employees) affirmed their support. Of the employees represented by these organizations, 572 are long-distance commuters traveling at least 15 miles each way. Figure 3 below shows the number of long-distance commuters (employees) associated with employers who would or would not support vanpooling.

Responses regarding employer support and the associated proportion of long-distance commuters inform estimates of similar commute habits among non-respondent organizations (see Figure 3). Using different assumptions about the validity of these estimates and the likelihood of those in the “I don’t know” category to support a vanpool program, four possible market size estimates were assembled, ranging from conservative (572 employees) to very optimistic (1880 employees). The market size estimates were combined with a similar set of four vanpool adoption rates, outlined in Table 4 below. The estimated “most likely” vanpool mode share represents the average vanpool mode share derived from a 2005 Evans and Pratt study and dataset of vanpool programs. The conservative vanpool adoption rate is half of the average; the optimistic rate was calculated using the Evans and Pratt data by excluding all employers with more than 1,000 employees; and the very optimistic rate represents a typical example of a highly successful vanpool program.

Figure 3: Employer Response to “Would you support vanpooling?” by Number of Potential Vanpoolers

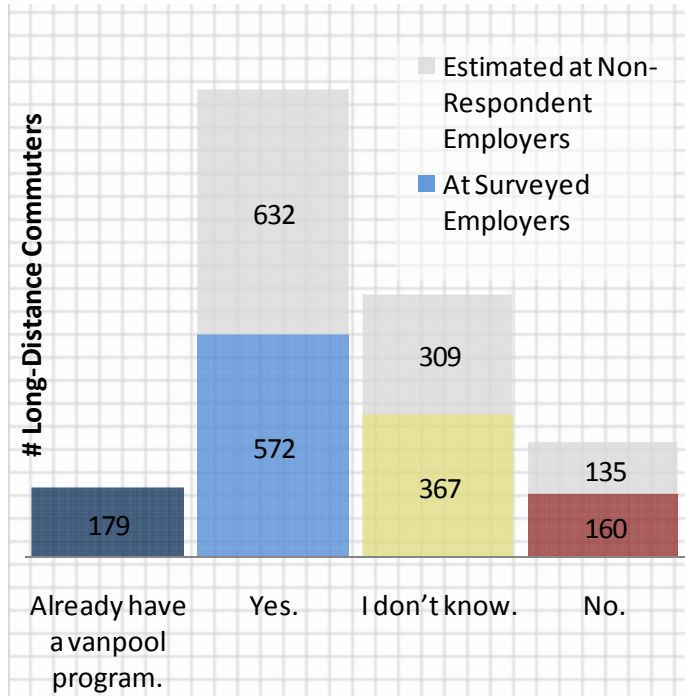


Table 4: Vanpool Market Analysis Results

Expected Vanpool Participants	Participation Rate	Yes Responses	Yes + ‘I don’t know’ Responses	Yes - Total Market Estimate	Yes + ‘I don’t know’ - Total Market Estimate
Conservative Estimate	3.7%	21	34	44	69
Most Likely Estimate	7.3%	42	69	88	137
Optimistic Estimate	11.2%	64	105	135	211
Very Optimistic Estimate	20.0%	114	188	241	376
Maximum Possible Market Size		572	939	1204	1880

Expected Number of Vans	Participation Rate	Yes Responses	Yes + ‘I don’t know’ Responses	Yes - Total Market Estimate	Yes + ‘I don’t know’ - Total Market Estimate
Conservative Estimate	3.7%	3	3	4	5
Most Likely Estimate	7.3%	5	7	9	10
Optimistic Estimate	11.2%	8	11	14	16
Very Optimistic Estimate	20.0%	14	19	24	28
Van Occupancy Rate		8	10	10	14

Multiplied together, the market sizes and adoption rates yield a matrix of possible outcomes for a vanpool program (see Table 4), ranging from very limited adoption of vanpooling (21 employees in 3 vans) to widespread use (376 employees in about 28 vans). The most likely range of adoption is 69 to 135 employees occupying 7 to 14 vans, which would lead to an increase in vanpool mode share from about 0.1% to 0.3%-0.5%. Table 5 below shows the potential effects of vanpooling on mode shares in the Gorge.

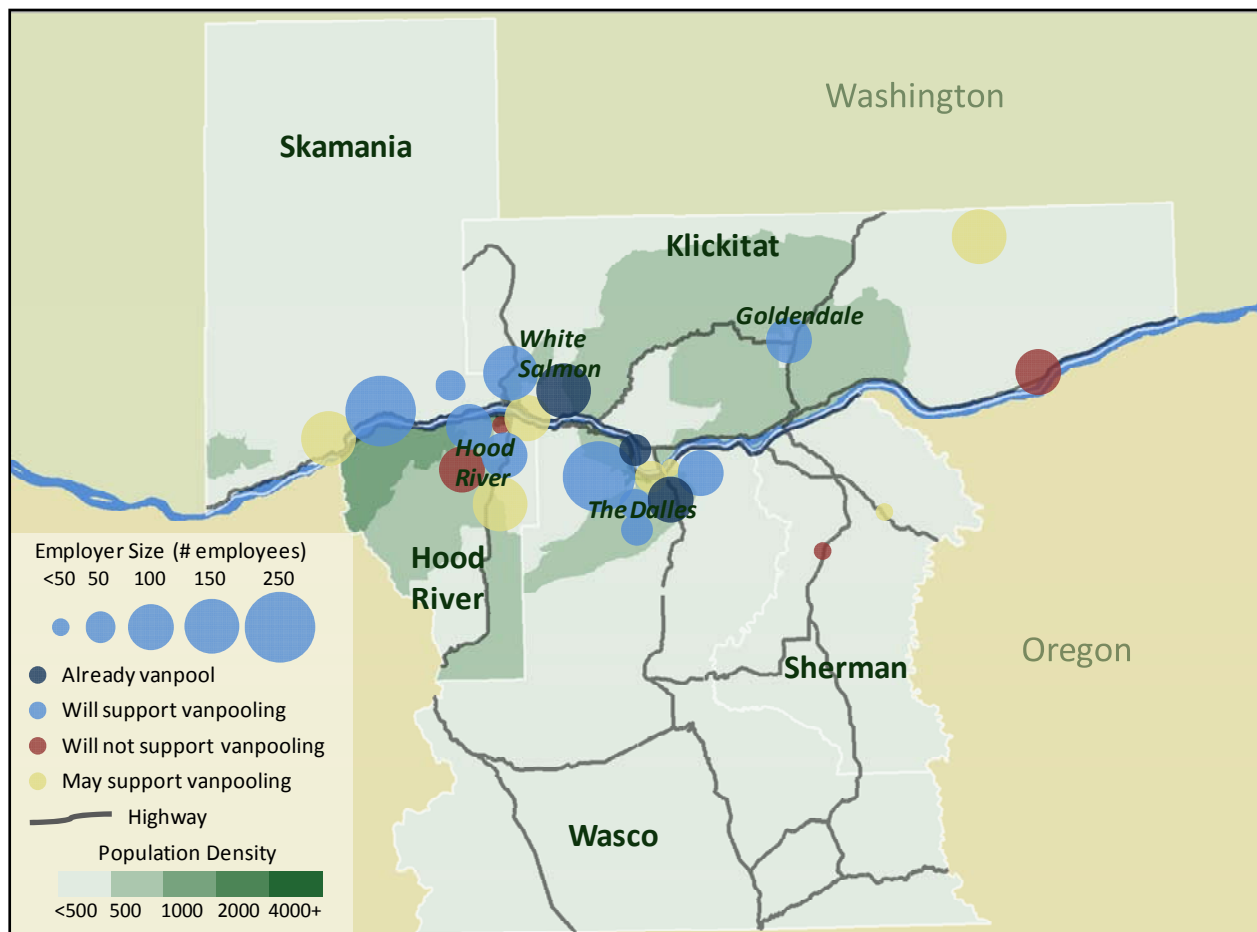
Table 5: Potential Commute Patterns in the Gorge, with Vanpooling

	Conservative	Most Likely	Optimistic	Very Optimistic
Potential New Vanpoolers	21	69	135	376
SOV Commuters	25,330	25,282	25,216	24,975
Vanpool Commuters	68	116	182	423
SOV Mode Share	73.6%	73.4%	73.2%	75%
<i>Potential Vanpool Mode Share</i>	<i>0.2%</i>	<i>0.3%</i>	<i>0.5%</i>	<i>1.2%</i>

GIS Analysis

Spatial characteristics play a major role in the success of any transportation system and vanpooling is no exception. Geographic Information Systems (GIS) software was used to assess the spatial characteristics of employment in the Gorge as it relates to vanpooling. Map 1 below shows the Mid-Columbia region and the general location of employers in the area that responded to the survey. The size of each dot indicates the number of people employed at that site, and the color of each dot indicates the response of the employer to the question “Would you promote vanpooling?” This map illustrates that most of the survey responses are from employers located in The Dalles or Hood River.

