AN INVESTIGATION OF FORMER QUICKRIDE USERS

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ABSTRACT

This paper investigates the low utilization rate of the Houston QuickRide program on the I-10 and US-290 High Occupancy/Toll lanes through the analysis of its former users' survey responses. The QuickRide program allows two-occupant vehicles to travel on the HOV lane during peak periods (normally restricted to 3+ occupant vehicles) for a $2 toll.

Two data sets from an April 2003 survey sent to both current and former users of QuickRide were analyzed for significant differences between the two populations' responses. Current and former users did not vary significantly in occupation, household type, average number of people per household, vehicles per household, age, and income. However, survey data supports the idea that current users take advantage of carpooling with family members more frequently than former users did. Additionally, current users' responses indicate that they value their trip time savings on the HOV lane more so than the former users.

It was also found that since leaving the QuickRide program the former participants are using more vehicles for travel. Since all current enrollees are traveling in two occupant vehicles, 50 vehicles are being used for every 100 current QuickRide users. However, 71.7 vehicles are being used for every 100 former QuickRide users, with half of the former users traveling in single occupant vehicles.

Proposed ideas for improving QuickRide were also analyzed for approval amongst the two populations. The concept of single occupancy vehicles being able to utilize the HOV lanes for a higher toll received overwhelming support from both current and former users, especially among those who indicated having problems with carpooling.

TABLE OF CONTENTS

INTRODUCTION

Traffic congestion has been a problem plaguing many urban areas. The high cost and lack of available land makes constructing new roads and expanding existing ones expensive or impossible solutions. Instead, cities everywhere are turning to solutions that maximize the efficiency of existing roadways. One such example of better traffic demand management is the implementation of High Occupancy Vehicle lanes (HOV lanes).

The Katy Freeway (I-10) HOV lane in Houston opened in 1984 as a 13-mile, single reversible lane facility. Since then, the HOV lane has been successful in attracting both bus patrons and carpools. Soon after it opened, all vehicles with two or more occupants could use the lane. However, by 1988, the popularity caused it to be congested and slow-moving during peak traffic hours. Since maintaining a significant speed advantage is the main draw for the HOV lane, the Metropolitan Transit Authority of Harris County (METRO) and the Texas Department of Transportation (TxDOT) decided to restrict traffic in the HOV lane during peak hours to use by vehicles with three or more occupants. Changing occupancy restrictions from a two plus person carpool to a three plus carpool resulted in a net loss of about 30 percent of vehicles typically moved during the peak hours, causing "Empty Lane Syndrome *(1)*." Drivers on the main lanes became frustrated with the apparent lack of vehicular travel on the HOV lane.

In 1998 the QuickRide program began on the Katy HOV lane as a solution between the overcrowded 2 plus HOV lane and the underutilized 3 plus HOV lane. QuickRide allows a number of two-occupant vehicles to use the Katy HOV lane during peak hours (6:45-8:00 a.m. and 5:00-6:00 p.m.) for a $2 charge while vehicles with three or more occupants could still use the HOV for free, thus making the Katy HOV a HOT (High Occupancy/Toll) lane *(2)*. HOT lanes utilize economic principles in recognizing that trips at varying times have various values for different travelers, a concept known as value pricing.

QuickRide allows a limited number of travelers to register for the program. When an application is accepted, a pre-paid account is established and the applicant is issued a transponder. When travelers in two-occupant vehicles choose the QuickRide option during peak hours, the registered motorist has $2 debited his/her account *(2)*. In 2000, the US-290 corridor also instituted a QuickRide program during the morning peak hours.

Value pricing can have a number of travel impacts. Potential impacts include:

- A shift in the time of travel from peak hours to off peak hours with a subsequent reduction of peak hour traffic.
- A change in the mode of travel.
- Abandoned trips.
- A shift in routes from tolled roads to toll-free roads.
- Linked trips that combine more activities on a single trip *(3)*.

