Title
The Importance of Interregional Refueling Availability to the Purchase Decision

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The Importance of Interregional Refueling Availability to the Purchase Decision


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How Many Alt Fuel Stations do You Need, and Where do You Put Them?

► There are at least two answers to this question
  ▪ Wherever they will get the most usage
  ▪ Wherever they will convince the greatest number of people to buy vehicles

► Many cite high usage as the primary justification for station construction

► However the value of a station that is infrequently used may not be predicated solely on the frequency of usage
Research Question

What effect does expanding the number of destinations (independent of usage) have on the attractiveness of an alternative fuel vehicle?
Methods

► Administered a survey trading off purchase price with refueling availability (pretest only)

► Respondents could make their own refueling network

► Stations were ranked in importance

► Vehicle was assumed to use a petroleum derived fuel incompatible with gasoline/diesel technology

► Fuel price, range, performance etc. same as for a gasoline vehicle
Map Questionnaire

Instructions:

► Draw your activity space consisting of roads and areas you are familiar with.

► Place station 1 near your residence.

► Place stations 2-10 in rank order to enable travel to the most important places in your activity space.

Activity Space Functions:
- Erase and Redo
- Modify
## Fix a Price You Will Likely Spend on Your Next Vehicle

4. Considering a Vehicle Purchase

4.02 Please put your price range for the next new or used vehicle you are considering (Example: $10,000-15,000).

<table>
<thead>
<tr>
<th>Minimum</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum</td>
<td></td>
</tr>
</tbody>
</table>

4.03 Now take your price range and choose a value in-between that represents the most likely price you expect to pay within the above range.

Most likely price: $

4.04 Imagine the vehicle you are most likely to replace were being repaired, and were not available. If you needed to make a trip more than 50 miles away and transit were not available, what alternative would you choose to make the trip?

*Choose only one of the following*

- Use one of the other vehicles I or my spouse own
- Borrow a friend’s vehicle
- Rent a vehicle
- Other
- No answer
### 4.06 ONE STATION

<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.07 Would you accept a vehicle that could fuel at only ONE station near your home if the vehicle were given to you at no cost in place of the vehicle you are considering buying in the future?</td>
<td>Yes, No, No answer</td>
</tr>
</tbody>
</table>

### 4.08 Maximum price paid

<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.08 What is the maximum price you would pay for a vehicle that you could only refuel at ONE station near your home in place of the vehicle you are considering buying in the future? (Example: $7000 would mean you would pay $7000 for this vehicle with limited refueling, but not $7001.)</td>
<td>$</td>
</tr>
</tbody>
</table>

### 4.09 TEN STATIONS

<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.10 Looking at your map, would you accept a vehicle that could fuel at all TEN stations you indicated if the vehicle were given to you at no cost in place of the vehicle you are considering buying in the future?</td>
<td>Yes, No, No answer</td>
</tr>
</tbody>
</table>

### 4.11 Maximum price paid

<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.11 What is the maximum price you would pay for a vehicle that you could only refuel at TEN stations near your home in place of the vehicle you are considering buying in the future? (Example: $7000 would mean you would pay $7000 for this vehicle with limited refueling, but not $7001.)</td>
<td>$</td>
</tr>
</tbody>
</table>
Respondents

- Convenience sample of 20 University Employees
- 12 live in Davis, 8 outside Davis
- 8 women, 12 men
- 9 one vehicle households
- 11 multi-vehicle households
All Respondents – Percent of Purchase Price of Gasoline Vehicle

![Graph showing the percent of purchase price of gasoline vehicle by the number of stations.](image-url)
All Respondents – Marginal Value Per Station

[Graph showing percent change per station for different numbers of stations, with lines indicating the percentage change for each station number.]
One-vehicle Households – Percent of Full Value

One-Vehicle Households

Number of Stations

Percent of “Full Value”

1
2
6
9
11
14
17
18
20

0.00% 20.00% 40.00% 60.00% 80.00% 100.00% 120.00%
Comparison of Multi and Single-Vehicle Households

![Box plot comparing multi and single vehicle households](image)
Activity Space Overlap

Legend

Activity Space Overlap

VALUE

0
1 - 2
2 - 4
4 - 5
5 - 6
6 - 10
11 - 12
13 - 14
15 - 16
17 - 18
19 - 20

0 35 70 140 210 280 Miles

0 35 70 140 210 280 Kilometers
Station Intensity - Only Davis Residents

Legend
Station Intensity by Marginal Value
Davis Resident External Locations
- 0 - 0
- 0.01 - 0
- 0.01 - 0.01
- 0.02 - 0.01
- 0.02 - 0.01
- 0.02 - 0.01
- 0.02 - 0.02
- 0.03 - 0.02
- 0.03 - 0.03
- 0.04 - 0.03
- 0.04 - 0.04

Scale:
- 0 35 70 140 210 280 Miles
- 0 35 70 140 210 280 Kilometers
Initial Indications

► Multi-vehicle households find much greater value in a vehicle with a limited infrastructure.
► One station in one’s hometown results in a vehicle retaining 20%-50% of its value for multi vehicle households. Mostly zero for one vehicle households.
► 10 station networks providing mobility throughout one’s activity space results in a vehicle retaining 55%-100% of its value for multi vehicle households. 0% to 100% for one vehicle households.
► Infrequently visited weekend spots have a noticeable effect on initial attractiveness of a vehicle
Limitations of The Method

► The general population is notoriously unreliable in stated response surveys about refueling availability
  ▪ No experience using a vehicle with limited refueling
  ▪ No real monetary consequences for survey choices

► Some ambiguity in the questions regarding activity space and station placement
Future Work

► Pretest again
► Do a full scale survey
► Modify the survey for CNG drivers assuming they know better how to make the tradeoff valuation
Acknowledgements

► STEPS program and sponsors
► Chris Congleton (survey design)
► Alex Mandel (online mapping interface)