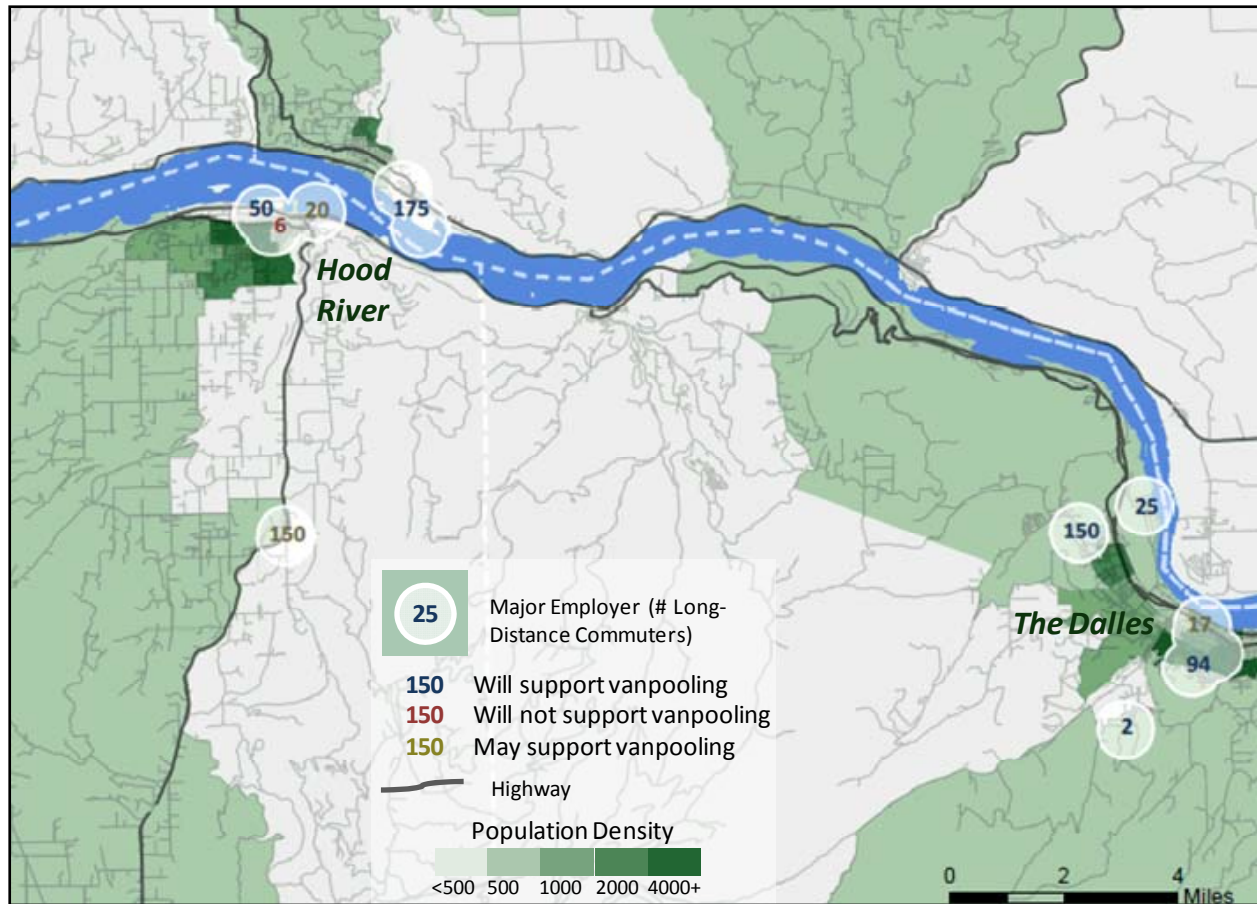
Map 1: Mid-Columbia River Gorge Employer Survey Respondents



Source: U.S. Census Bureau 2010

Multi-employer vanpooling has been shown to be successful, but difficulties arise when employers are more than one mile away from one another (Weisbrod 1981). Map 2 provides a close-up view of the Hood River-The Dalles area, and identifies some of the employment clusters in the Gorge most suitable for vanpooling. A half-mile buffer surrounds each employment site. Sites whose buffers intersect are within one mile of each other, forming a cluster of employment suitable to vanpooling. Each cluster is labeled with the number of employees in that cluster that commute more than 15 miles each way, and the label color indicates how whether the employer would you promote vanpooling.

Map 2: High-Potential Vanpool Sites in the Mid-Columbia River Gorge



Source: U.S. Census Bureau 2010

As Map 2 shows, there are several employment clusters with the potential to be served by vanpooling. These clusters represent high priority targets for a vanpool program, because they are more likely to yield significant ridership. Ultimately, the eventual level of vanpooling will depend in large part on the home addresses of the employees within the clusters. As Maps 1 and 2 show, population density is clustered in the urban areas of Hood River, White Salmon/Bingen, The Dalles, and others, which indicates potential for vanpooling for residents of one urban area who commute to another for work. Commuters from outside urban areas may not live close enough to others to make vanpooling viable.

Taken together, the market analysis and GIS analysis suggest that vanpooling has significant potential for success in the Gorge, as well as barriers related to its geography and employment patterns. This is in keeping with past experience with rural vanpooling, such as the Palouse Rideshare program in Idaho (see Appendix A: Case Studies).

Financial Feasibility Assessment

A detailed lifetime profit and loss statement was taken from Herk (1981) and updated using 2010 input costs and fuel efficiency levels to determine the financial feasibility of vanpooling in the Gorge. Conservative, mid-range, and optimistic assessments of vanpool operation costs were completed based on assumptions about the price of fuel, average van occupancy, trip length, and other factors.

The primary output of this model was a minimum monthly per-passenger fare rate required for the vanpool program to break even within the first year. The model also calculated the annual net operating expenses per van of a vanpool program. Table 6 presents the breakeven monthly fare point and net annual operating costs for each assessment.

Table 6: Vanpool Feasibility Assessment Results

	Conservative	Most Likely	Optimistic
Year 1 Break-Even Monthly Fare per Passenger	\$ 186	\$ 123	\$ 72
Year 1 Net Annual Operating Cost	\$ 16,744	\$ 13,333	\$ 10,770

The results of the financial feasibility assessment are roughly in line with contemporary vanpooling costs (Valley Vanpool 2009, Kay 2010). However, they do appear to be lower than estimated costs through private contractors. A 2007 cost model analysis by IBI Group found annual leasing costs (fuel, tax, and subsidies not included) to be about \$11,000-\$12,000, about \$1000-\$2000 higher than the analysis performed above. The actual costs will depend on a number of factors specific to the vanpool program itself, and may be lower if employer or government subsidies can be secured.

Benefit-Cost Analysis

The potential benefits and costs of vanpooling in the Gorge were derived from the range of estimated vanpool adoption levels from the market analysis and data estimating the private and social costs of automobile use. Analysis focused on private savings in the form of reduced fuel consumption – benefits that accrue to individual commuters – as well as public savings such as emissions reduction and reduced cost of externalities. Externalities are difficult to account for because they affect a broad range of parties and scales, from local to global. For this study, externalities considered include automobile collisions (affecting only those involved in the accident), congestion (a cost borne by all commuters), parking construction (paid for by the employer or the local municipality), local pollution (affecting all Gorge residents), oil dependency (affecting the entire nation), and climate change (affecting the global population). The complete results of the benefit cost analysis are presented in Table 7.