As illustrated by the above possible effects, the range of behavioral adaptations to value pricing is quite complex. The exact response of each driver depends on his/her value of time. Some drivers are willing to pay the $2 toll to save 15 minutes of travel time in the HOT lane while others are not. Additionally, for the driver to be able to use the Houston HOT lane, he/she must carpool. Here the issue becomes the tradeoff in spending extra time picking up other passengers and saving travel time on the HOT lane.

PROBLEM

Despite saving drivers substantial travel time (on average, 17.3 minutes during Katy AM peak, 15.0 minutes during Katy PM peak, and 10.5 minutes during US-290 AM peak) over the main lanes, use of QuickRide is rather limited. In fact, with over 1500 enrollees, the average numbers of QuickRide trips per day in 2002 were 82.7, 43.3, and 55.6 for Katy AM, Katy PM, and US-290 AM peaks, respectively *(4)*. Furthermore, approximately 25% of individuals who enrolled in QuickRide have subsequently left the program. To better understand this travel behavior and to ultimately improve the benefits drivers receive from QuickRide, a survey was sent to QuickRide users and former users in April 2003 to further investigate the value of different travel options for these two groups.

The survey requests information about the participant's most recent trip on the Katy Freeway or US-290 corridor during the work week, the participant's past frequency and purpose of using QuickRide, and standard socioeconomic data. The survey also introduces several possible new options for the QuickRide program to be evaluated by the participants. For example, the survey introduces a value pricing concept where the toll will vary during the peak period. The 7:00-7:45 a.m. peak will be tolled the heaviest while the slightly less congested peaks around that time will be tolled less. Also introduced in the survey is the idea of a single-occupant vehicle using the HOT lane at a higher toll than the two-occupant carpool. Participants were asked how frequently they would use the HOT lane while driving by themselves at incremental rates ranging from $3.00 to $6.00. Out of the 1459 current user surveys sent, 525 were returned for a response rate of 36.0%. Out of the 582 former user surveys sent, 64 were returned for a response rate of 11.0%.

The purpose of this study is to better understand the main motives of those who have used QuickRide in the past but chose to terminate their affiliation with the program. The analysis relies on two sets of data, one from current QuickRide users and the other from drivers who have used and dropped out of the program. The two populations provide the opportunity for comparison of travel behaviors. In comparing the favorability of new QuickRide program ideas and commuting characteristics between the populations, a better understanding of QuickRide travelers' needs and possible shortcomings of the program can be realized.

OBJECTIVES

The objectives of this research are as follows:

- To increase the benefits program participants receive from QuickRide.
- Identify common factors leading to former users quitting the QuickRide program.
- Compare the two sets of data obtained from the QuickRide user and former user surveys for differences in socioeconomic and travel characteristics.
- Compare the above two sets of data for favorability of new QuickRide concepts.

METHODOLOGY

To obtain the objectives, survey data from both current QuickRide users and former QuickRide users were examined. Before any analysis took place, a weight variable was developed to account for the lower response rate of the former user surveys. Current users were weighed by frequency of QuickRide use with infrequent users weighted more heavily to reflect actual travel behavior. Former users were weighed even more heavily, with respect to the individual survey response rates for I-10 and US-290. Weights for

former users were determined by dividing the number of surveys sent by the number of responses received. For QuickRide former users who travel on Katy, out of the 450 surveys sent, 41 responded, yielding a weight variable of 10.98. For former users who travel on US-290, 20 responded to the 132 surveys sent. Thus, a weight variable of 6.60 was used for this group. The weighted total number of responses equaled the number of former users, much like the weighted total number of responses from current QuickRide users equaled the number of current users.

Data from the two sets of surveys were scanned for errors before analysis. Out of the 64 former user surveys, 3 were discarded because the responders were still enrolled in QuickRide. This was possible as a household could have multiple QuickRide enrollees. If one member of the household drops out, that residence would still receive the survey. In these 3 cases, it was possible the unintended (enrolled) person filled out the survey instead. The remaining 61 surveys were checked for entry errors and marked if the responses did not follow the survey guidelines. Conflicts in the data set were checked against the original paper copy of the survey and corrected if possible. If the error was indeed made by the survey responder, then responses for that question were marked on the data sheet to be disregarded during analysis.

