City of Glen Cove, NY, Environmental and Transportation Revitalization:

Application of Discrete Choice Experiments

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Abstract

More than 140 surveys were collected along four train stations in the Glen Cove area during morning rush hour. The survey was constructed in the format of a Discrete Choice Experiment. Participants were asked if they were content with the current train situation or if they would consider a proposed option. The suggested alternative offered one or two larger stations with a faster journey to Jamaica rather than the existing condition with four stations within a close proximity and several stops. Two different surveys were distributed randomly to the commuters, where one included more information regarding the environmental benefits of the proposed option. A significant number of the participants who took the survey preferred the suggested alternative, referring to less stations, and shorter travel time. Even though the additional information about the environmental impacts played some role, it did not show a statistically significant result. According to the outcomes, other factors had greater influence on the decision making than environmental consciousness.

Introduction

The growing concern about climate change and environmental degradation is having a great effect on many decisions. First of all, we wanted to examine if people were content or not with the current train option. We also wanted to investigate whether more information about the environmental impacts influenced commuters' choice when it comes to rebuilding the Oyster Bay Branch. Finally, we were interested in exploring if those who lived in the beginning of the four stations we inspected were more likely to choose the proposed option since their experience with more frequent stops might affect them.

Methodology

- I conducted a survey and did a pilot test with ~50 students to make sure that the questionnaire was easy to understand.
- I handed it out on the platform of four stations along Oyster Bay Line during morning rush hour. The same amount of trains were covered at each station during ~2 hours to make the selection fair.
- Except the main question pictured above, participants were asked to answer questions regarding their characteristics, such as age, race, income, sex, highest degree received, what ticket type they used, how often they used the train and for what reason.
- The collected data was transferred to an Excel spreadsheet and later analyzed in Stata SE 13 with the help of t-tests, chi^2-tests, and logistic regressions.

Descriptive Statistics

- 144 surveys collected
- ~20% of all passenger travelling during the specific time we were present answered the survey
- 78.47% Bachelor degree or higher
- 80% use a monthly ticket
- Mean age: ~ 46 years
- ~48% of the participating were women
- ~92% answered "work" as reason for travel

Percentage of surveys collected at each station:

- Glen Cove 23%
- Glen Street 17%
- Sea Clif 39%
- Glen Head 21%

Survey Design & Question

The first page (not visible here) asked participants about their age, race, income, sex, level of education, etc.

Main question:

Suppose that the number of train stations in the Glen Cove area would be reduced to one or two larger stations with more parking spaces available. This may lead to a longer travel for some to reach a station nearby. However, fewer stations will shorten the train journey since the train will make fewer stops. In addition, a modern train would make it possible for trains to go directly to Manhattan. **Which option would you chose? (Check the box to choose your option)**

Type 1 - Standard

Current Option

- Four stations:
  - Glen Cove
  - Glen Street
  - Sea Clif
  - Glen Head
- Travel time
  - ~ 40 min to Jamaica during morning peak hour
- Switch at Jamaica station

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Proposed Option

- 1 or 2 larger stations in the Glen Cove area
  - Ample parking available
  - Shorter and more convenient trip with fewer stop
- Travel time
  - ~ 5min shorter journey to Jamaica station
- New train
  - No need to switch at Jamaica for trains to Manhattan#

☐

Type 2 – Environmental Emp.

CURRENT OPTION

- Four stations:
  - Glen Cove
  - Glen Street
  - Sea Clif
  - Glen Head
- Travel time
  - ~ 40 min to Jamaica during morning peak hour
- Switch at Jamaica station
- Use of the existing diesel train engines
  - Fairly inefficient
  - Harmful to the environment
  - High levels of noise and air pollution

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Proposed Option

- 1 or 2 larger stations in the Glen Cove area
  - Ample parking available
  - Shorter and more convenient trip with fewer stop
- Travel time
  - ~ 5min shorter journey to Jamaica station
- New train
  - No need to switch at Jamaica for trains to Manhattan #
- Electric train engines #
  - More efficient than current option#
  - Environmentally friendly#
  - Lower levels of air and noise pollution compared to standard diesel engines.#

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Results

Below are the results from different types of tests in Stata. We started with the T-test, followed by the Chi^2-test, and finally ended up with a Logistic Regression to see which variable(s) influenced the dependent variable.

Table. 1 T-test

Variable	Mean	Std. Err.	[95% Conf.	Interval]
MAINQUESTION	0.61	0.05	0.52	0.70

Ha: p < 0.5 | Ha: p != 0.5 | Ha: p > 0.5

Pr(Z < z) = 0.9921 | Pr(|Z| > |z|) = 0.0158 | Pr(Z > z) = 0.0079

This t-test compares answers in the MAINQUESTION. As the Mean tells us, 61% preferred the proposed option. The p-value is 0.0158 and is therefore statistically significant.

Table. 2 – Chi^2-test

	Standard Survey	Environmental Emphasis Survey	Total
MAINQUESTION	1	2	
Current Option	25	20	45
Proposed Option	33	38	71
Total	58	58	116

Pearson chi2(1) = 0.9077 Pr = 0.341

This chi^2-test explores whether there is a relationship between the dependent variable (MAINQUESTION) and Type (Standard or Environmental Emp.). The p-value is 0.341, and the result is therefor not statistically significant. More information about the environmental impacts did not influence the dependent variable significantly.

Table. 3 – Logistic Regression

Variables	First Regression		Second Regression	
MAINQUESTION	Odds Ratio	P>z	Odds Ratio	P>z
Type	1.09	0.88	-	-
Station	1.01	0.97	-	-
Daysweek	0.31	0.02*	0.39	0.01**
Tickettype	4.99	0.045**	4.48	0.022**
Sex	0.58	0.33	-	-
Age	0.96	0.05*	0.97	0.08*
White	4.62	0.077**	5.39	0.035*
Income	1.04	0.77	-	-
EducationLevel	0.87	0.57	-	-
_cons	38.10	0.11	5.84	0.15

* Statistically significant at 90%
** Statistically significant at 95%

The Logistic Regression shows that neither Type nor Station, as we first predicted, influence the dependent variable (MAINQUESTION). Instead, other variables, such as Daysweek, Tickettype, Age, and White (race) have a greater impact on the MAINQUESTION. In fact, less travel days increase the likeliness to favor the proposed option. Younger people tend to do the same. Non-whites are also more likely to support the proposed option. The regression also shows that people with tickets that covered more than one journey were more likely to choose the proposed option. In the second regression we excluded those variables that did not give us a significant result, and simply ran the variables that were statistically significant. It shows that, while these variables are tested alone, race becomes more significant than age, which was not the case in the first regression.

Conclusion

Our results suggests that more information about the environmental impacts will not necessarily influence a commuter's decision-making. Even though more participants who answered the survey with environmental emphasis chose the proposed option, the result was *not* statistically significant, implying that the environmental impacts that were included in the survey did not mattered. Also, it could not be shown that a commuter's station had an impact on the participants' choice. However, one of the findings shows that people who travel less are more likely to prefer the proposed option, which raises some interesting questions. Are these results implying that these people would travel *more* if the proposed option was implemented? In fact, are the regular commuters so used to the current system that they do not bother to change old habits? These results shows that commuters are not necessarily concerned about the environmental impacts, but more so about travel time and accessibility. However, these factors are not mutually excluded, an environmentally friendly system can be both quicker and more accessible.