The total net benefits of vanpooling in the mid-range, “most-likely” case added up to about \$140,000 per year. This amount consisted of \$107,000 in fuel savings and \$117,000 in reduced external costs from SOVs, from which was subtracted \$83,000 in total vanpool operating costs. This translates to a benefit-cost ratio of 2.7 for vanpooling in the Gorge. The slightly more optimistic scenario estimated a net benefit of \$276,000 per year, also with a benefit-cost ratio of 2.7. In contrast, the conservative scenario found the costs of vanpool promotion to be slightly greater than the benefits, for a loss of about \$1,400/year and a benefit-cost ratio of 0.96. Finally, to set an upper bound on the possible benefits of vanpooling, a highly-optimistic, wide-scale adoption scenario was calculated. The net benefits of such a scenario were much higher – over \$2 million per year, with the benefits outweighing the costs by a factor of almost 8 to 1.

In the most likely scenario, vanpooling reduced CO₂ emissions by 259 tons per year—a significant reduction, but less than one tenth of one percent of the Gorge’s total transportation CO₂ emissions, as

estimated using national per capita VMT and fuel usage data (U.S. Department of Energy 2011). Emissions reductions estimates for local pollutants were slightly higher. In the very optimistic scenario, emissions reductions for CO₂ and local pollutants were each about 0.6%.

Table 7: Estimated Annual Benefits of Vanpooling in the Gorge (Benefit-Cost Analysis Results)

	Conservative	Most Likely	Optimistic	Very Optimistic
Potential Vanpooling				
Number of Vanpoolers	21	69	135	376
Number of Vans	3	7	14	28
First Order Effects of Vanpooling				
VMT Reduction (VMT)	148,941	637,611	1,247,500	4,320,101
Fuel Conservation (gal)	5,705	26,718	52,273	189,581
Fuel Cost Savings (\$)	\$ 17,115	\$ 106,870	\$ 209,094	\$ 947,903
Emissions Reductions				
Carbon Emissions Reduction (%)	0.016%	0.076%	0.149%	0.539%
CO Emissions Reduction (%)	0.022%	0.093%	0.182%	0.620%
HC Exhaust Emissions Reduction (%)	0.022%	0.092%	0.180%	0.615%
NOx Emissions Reduction (%)	0.021%	0.091%	0.178%	0.610%
External Cost Reductions				
Climate Change	\$ 300	\$ 3,366	\$ 6,586	\$ 143,323
Dependence of Foreign Oil	\$ 449	\$ 3,366	\$ 6,586	\$ 99,530
Local Pollution	\$ 3,128	\$ 13,390	\$ 26,197	\$ 90,722
Congestion	\$ 5,474	\$ 33,475	\$ 65,494	\$ 294,847
Accidents	\$ 3,128	\$ 20,085	\$ 39,292	\$ 317,527
Parking	\$ 4,692	\$ 43,517	\$ 85,142	\$ 453,611
Total External Cost Reduction	\$ 17,170	\$ 117,199	\$ 229,302	\$ 1,399,560
Total Monetized Benefits	\$ 32,285	\$ 224,069	\$ 438,396	\$ 2,347,463
Operating Costs				
Operating Cost per Van (\$)	\$ 13,588	\$ 12,020	\$ 12,020	\$ 10,770
Total Operating Costs	\$ 35,669	\$ 82,935	\$ 162,263	\$ 299,976
Net Benefits (\$)	\$ (1,384)	\$ 141,134	\$ 276,133	\$ 2,047,487
Benefit-Cost Ratio	0.96	2.70	2.70	7.83

In terms of monetized benefits, reduced fuel costs accounted for slightly less than half in each scenario. Following these private benefits in decreasing order of magnitude were the social costs of parking infrastructure, congestion, accidents, local pollution, oil dependency, and climate change. However, congestion is not a major concern in the Gorge, and typical CO₂ emissions valuations are arguably a gross underestimate of the costs of climate change (Weitzman 2009).

The results of this benefit-cost analysis are in keeping with the national experience with vanpooling: there are significant benefits and vanpooling is very cost-effective – but its effects are fairly small relative to the size of the transportation system.

Employer Preferences Survey

Prompted by the lack of research about what makes a vanpool program more or less attractive to employers, the survey of large employers in the Gorge posed questions about employer perceptions of benefits, concerns, program structures, and incentives associated with vanpooling.

Characteristics of Survey Population and Respondents

The employer survey achieved a response rate of about 59%. Twenty-four employers, employing a total of over 3,500 people, provided usable survey responses. Employers who responded ranged in size from 34 to 371 employees (employers with multiple locations were asked to consider the largest number of employees at one location or place of business), with an average of about 155 employees.

Seventeen of the respondents, representing 59% of the employees employed by respondents, are based in Oregon in either The Dalles (9) or Hood River (6). Nearly 57% of employees represented by survey respondents work in The Dalles or Hood River. Respondent organizations include public agencies and private companies from a variety of sectors including the agricultural/food processing, industrial, technology, medical, and service sectors.

The group of organizations that did not respond to the survey consists of 21 employers representing 4,357 employees, based on existing employment data supplied by Mid-Columbia Economic Development District (MCEDD). However, most responding organizations reported fewer employees than had been listed in MCEDD's records prior to the survey; on average, the number of employees at the time of the survey was 69% of the number of employees on record prior to the survey. Assuming this proportion holds for non-response organizations, the 21 non-respondent employers likely represented approximately 3,000 employees at the time of the survey.

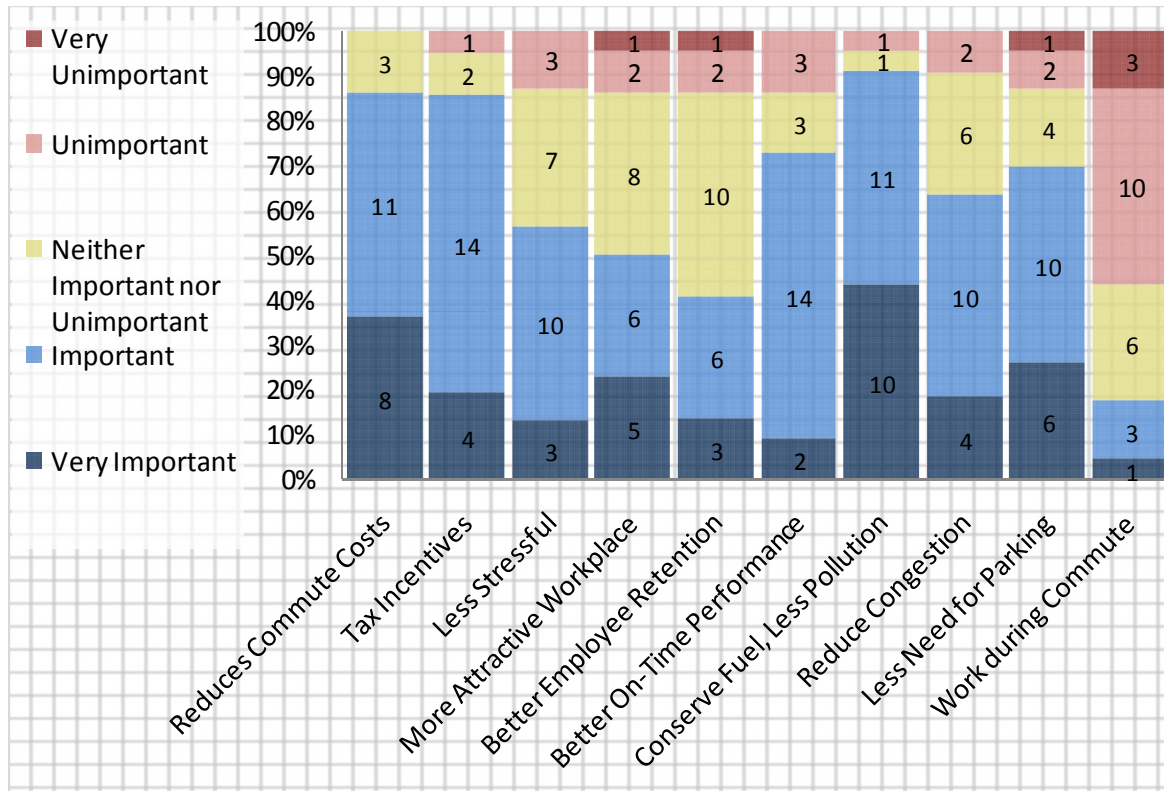
Benefits of Vanpooling

When asked about the importance of vanpooling's potential benefits, most employers highlighted those benefits with an easily quantifiable monetary value: about 85% indicated reduced commute costs and tax incentives were "Important" or "Very Important".