A table of descriptive characteristics was developed for the former users from the survey responses to understand their characteristics and their reasons for leaving QuickRide. Frequencies were determined for categorical questions and means were calculated for quantitative questions. Then this table was compared to a similar table developed for the current users to test for significant differences between the two populations' responses at a 95% confidence level. The Mann-Whitney test was used for comparison of ordinal data such as age, education, and income. The t-test was used for comparison of continuous data such as perceived average time savings. The chi-squared test was used for comparison of nominal data such as trip purpose, gender, and household type. Significant differences in responses were indicated on a merged comparison chart contrasting QuickRide enrollee versus former enrollee responses (see Appendix A). All of these results and analyses used weighted survey data.

RESULTS

Approximately 25% of the former users indicated on their surveys that they quit QuickRide because they no longer traveled on Katy or US-290. For the remaining 75%, it is important to examine how these former users are now traveling on Katy and US-290. If former users quit QuickRide because they are now using public transit or participating in a three plus carpool, then they are actually contributing to the overall goal of congestion reduction. However, this is not the case. A survey question which asked former users of their vehicle occupancy on their most recent trip on Katy or US-290 indicated an overall increase of number of vehicles used (see Table 1).

Since all current enrollees are traveling in two occupant vehicles, 50 vehicles are being used for every 100 current QuickRide users. However, 71.7 vehicles are being used for every 100 former QuickRide users, with half of the former users traveling in single occupant vehicles. This increase in number of vehicles used per 100 people hinders the congestion reduction objective. Thus, it becomes necessary to examine significant differences between the current user and former user populations. Meaningful differences will, in turn, lead to a better understanding of the limited utilization of QuickRide and potential QuickRide improvements to keep current users enrolled in the program.

First, standard socioeconomic characteristics of the two groups were examined. Mean age, income, household size, and number of vehicles per household did not vary significantly between the user and former user populations (see Table 2). With the exception of a higher unemployment rate among former users, percentage profiles of occupations and household types also did not vary significantly.

Table 1. Vehicle Occupancy

Occupancy	Current Users (N=525)	Former Users (N=61)
1	0	50.3
2	100.0	33.0
3	0	11.0
4	0	0.9
5 or more	0	0
Bus	0	5.2
Motorcycle	0	0

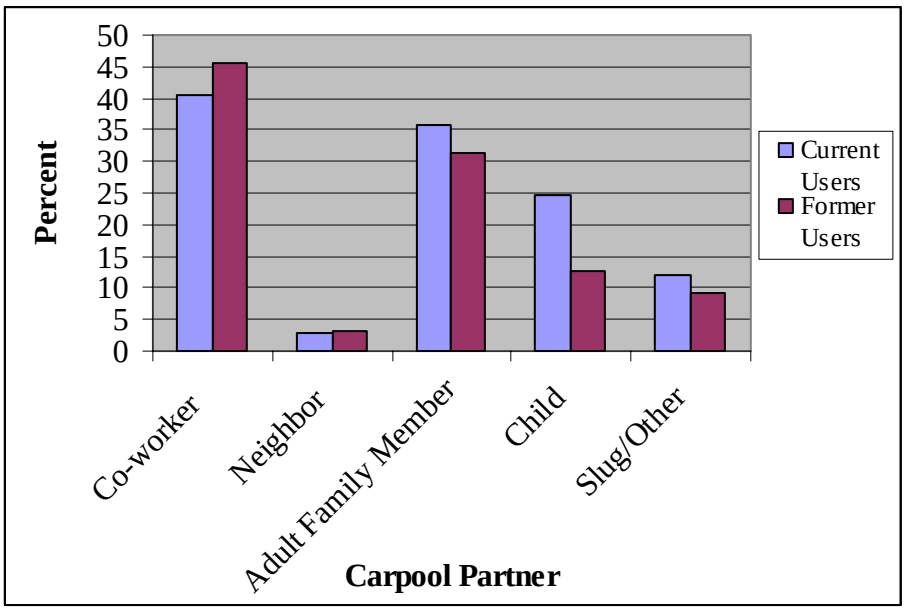
Table 2. Mean Age, Income, Household Size, and Number of Vehicles per Household