Somewhat surprisingly, however, fuel conservation/decreased pollution was even more important – over 90% of employers identified it as important or very important. It is unclear whether employers were reacting to the public benefits of reduced fuel use, the cost savings of fuel conservation, or both.

Employers felt less strongly about the remaining benefits, most of which are less tangible. Among these, the ones rated most important were those in which employers have a direct financial stake – better on-time performance and less need for parking. The possibility of employees working during their commute received almost no support at all, which may be due to the nature of the work at the respondents' companies, or simply because it is not an arrangement with which they are familiar.

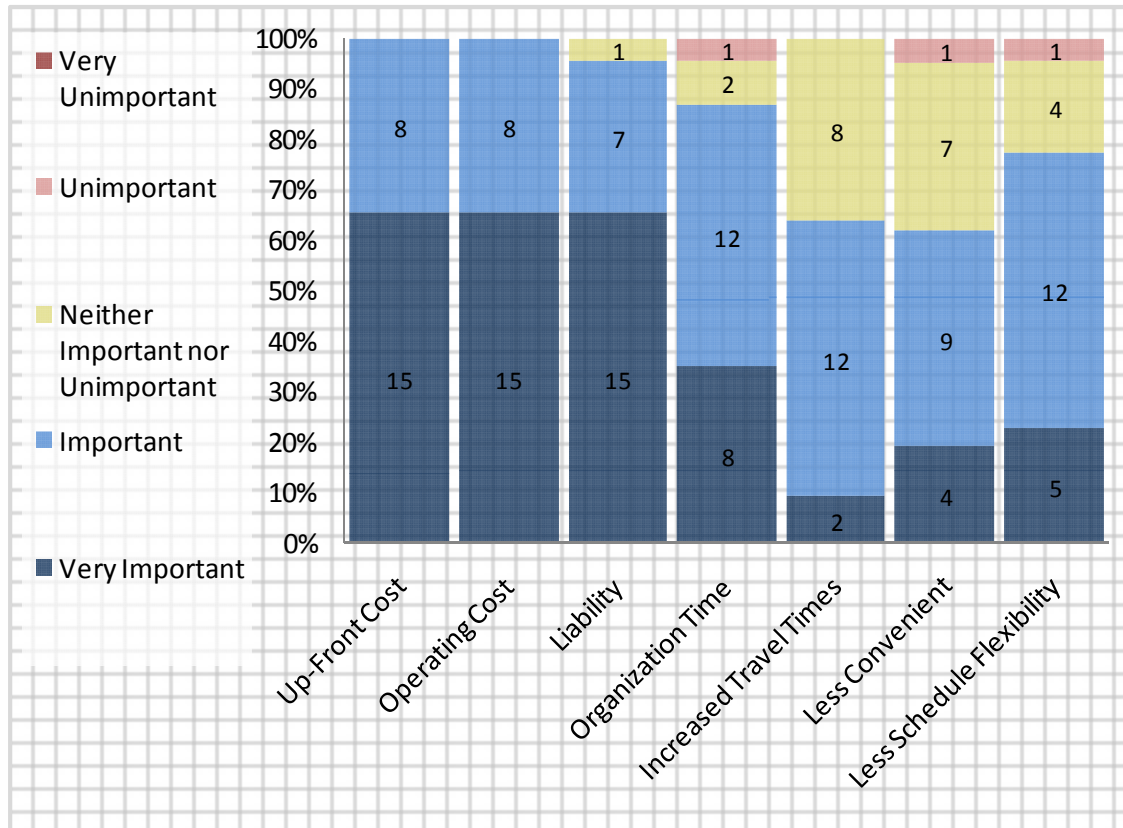
Figure 4: Employer Perception of Vanpool Benefits



Concerns about Vanpooling

The most important concerns for employers were those that directly affected their bottom line, while concerns affecting employees were generally seen as less important. Up-front cost, operating cost, and liability were the most important, with 95%-100% of respondents identifying them as at least “Important” and 65% identifying them as “Very Important”. All of the other concerns presented were listed as “Important” or “Very Important” by over 60% of respondents.

Figure 5: Employer Concerns about Vanpooling

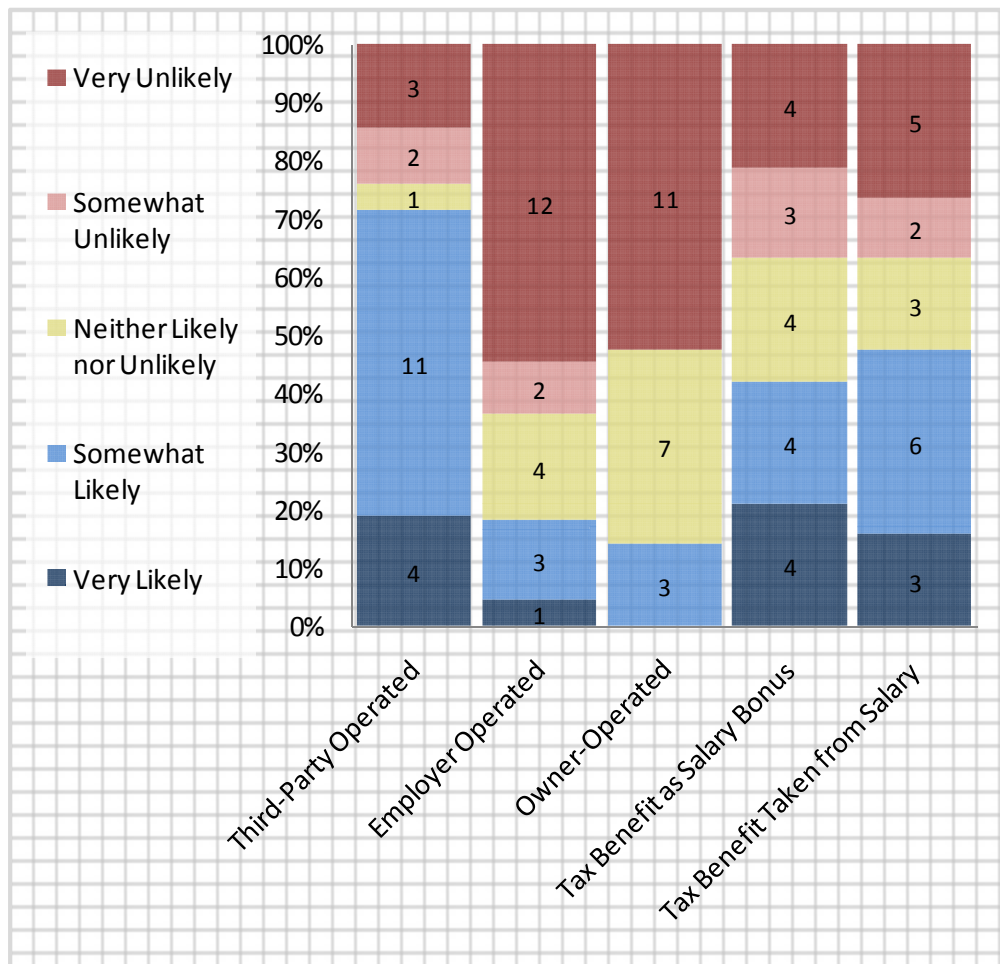


Vanpool Program Structures

Of the three ownership schemes presented, third-party-operated vanpooling was by far the most acceptable to respondents – perhaps because it requires the least administrative effort, financial risk, or legal liability on the part of the employer. Over 70% responded that they were “Somewhat Likely” or “Very Likely” to participate in such a program, while less than 20% responded similarly toward employer- or owner-operated models. Georgia’s Coastal Regional Commission is an example of a successful vanpool operated by a private third-party contractor (see Appendix A: Case Studies).

Employers were split roughly down the middle in their response to tax benefits, as slightly less than half indicated they would be more likely to participate in vanpooling because of the Federal Commuter Choice Program incentives. This may be due in part to confusion about the question’s meaning.

Figure 6: Employer Preference for Vanpool Program Structures

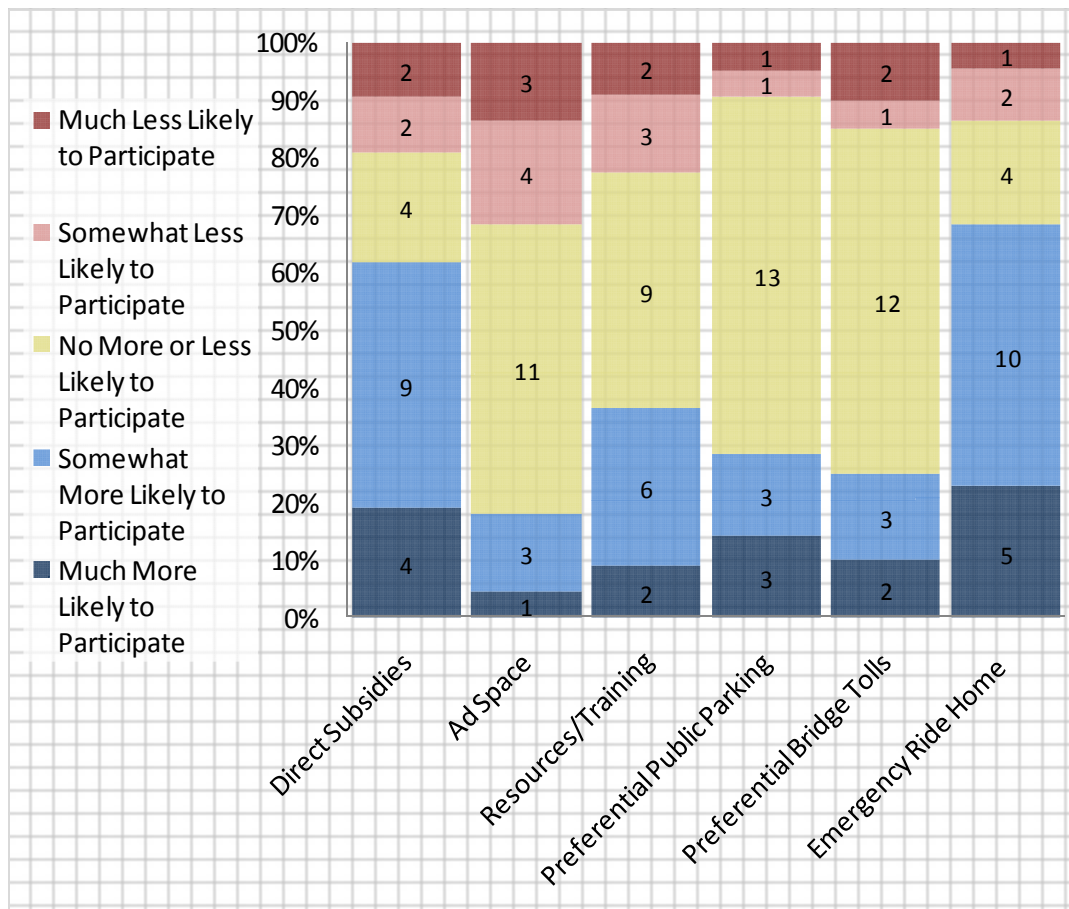


Employer Incentives

The most popular employer incentives were those with the greatest financial value. Over 60% of respondents identified direct subsidies and publicly-funded emergency ride home services as incentives that would make them “Somewhat More Likely” or “Much More Likely” to participate in vanpooling. In addition, a third of respondents identified resources/training support as an encouraging incentive.

The remaining three incentives—ad space on vans, preferential public parking, and preferential bridge tolls—were identified by fewer than 30% of respondents as encouraging them to participate in vanpooling. It is likely that the respondents simply saw these incentives as having little value for their organization. However, for each of these incentives there was at least one organization that said it would be “Much More Likely to Participate” if that incentive was provided.

Figure 7: Employer Preference for Employer Vanpool Incentives



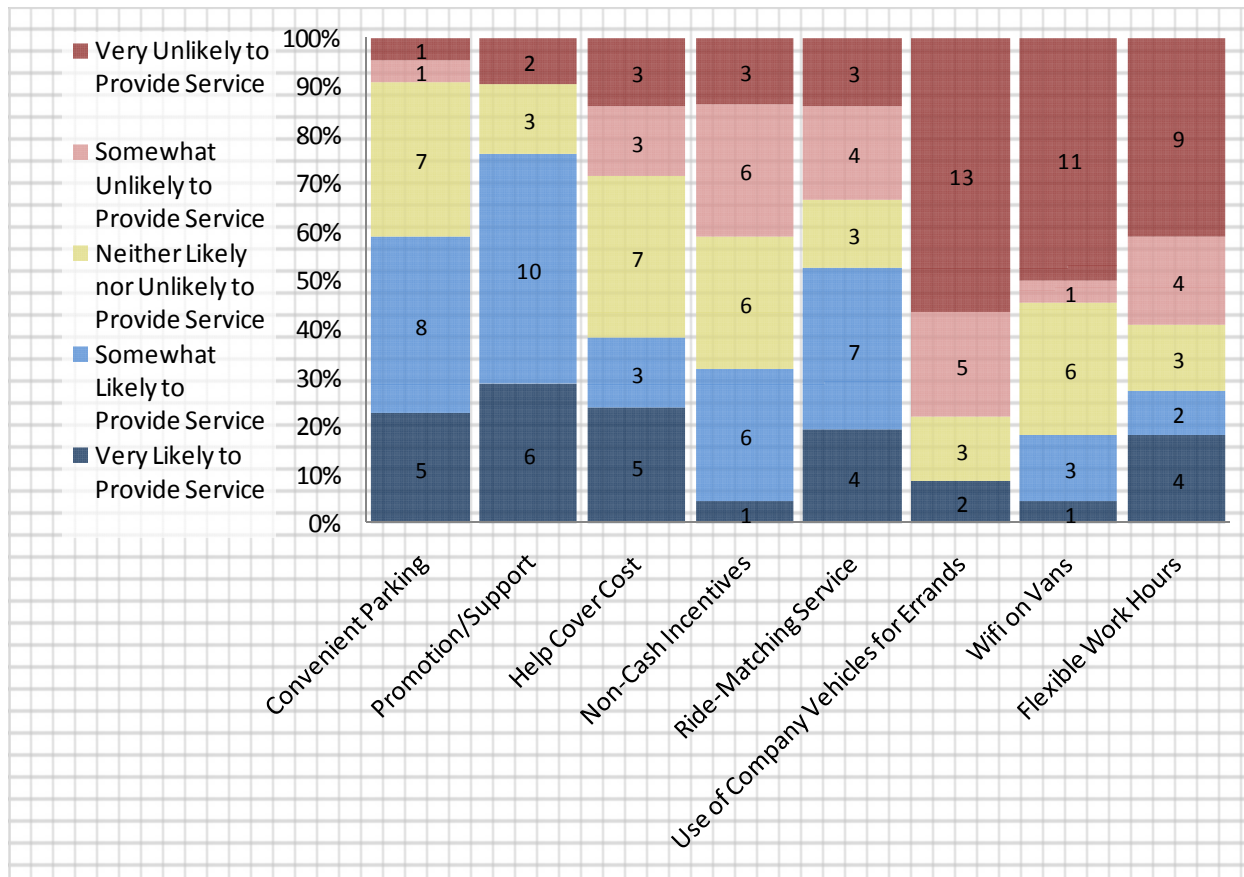
Commuter Incentives

The commuter incentives employers were most likely to provide were not necessarily the ones with the lowest financial cost. Rather, employers indicated support for incentives that could be provided with existing resources and with minimal change to their current scope of operations.

Promotion/support was the only widely popular service, as about 75% indicated they were likely or very likely to provide the service. Convenient parking and ride-matching services were supported by over 50% of respondents. All three of these services could be provided using existing company resources.