Means	Current Users (N=525)	Former Users (N=61)
Age	45.9	47.4
Income	$119,273	$114,215
Household size	3.0	2.8
Number of vehicles per household	2.3	2.4

However, two travel characteristics were found to be different between the two groups. Similar percents of former users and current users indicated having difficulty with carpooling (31.4% of former users and 33.1% of current users). However, the average time spent picking up a carpool partner was significantly higher among the former user group. Users spent on average only 4.3 minutes picking up his/her carpool partner while former users spent 12.2 minutes. To better understand this gap in carpool pickup times, carpooling behavior was investigated.

When indicating his/her carpool partner, current users were allowed to check more than one answer on the survey. While the percent of QuickRide carpool partners in the co-worker and neighbor categories did not vary significantly, in the child category there was significant differences (see Figure 1). Approximately a quarter of current user survey responders indicated main QuickRide carpool partner was a son/daughter while only 12.7% of former users indicated as such. These findings lead to the conclusion that current users are carpooling with family members more frequently than former users. This conclusion was reinforced by the fact that when using QuickRide, 47.2% of former users' carpool partners helped pay the toll while only 26.8% of current users' carpool partners did so. This is a logical occurrence since most people using QuickRide with a family member would consider the $2 toll as a charge to the entire household.

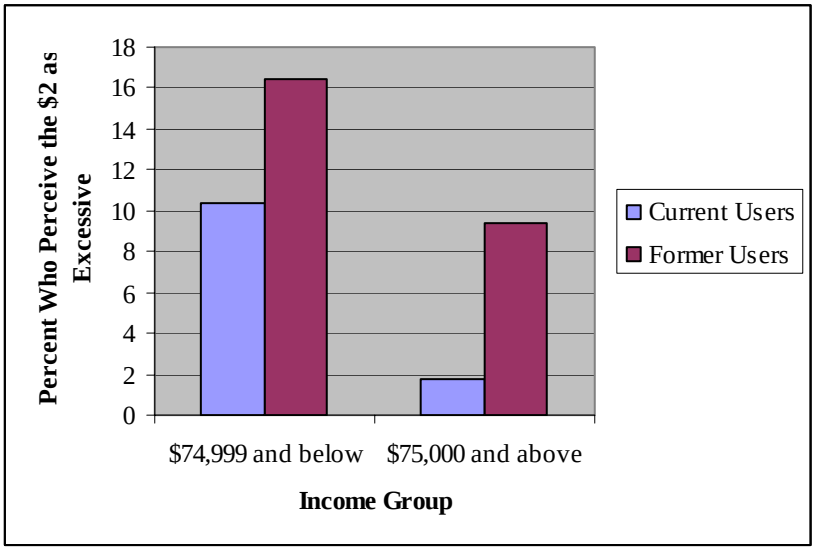
Figure 1. Carpooling Partner While Using QuickRide



Another travel characteristic which varied significantly between the two groups was the perception of the price of the toll. While the two groups indicated similar perceived time savings per QuickRide trip (29.8 minutes for current users and 35.0 minutes for former users), a higher percentage of former users viewed the $2 as excessive (10.0% of former users versus 3.3% of current users). When broken down into two income groups (above and below $75,000), the differences were even more apparent (see Figure 2).