In contrast, commuter incentives that require new financial contributions or some sort of change in current operating procedures were supported by fewer than 40% of employers. However, responses to each commuter incentive were mixed – each incentive had at least one response of “Very Unlikely to Provide Service” and one of “Very Likely to Provide Service,” which suggests vanpool promoters should tailor efforts to encourage employer support on an individual level.

Figure 8: Employer Willingness to Provide Commuters Incentives



Discussion and Recommendations

The market analysis and employer survey paint a mixed picture of the potential for vanpooling in the Mid-Columbia River Gorge. Its results are nonetheless in line with the existing characterization of vanpooling: an effective commuting option with potential for success within a relatively limited prospective market (Evans and Pratt 2005).

Accordingly, the vanpool feasibility assessment suggests that there is great enthusiasm and support for vanpooling in the Gorge among a fairly small group of employers. It is likely that a vanpool program would be successful in serving these employers. Furthermore, the accompanying economic, social, and environmental gains, while modest, would be significant. The employer preferences survey suggests that employers are focused on the aspects of vanpooling with the greatest potential to create real cost savings and would like to avoid any new costs, risks, or responsibilities.

This section includes a detailed discussion of the findings, acknowledges limitations, and provides recommendations for fostering vanpooling in the Gorge.

Vanpool Feasibility Assessment

The vanpool feasibility assessment indicates significant potential for vanpooling in the Gorge among a limited percentage of commuters. Potential adoption levels could vary widely depending on a number of factors, but in the most optimistic scenario the vanpool mode share could reach about 1.2% of all Gorge commuters. Organizations looking to promote vanpooling as a commuting strategy must remember that vanpooling is one piece in a larger transportation system. For instance, vanpooling and carpooling promotional efforts can coincide as carpooling tends to attract a wider market than vanpooling, often by one or two orders of magnitude (Kostyniuk 1982, Kay 2010). Furthermore, long-term trends that favor vanpooling, such as high fuel prices, concern for the environment, and economic challenges, are on the rise. Other factors, such as the geography of the region and dispersed residential and employment areas, stand against widespread vanpooling in the Gorge. Although there is some evidence that vanpooling can work in rural areas, such as Palouse Rideshare and the existing vans in operation in the Gorge, there are few examples of widespread vanpooling in such areas. In order to produce legitimate opportunities for success organizations working to foster regional vanpooling can incorporate several best practices, such as employer support, direct follow-up with commuters, flat fare structure, and ERH service.

Employer Preferences Survey

The employer preferences survey found that employers were primarily concerned with their bottom line. They highlighted cost savings as an important benefit of vanpooling and cost, liability, and staff time for program organization as important items of concern. When asked what employer incentives they would respond best to, they cited direct financial subsidies, and overwhelmingly preferred the possibility of a third-party-operated vanpool program to one operated in-house. They reported being most willing to provide commuter incentives that were perceived as cost-effective and made use of existing resources.

The results include some interesting nuances and anomalies. For example, fuel conservation/pollution reduction was seen as the most important benefit of vanpooling by employers. This may have been caused by a biased sample – those employers concerned with the environment were more likely to respond to a vanpooling survey in the first place. However, this result may also suggest a growing awareness of the importance of fuel conservation in the face of rising gas prices—paralleling what happened in the 1970s, when vanpooling first arose.

Beyond simple financial considerations, there is also evidence of an employer preference for the status quo and against uncertainty or new areas of responsibility. The least popular commuter incentives such as non-cash incentives, wifi on vans, use of company vehicles for errands, and flexible work hours are not necessarily the most expensive, but such incentives are different from what the employer may typically provide. Meanwhile, almost a quarter of employers indicated they were “Very Likely” to help cover the costs of vanpooling, even though this money would come straight out of their bottom line.

Similarly, the employer preference for a third-party-operated vanpool and ambivalent reactions to the Federal Commuter Choice program tax incentives suggest more of an unwillingness to take on new and uncertain responsibilities than strictly a drive to minimize expected costs. Given the limits on staff time and current economic uncertainty, wariness of change is somewhat expected. When promoting vanpooling, governments and non-profits should be aware of potential wariness and address it by emphasizing the simplicity and well-established nature of vanpooling as a transportation strategy.

Limitations

This study’s vanpool market model was unable to account for many significant factors affecting vanpool ridership, as such variables are difficult or impossible to predict and their effects are uncertain. Variables that could affect the success of a vanpool program but which were not incorporated into the market analysis include: effect of program cost on vanpool adoption level; availability of funding for incentives; fuel prices and their effect on commuter behavior; shifting culture and commuter preferences; national and state legislation; and economic trends and level of employment. To incorporate these variables would require a degree of further research and model complexity that is beyond the scope of this study.

Regarding the employer preferences survey, about half of the employers contacted responded and the sample size was relatively small (24 organizations). Further communication with non-respondent organizations is necessary to determine the level of support for vanpooling among those employers.

The financial feasibility analysis was based on a model from 1981. The model variables were updated to reflect contemporary costs and technologies, but the age of the model raises questions about its validity. For example, the cost of organizing a vanpool may be lower today due to the widespread availability of computers and the internet. However, a 2007 cost analysis of private van rental services found that VPSI (the cheapest option) had an annual cost of \$1000-\$2000 above the annual cost calculated in this study.

The benefit-cost analysis was based in part on estimates of the value of non-monetary benefits, such as reduced climate change and dependence on foreign oil, which are subjective and different interpretations of their value would lead to significantly different outcomes.

Lastly, the employer preferences survey attempts to analyze a complex issue through the use of an online survey. Although the survey was designed to provide explanation and detail to ensure full understanding and accurate responses from survey respondents, a more detailed picture could be obtained through interviews or focus groups. Asking employers how they will act is not the same as observing them making real economic decisions. A greater degree of certainty could be achieved through real-world observation of employers' vanpooling activity.

Recommendations

Based on the research and analysis conducted in this study, a set of recommendations emerges for how MCEDD or another organization could encourage vanpooling in the Gorge or other rural areas. Vanpool promoters should start by working with the largest clusters of employers that expressed interest in vanpooling to set up a vanpool pilot program. Since most employers expressed an unwillingness to operate such a program in-house, the promoting organization should investigate the possibility of contracting with a private company (e.g. Enterprise Rideshare or VPSI, Inc.), a transit agency, or some other third-party organization to run the vanpool program. External program management would help to allay employers' primary concerns about vanpooling, such as cost, liability, and organization/staff time.

The following recommendations include a set of proven success factors and best practices to increase vanpool adoption that MCEDD or another vanpool coordinating organization should consider to promote a successful vanpool program:

- **Provide financial incentives for first-time vanpoolers** during the first 4-6 months of participation to help form commuter habits.
- **Ensure the availability of emergency ride home services** to decrease perceived barriers to vanpooling.
- Participating employers and program partners actively **educate employees about vanpooling and promote vanpooling as a beneficial ridesharing strategy.**
- **Provide resource and training assistance to employers to help them promote vanpooling.**
- **Engage in direct follow-up with potential and active vanpoolers** to minimize attrition rates.
- **Establish a fare structure based on distance and gas prices** rather than on the number of people in a van.
- **Promote vanpooling and carpooling together** as part of a larger effort to promote ridesharing – although vanpooling has a greater impact per rider; carpooling is more flexible and requires less commitment.

All of these strategies have the potential to increase the number of people vanpooling in the Gorge. However, as this study's analysis suggests, widespread adoption is far from certain. Rural areas face difficult transportation challenges and it will take an entire strategic toolbox to address them. Ultimately, vanpooling is an important commute option that with broader adoption by employers in the region could become a common and effective part of the transportation system in the Gorge.

References

- AAA. (2008). Your Driving Costs: How much are you really paying to drive? In AAA (Ed.). Heathrow, FL: AAA Association Communication.
- Bailey, J. M. (1983). Market for Vanpooling in the Baltimore Region. *Transportation Research Record*(914).
- Barone, C. S., & Jain, R. (1986). Interest-Free Vanpool Program: Experience in Connecticut. (1082).
- Chambers, C. (1981). Role of the Transportation Broker at Children's Hospital of San Francisco: A Case Study. *Transportation Research Record*(823).
- Chun, D. (1993). Ridesharing and the Consumer: A Tale of Two Marketing Strategies. *Transportation Research Record*(1390), 60 - 65.
- Coastal Regional Commission. (2009). Coastal Georgia Regional Transportation Assessment. Atlanta, GA.
- Concas, S., Winters, P., & Wambalaba, F. (2005). Fare Pricing Elasticity, Subsidies, and Demand for Vanpool Services. [10.3141/1924-27]. *Transportation Research Record: Journal of the Transportation Research Board*, 1924(-1), 215-223.
- Delucchi, M. A. (1998). The Annualized Social Cost of Motor-Vehicle Use in the U.S., 1990-1991: Summary of Theory, Data, Methods, and Results *The Annualized Social Cost of Motor-Vehicle Use in the United States, based on 1990-1991 Data* (Vol. 1). Davis, CA: University of California, Davis.
- Delucchi, M. A. (2003). A Lifecycle Emissions Model (LEM): Lifecycle Emissions from Transportation Fuels, Motor Vehicles, Transportation Modes, Electricity Use, Heating and Cooking Fuels, and Materials. Davis, CA: Institute of Transportation Studie.
- Energy - Definitions, 420 C.F.R. § 2 (1997).
- Eriksson, L., Nordlund, A. M., & Garvill, J. (2010). Expected Car Use Reduction in Response to Structural Travel Demand Management Measures. *Transportation Research Part F*, 13.
- Evans IV, J. E., & Pratt, R. H. (2005). Chapter 5 - Vanpools and Buspools *TCRP Report 95 - Traveler Response to Transportation System Changes*. Washington, DC: Transportation Research Board.
- Evans, J. R., Jackson, W. K., Westerbeck, G. J., & Thomas, M. P. (1984). A methodology for the assessment of ridesharing program benefits and impacts. *Socio-Economic Planning Sciences*, 18(4), 241-246.
- Friedman, S. M. (2010). The Inflation Calculator Retrieved May 18, 2011, from <http://www.westegg.com/inflation/>
- Hekimian, A. J., & Hershey, W. R. (1981). Personalized Approach for Ridesharing Projects: Experience of Share-A-Ride in Silver Spring, Maryland. *Transportation Research Record*(823).
- Herk, L. F., Jr. (1981). Business Plan for a Commercial, Third-Party Vanpool Operation. *Transportation Research Record*(823).
- Hershey, W. R., & Hekimian, A. J. (1983). Measuring the Effectiveness of Personalized Ridesharing Assistance. *Transportation Research Record*(914).
- Hoey, A. (2010). [Personal E-mail: "Re: Question"].
- IBI Group. (2007). Short Distance Vanpool Transportation Feasibility Study. San Diego, CA: San Diego Association of Governments.

- iTrans Consulting. (2007). Vanpool Program Feasibility Study Final Report. Toronto, ON: Smart Commute Association - Greater Toronto Area and Hamilton.
- Kadesh, E., & Elder, L. (1989). Emergency ride home: An Insurance Program for HOV Users. *Transportation Research Record*(1212).
- Kay, M., & Lyons, W. (2010). Ridesharing Options Analysis and Practitioners' Toolkit. Cambridge, MA: Volpe National Transportation Systems Center.
- Kodama, M. R., Pankratz, J. J., & Moilov, M. (1991). Ventura Freeway Vanpool Support Program. *Transportation Research Record*(1321), 21-25.
- Kostyniuk, L. P. (1981). Demand Analysis for Ridesharing: State-of-the-Art Review. *Transportation Research Record*(876).
- Maxwell, D. A., & McIntyre, J. P. (1979). Economics of Vanpooling. *Transportation Research Record*(724).
- MCEDD. (2010). 2010-11 Comprehensive Economic Development Strategy.
- Mielke, J. (2006). Vanpooling in North Dakota: Feasibility and Operating Scenarios. Fargo, ND: Small Urban & Rural Transit Center - North Dakota State University.
- Parry, I. W. H., Walls, M., & Harrington, W. (2007). Automobile Externalities and Policies. *Journal of Economic Literature*, 45(June).
- Polena, C., & Glazer, L. J. (1991). Examination Of 11 Emergency ride home Programs Nationwide. *Transportation Research Record*.
- U.S. Bureau of Transportation Statistics. (2001). National Household Travel Survey Daily Travel Quick Facts, from http://www.bts.gov/programs/national_household_travel_survey/daily_travel.html
- U.S. Bureau of Transportation Statistics. (2002). National Household Travel Survey. from Bureau of Transportation Statistics http://www.bts.gov/programs/national_household_travel_survey/
- U.S. Bureau of Transportation Statistics. (2007). Table 4-3: Passenger-Miles. from Research and Innovative Technology Administration http://www.bts.gov/publications/pocket_guide_to_transportation/2008/html/table_04_03.html
- U.S. Bureau of Transportation Statistics. (2009). Table 1-1: System Mileage within the United States. from Research and Innovative Technology Administration http://www.bts.gov/publications/national_transportation_statistics/html/table_01_01.html
- U.S. Bureau of Transportation Statistics. (2010). National Transportation Statistics. http://www.bts.gov/publications/national_transportation_statistics/#chapter_1
- U.S. Census Bureau (2009). American Factfinder Survey. from U.S. Census Bureau
- U.S. Department of Energy (2011). U.S. Light-Duty Fuel Consumption and Vehicle Miles Traveled (VMT) Retrieved May 6, 2011, from http://www.afdc.energy.gov/afdc/data/docs/ldv_consumption_vmt.xls
- U.S. Energy Information Administration. (2009). Emissions of Greenhouse Gases Report Retrieved April 20, 2011, from <http://www.eia.doe.gov/oiaf/1605/ggrpt/carbon.html#transportation>
- U.S. Environmental Protection Agency. (2010). Light Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 Through 2010: U.S. Environmental Protection Agency.

- U.S. Environmental Protection Agency (2010). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 - 2008. Washington, DC: U.S. Environmental Protection Agency.
- U.S. Environmental Protection Agency. (2011). Emission Facts: Average Carbon Dioxide Emissions Resulting from Gasoline and Diesel Fuel Retrieved April 30, 2011, from <http://www.epa.gov/oms/climate/420f05001.htm>
- Strochlic, R. (2009). An Assessment of the Demand for a Vanpool Program Serving Agricultural Workers in Napa Valley. Davis, CA: California Institute for Rural Studies.
- Torluemke, D. A., & Roseman, D. (1989). Vanpools: Pricing and Market Penetration. *Transportation Research Record*(1212), 83-87.
- U.S. Census Bureau. (2009). American Factfinder: New York City, New York Population Estimates. from U.S. Census Bureau http://factfinder.census.gov/servlet/DTable?_bm=y&-context=dt&-ds_name=PEP_2009_EST&-mt_name=PEP_2009_EST_G2009_T001&-mt_name=PEP_2009_EST_G2009_T002&-mt_name=PEP_2009_EST_G2009_T003_2009&-mt_name=PEP_2009_EST_G2009_T004_2009&-mt_name=PEP_2009_EST_G2009_T005_2009&-mt_name=PEP_2009_EST_G2009_T006_2009&-mt_name=PEP_2009_EST_G2009_T007_2009&-mt_name=PEP_2009_EST_G2009_T008_2009&-CONTEXT=dt&-tree_id=809&-all_geo_types=N&-geo_id=16000US3651000&-search_results=16000US3651000&-format=&-_lang=en
- Ungemah, D., & Dusza, C. (2009). Transportation Demand Management Benchmark. *Transportation Research Record*, 2118.
- Ungemah, D., Rivers, M., & Anderson, S. (2005). The World Can Be Flat: Case Study of Flat-Rate Pricing for Vanpool Operations. *Transportation Research Record*, 1956.
- Valley Vanpool. (2009). Vanpool Routes Retrieved May 22, 2011, from http://www.valleyvanpool.info/vanpool_routes.htm
- VPSI, Inc. (2011). Our Roots (Corporate History) Retrieved April 23, 2011, from <http://www.vpsi.org/mysitecaddy/site3/aboutroots.htm>
- Wambalaba, F., Concas, S., & Chavarria, M. (2004). Price Elasticity of Rideshare: Commuter Fringe Benefits of Vanpools. Tampa, FL: National Center for Transportation Research.
- Wegmann, F. J. (1989). Cost-Effectiveness of Private Employer Ridesharing Programs: An Employer's Assessment. *Transportation Research Record*(1212).
- Weisbrod, G. E., & Eder, E. S. (1981). Multiemployer Ridesharing Brokerage: Findings from Minneapolis Commuter Services Demonstration. *Transportation Research Record*(823).
- Weitzman, M. L. (2009). On Modeling and Interpreting the Economics of Catastrophic Climate Change. *The Review of Economics and Statistics*, 91(1).
- Wiersig, D. W. (1981). Planning Guidelines for Selecting Ridesharing Strategies. *Transportation Research Record*(876).
- Wiersig, D. W. (1985). Estimating Ridesharing Levels for Reductions in VMT. *Transportation Research Record*(1018).
- Zupan, J. M. (1992). Transportation Demand Management: A Cautious Look. *Transportation Research Record*(1346), 1-9.