As illustrated in Figure 2, 16.4% of former users with a household income of $74,999 and below indicated that the $2 was excessive while only 10.4% of current users did. Even in the higher income group of $75,000 and above, 9.4% of former users indicated that the $2 was excessive compared to the 1.8% current users who thought so. Such percentages demonstrate that current users value their QuickRide time savings more so compared to former users. That is, current users are more willing to pay the $2.00 for the same amount of time savings.

Figure 2. Perception of $2.00 Toll by Income Group



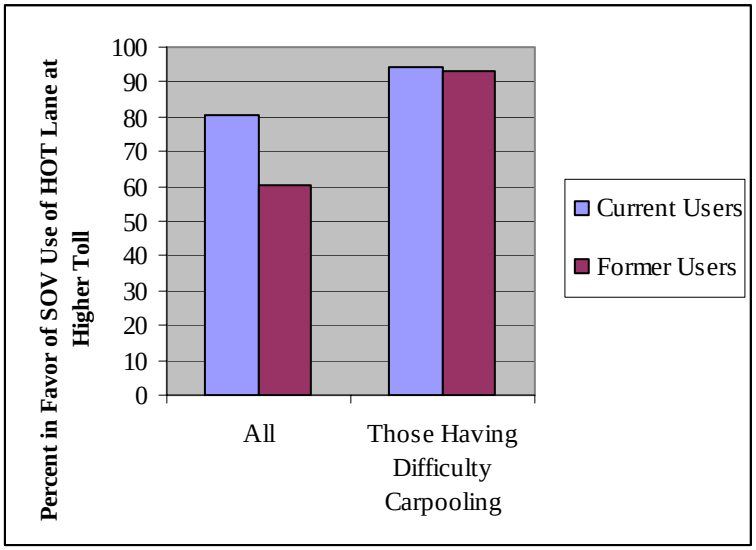
Although former users more frequently indicated that the $2 toll was excessive, the main cause for the underutilization of QuickRide was still the difficulty with carpooling. Out of the seven options given to current users on why they are not using QuickRide more often and the twelve given to former users on why they no longer use QuickRide, the top reason among both groups remains finding it "hard to carpool" (see Table 3).

Table 3. Top 3 Reasons for Leaving QuickRide/Not Using QuickRide More Often

Reason	Current Users (N=525)	Former Users (N=61)
1. Hard to carpool	33.1%	31.4%
2. Flexible work schedule	14.7%	10.5%
3. Trip cost ($2.00) is too much	3.3%	10.0%

Although three new concepts for QuickRide were introduced in the survey, including variable tolling with time and with traffic, the only idea to receive overwhelming support is the proposal to allow single occupant vehicles (SOVs) to travel on the HOT lane at a higher toll. A total of 80.5% of current users and 60.3% of former users were supportive of this idea.

Figure 3. Favorability of SOV Use of HOT Lane



The percent of approval was even higher amongst those who also indicated that trouble with carpooling was their main reason for quitting QuickRide/not using QuickRide more (94.4% of current users and 92.9% of former users). The survey respondents were also asked to indicate how many trips they would make on the HOT lane in a single occupant vehicle at the following incremental tolls (see Table 4).

Table 4. Intended Number of Trips per Week for Single Occupancy Usage of HOT Lane

Toll	Current Users (N=525)	Former Users (N=61)
$3.00	3.5	4.3
$4.00	1.9	1.7
$5.00	1.6	1.1
$6.00	1.1	0.4

The idea of single-occupant vehicles utilizing the HOT lane has already been put into practice in San Diego on I-15 and has been successful. As indicated by the survey responses above, similar success in increasing HOT lane use would occur in Houston if the concept was implemented.

A concept only introduced in the former user survey is the idea of a flat monthly fee for QuickRide. A majority of former users, 76%, were in favor of the idea, indicating that they would be willing to pay an average of $48.56 per month to use QuickRide.

CONCLUSIONS

The primary problem limiting the use QuickRide appears to be one of convenience and not of money. Both current users and former users are more discouraged by the burden of carpooling than by any other QuickRide factor. Drivers choose the HOT lane because of its valuable time savings. However, if the time it takes to pick up a carpool partner almost breaks even with the time saved on the HOT lane, drivers lose the motivation to carpool. This very circumstance appears to have afflicted many of QuickRide former users and prompted them to subsequently leave the program. Thus, utilization of the HOT lane can be increased by either facilitating the carpooling process for travelers or decreasing the occupancy minimum.

An increase in QuickRide use should also reduce the number of vehicles used in the corridor as former participants are using more vehicles for travel now than with QuickRide. Since all current enrollees are traveling in two occupant vehicles, 50 vehicles are being used for every 100 current QuickRide users. However, 71.7 vehicles are being used for every 100 former QuickRide users, with half of the former users traveling in single occupant vehicles.

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3. Smith, Lauren. *Congestion Pricing*. ITS Decision Report. Berkeley University, Berkeley, California, May 2002.

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APPENDIX A:

SUMMARY OF CURRENT AND FORMER QUICKRIDE USER SURVEY RESPONSES

Respondent Group	*Users (N=525[B])*	*Former Users (N=61 [B])*
Trip Purpose*		
Commute	66.7	78.3
Shopping/Recreational*	9.9	12.2
Work (other than commute)*	4.1	1.0
School*	11.0	4.0
Other*	8.3	4.6
Vehicle Occupancy		
1	0	50.3
2	100.0	33.0
3	0	11.0
4	0	0.9
5 or more	0	0
Bus	0	5.2
Motorcycle	0	0
HOV Lane Use		
Yes	100.0	53.6
No	0	46.4
Average Total Trips per Work Week*	7.3	7.9
First Learned of QuickRide by:*		
TV*	0.4	6.2
Mail	3.6	3.2
Newspaper*	23.7	24.8
Radio	2.6	3.1
Family/Friend*	39.8	25.9
On the bus*	0.1	5.0
I don't remember	18.1	22.8
Other*	11.6	8.5
Reason for Joining QuickRide*		
To avoid traffic congestion	66.2	66.9
Too dangerous to drive on main lanes*	7.3	0
Travel during peak period with carpool partner	22.6	31.0
Other	3.9	2.1
Average Number of QuickRide Trips per Week*[A,C]	0.64	6.8
Average HOV Time Savings per Trip (mins)* [A]	29.8	35.0
Reason for Not Using QuickRide More Often/No Longer Using QuickRide		
Hard to carpool	33.1	31.4
Carpool with 3+		6.7

Respondent Group	*Users (N=525[B])*	*Former Users (N=61[B])*
HOV lane is congested	0.4	5.4
Not enough time savings	1.8	4.6
Entrance/exit inconvenience		3.3
Program is complicated	0.1	0
Flexible work schedule	14.7	10.5
Credit card requirement		2.1
No longer use I-10/US-290		34.7
Trip cost ($2.00) is too much	3.3	10.0
$2.50 monthly fee		2.5
Other	45.1	13.0
$2.50 Monthly Administrative Fee Factor		
The fee was my main reason		4.5
The fee was one reason		7.5
Not Sure		0
The fee played a minor role		4.5
The fee was not a factor		83.6
$2.00 Toll Factor		
The toll was my main reason		11.1
The toll was one reason		18.1
Not sure		0
The toll played a minor role		4.2
The toll was not a factor		66.7
Travel Partner When Using QuickRide		
Co-worker	40.6	45.6
Neighbor	2.8	3.2
Adult family member*	35.9	31.4
Casual carpool (slugging)*	7.1	0
Child*	24.7	12.7
Other*	4.8	9.1
Additional Time for Picking up Carpool (mins)*	4.3	12.2
Did passenger Help Pay QuickRide Toll?*		
Yes	26.8	47.4
No	73.2	52.6
Incentive for Using More /Rejoining QuickRide*		
Increased traffic on main lanes	16.2	16.4
Reduced QuickRide toll*	28.4	13.7
Longer QuickRide hours	15.8	12.6
Ability to drive alone on HOV*	80.5	60.3
Other*	12.1	25.2
Favorability of Variable Tolling (with Time)*		
Yes	14.3	43.4
Probably	14.5	7.4
Not sure	32.8	9.1