Appendix A: Case Studies

Pace's Vanpool Incentive Program in Suburban Chicago

Pace, the Chicago Regional Transportation Authority's suburban bus division, established its Vanpool Incentive Program (VIP) in 1991. The program serves the suburban area surrounding Chicago – a region of 3,446 square miles, 4.4 million people, 6 counties, and 264 municipalities.

VIP provides a variety of services for those wanting to vanpool, including:

- Providing a van and insurance
- Planning a route
- Paying for fuel and maintenance
- Setting fares
- Billing riders individually
- Offering emergency ride home (ERH) service



VIP's fares are calculated based on mileage, not the number of riders, which means fares do not increase if a member of the vanpool drops out. Program staff also worked with the Sears Company prior to its 1992 relocation to help develop transportation alternatives for its employees.

VIP has successfully promoted vanpooling in the Chicago area, even during a time of relatively low gas prices: the number of vans increased to 162 by 1994 and 291 by 1997. Most of the trips (80-90%) were between suburbs, suggesting that vanpooling can function well in relatively decentralized areas. Trip lengths averaged nearly 40 miles each way, which supports the notion that vanpooling thrives among long-distance commuters.

(Source: Evans and Pratt 2005)

Coastal Regional Commission of Georgia Regional Vanpool Program

Georgia's Coastal Regional Commission (CRC) provides transportation services and acts as the Economic Development District for the coastal region of Georgia, an area covering over 5,000 sq mi., 10 counties and 350 cities. The role of the CRC and the geographic nature of the region are analogous to MCEDD and the Gorge, though its population density is significantly higher.

A Vanpool Feasibility Study commissioned by the CRC in 2007 confirmed strong interest in ridesharing using both employer and employee surveys. Based on the recommendations of this study, a Regional Vanpool Program was founded. The CRC contracts with private vanpool operator VPSI, Inc. to operate the program. VPSI contracts with the CRC on a month-to-month basis; there is no long-term lease. The cost per commuter for the vanpool program is about \$100/month.

(Source: Kay 2010, CRC 2009)

Ventura Freeway Vanpool Support Program

The Ventura Freeway Vanpool Support Program (VSP) in southern California was a subsidy program designed to increase vanpool ridership. Administered by the California Department of Transportation and promoted by the local rideshare agency, Commuter Transportation Services (CTS), the reduced-fare vanpool program was founded to relieve congestion during freeway construction.

The VSP provided fare discounts for new vanpool customers, starting at 50% off and ramping down over 6 months. The program converted 673 people to vanpooling in 16 months, with 618 continuing after the program ended; a 92% retention rate. The mean trip length for participants was 43 miles. Promotional materials included posters, brochures, and an informational manual. Workshops and conversations with employers were used at first, but they were discontinued after generating little interest. Calls to employee transportation coordinators constituted an effective promotion strategy.

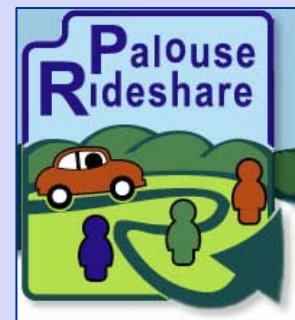
Lessons learned:

- Ease of use is very important to encourage ridesharing.
- The vanpool-focused promotional efforts of the VSP had the side benefit of generating carpool placements for those for whom vanpooling was unfeasible.
- Although the program provided incentives to new vanpoolers for 6 months, 4 months of financial support is likely sufficient to establish a habit of vanpooling.

(Source: Kodama 1991)

Palouse Rideshare, Idaho

Palouse Rideshare is an online rideshare matching program operating in rural Idaho and parts of Washington. The program initiated and managed a vanpool between the town of Lewiston and the University of Idaho (a distance of about 32 miles). Jurisdiction of this program transferred to the City of Moscow (where the University is located) in 2010.



Idaho is one of the least-dense states in the U.S., ranking 44th for population density. So, as Kay (2010) suggests, “the success of this rideshare program demonstrates that ridesharing can thrive in even the most rural of places.” However, it is important to note that the program has thus far only led to the organization of one vanpool, carrying twelve daily riders. Data on the carpool aspect of Palouse Rideshare’s program does not exist, but perhaps carpooling has gained wider adoption in the region. *(Source: Kay 2010)*

Further Case Studies and Resources

Many articles and reports describe successful (or unsuccessful) vanpool programs. There are also a number of vanpool feasibility assessments and other vanpool resources available online. This section briefly describes some of the more valuable resources and provides links to them when available.

Evans & Pratt, 2005: *TCRP Report 95 Chapter 5 – Vanpools and Buspools*

http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_95c5.pdf

This booklet provides a detailed overview of the history and literature of vanpooling and includes four case studies: St. Paul (3M Company), San Francisco (Golden Gate Vanpool Transportation Demonstration Project), Connecticut (Easy Street Vanpool Program), and Chicago (Pace Rideshare).

Kay, 2010: *Ridesharing Options Analysis and Practitioners' Toolkit*

http://www.planning.dot.gov/documents/RidesharingOptions_Toolkit.pdf

This document is a useful accumulation of tools and ideas for agencies looking to foster ridesharing. Case study sidebars include: Idaho (Palouse Rideshare), Alabama (Commutesmart Alabama), Missoula (Missoula-Ravalli TMA Vanpool Program), and Georgia (Georgia Coastal Regional Commission). It also lists rideshare-oriented companies throughout the U.S.

iTrans Consulting, 2007: *Vanpool Program Feasibility Study Final Report*

http://www.smartcommute.ca/media/uploads/pdf/vanpool_feasibility_study.pdf

This feasibility study of vanpooling in Toronto was used extensively to develop a structure for the Mid-Columbia River Gorge assessment. It includes case studies of local vanpool programs in Toronto, Utah, North Carolina, San Diego, Washington (Pierce Transit), and Oregon (Valley Vanpool).

Strochlic, 2009: *An Assessment of the Demand for a Vanpool Program Serving Agricultural Workers in Napa County*

(available through Google)

This document provides a detailed analysis of the vanpool needs of agricultural workers in California's Napa Valley. It represents one of the few explicit discussions of rural vanpooling in the literature, and may be applicable to the Columbia Gorge depending on the needs of agricultural workers in the area.

Mielke, 2006: *Vanpooling in North Dakota: Feasibility and Operating Scenarios*

<http://www.ugpti.org/pubs/pdf/DP174.pdf>

This feasibility study of vanpooling in North Dakota includes brief case studies of seven state programs and local programs in Minneapolis, Fort Collins, Denver, Colorado Springs, Boise, Missoula, and Fargo.

IBI Group, 2007: *Short Distance Vanpool Transportation Feasibility Study*

http://www.icommutesd.com/Transit/documents/SDvanpool_Final_public_ALL.pdf

This feasibility study of short-distance vanpooling in the San Diego area includes case studies from Washington (Metro Transit), California (UCLA, UCSD, Los Angeles METRO), Hampton Road, VA (Traffix), Houston (METROVan), Chicago (Pace Rideshare), and Richmond (Greater Richmond Transit Company). It also includes a cost comparison of third-party vanpool providers VPSI, Inc. and Enterprise Rideshare.