Respondent Group	*Users (N=525[B])*	*Former Users (N=61[B])*
Probably not	17.7	12.8
No	20.6	27.3
Favorability of Variable Tolling (with Amount of Traffic)*		
Yes	13.8	34.6
Probably	12.2	6.3
Not sure	31.4	14.3
Probably not	21.4	16.5
No	21.2	28.3
Favorability of Single Driver Use of HOV		
Strongly favor	47.3	46.3
Somewhat favor	22.2	20.6
Indifferent	8.1	5.1
Somewhat oppose	4.6	7.1
Strongly oppose	17.9	21.0
Average Number of Trips per Week for Single Driver HOV Lane Use*[A]		
$3.00*	3.5	4.3
$4.00	1.9	1.7
$5.00	1.6	1.1
$6.00*	1.1	0.4
Favorability of Flat Monthly Fee		
Still would not use QuickRide		24.0
Favors flat monthly fee		76.0
Average amount willing to pay[A]		$48.56
Age		
16 – 24*	3.4	0
25 – 34 *	14.3	8.5
35 – 44	26.0	35.4
45 – 54	38.4	35.4
55 – 64*	11.6	15.8
65 and over	6.2	5.0
Gender*		
Male	47.0	37.7
Female	53.0	62.3
Household Type*		
Single adult	5.7	6.2
Unrelated adults	0.4	0
Married without child*	29.9	25.8
Married with child(ren)	60.5	56.5
Single parent family*	1.7	11.5
Other*	1.7	0
Average Number of People in Household[A]	3.0	2.8
Average Number of Vehicles in Household[A]	2.3	2.4
Occupation*		
Professional/Managerial	64.8	66.0

Respondent Group	*Users (N=525[B])*	*Former Users (N=61 [B])*
Technical*	10.1	1.1
Sales	5.5	6.0
Administrative/Clerical	9.3	8.7
Manufacturing	0	0
Stay-at-home-parent	0.4	1.9
Unemployed*	1.6	6.8
Other*	8.4	9.4
Education*		
Less than high school	0.2	0
High school graduate	8.8	5.8
Some college/vocational*	17.0	26.9
College graduate	38.6	46.9
Postgraduate degree*	35.3	20.4
Hourly Wage*		
Less than $10*	3.8	0
$10.01 to $15*	7.8	0
$15.01 to $20	7.8	7.1
$20.01 to $30*	17.0	28.1
$30.01 to $40	22.2	18.3
$40.01 to $50	8.9	12.5
$50.01 to $60	10.5	12.1
$60.01 to $100	8.1	7.1
Over $100	13.9	14.7
Income*		
Less than $10,000	0.1	0
$10,000 to $14,999	0	0
$15,000 to $24,999	0.1	0
$25,000 to $34,999*	2.0	0
$35,000 to $49,999*	4.6	9.1
$50,000 to $74,999*	13.7	20.7
$75,000 to $99,999*	17.8	12.5
$100,000 or more	61.7	57.8

Where users could select more than one answer the total response for that question may exceed 100%.

* Significant difference (at the 0.05 level) between groups of survey respondents. Statistical tests used included:

- Mann-Whitney test for 2-way comparison (by group number) of ordinal data (for example; age, education, and income).
- Student's t-test for 2-way comparison (by group number) of continuous data (for example; travel time savings).
- Chi-square test for 2-way comparison of nominal data (for example; trip purpose, gender, household type, and occupation).

A. These entries represent mean responses (not proportions).
B. N values based on unweighted data. The weighted number of surveys was 1459 and 582 for current and former participants, respectively.
C. Current user surveys were weighted on the basis of number of QuickRide trips per week with infrequent users weighted heavily to accurately represent actual travel behavior. Without weights, users claimed 4.3 trips per week.