

The Effect of Free Bus Ticket Policy on Bus Taking Behaviors of Motorcyclists: Examining from the Electronic Ticket

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Abstract

Due to the numerous time-consumption and costly expenses of constructing public transportation infrastructure, free bus policy had been adopted as a marketing strategy and encouragement to increase the bus ridership in several cities of Taiwan. To examine the effect of free bus strategy, this paper analyzed the before/after behavior change of bus taking frequency first. Then, the psychological perceptions regarding the sample of motorcyclists whom were provided with a one-month free electronic ticket, concluded a different research finding. The results reveal the significant difference in mode use frequency between self-reported survey data and e-ticket data, and the insignificant effects of free bus ridership to bus use frequency.

Key Words: Free Bus ticket, Electronic Ticket, Motorcyclist

1. Introduction

There are plenty of researches to support the concept of applying price discount and communication as the marketing strategies to promote the ridership of public transportation. However, there are no consistent discoveries regarding the implementation of marketing approach. The choice of transportation is considered as a “rational behavior” that price discount and information will change the behaviors (Bamberg et al., 2003; Fujii and Kitamura, 2003; Thøgersen, 2009). On the other hand, there are mounting evidences in supporting the choice of travel mode that tends to be habitual behavior and it is difficult to change (Verplanken et al., 1997; Lovelock et al., 1987; Beals & Bonsall, 2007). The previous experience of transportation taking will influence peoples’ behaviors and choices of latter day that complex the mass transit policy.

Except the implementable effect does not reach the mutual agreement, the previous studies on the effect of free public transportation focus on the car-drivers instead of the motorcyclists is another issue. Therefore, the research conclusion is not viable in a Taiwanese context because most of the Asian countries, car-drivers are not the majority, instead, motorcyclists are: Taiwan is considered as the highest density of motorcycles in the world (Chen & Lai, 2011). In addition to the significant benefit in term of cost, motorcycle serves as a convenient accessibility for most of the citizens over 18 (Lai & Lu, 2007; Environmental Protection Administration, 2015). Therefore, the habitual behavior of using motorcycles to travel within the urban areas becomes a serious challenge for the mass transit policy since the public transportation adoption is not only determined by the habits of the people, but also the cost. Thus, percolation of people to switch from motorcycle to public transportation is complicated for any policy maker under the pressure of energy utilization and air pollution issue. The unsolved social problem exists because a free public transit policy encourages people to switch from motorcycle to public transit remains a research gap.

In addition to the experimental approach, the research design was constructed based on actual observation of dynamic panel data to discuss the marketing effects of public transit. In other words, the free-buss-pass acted as an interventional mechanism in which survey were taken to exam the before/after taking frequency in terms of consumer behaviors. Two major approaches were applied in this research; one is called “diary-approach,” while the other is named “scale-approach.” The diary approach is identified to record individuals certain day of public transportation taking as the outcome of travel frequency (Bamberg et al., 2003). The other is referred to calculate the transportation frequency (Fujii & Kitamura, 2003; Thøgersen & Møller, 2008). Those two approaches are subjective to the interviewees’ personal interpretation that probably involve with missing or bias. Thus, the un-intentional error influences the research outcome that leads to an objective research conclusion in terms of interventional mechanism.

Since the previous research focused more on the car-divers as the sample of studying free-bus pass and there is no research targeting on motorcyclists who are the majority on the roads in most of Asian countries. Although there is no typical research which is focusing on the fitness of methodology in terms of evaluating public transport, but there are variations in scopes and methods among various countries (Nakamura, 2000). Based on the contextual development of different countries regarding public transport, this research aims to target on motorcyclist commuters by providing

free-bus-pass for a month to evaluate the travel frequency through the project. Pre-test and after-test were conducted by implementing traditional survey and record of e-bus-pass. The electronic data acted as a confirmation to exempt the reasonability of travel frequency as well as provided a correspondent comparison with traditional survey. Therefore, an innovative approach was applied to evaluate the frequency through an interventional mechanism was applied to compare and adjust the subjective methodology while electronic-bus-pass can retrieve data more scientifically and accurately.

2. Methodology

Bamberg et al. (2003) studied the travel behavior by using a one-day “mobility diary” that consisted of a booklet with one page for each trip on a prior specified day. The interviewees registered time and starting location, purpose (e.g. work, shopping, or leisure), travel mode for each trip (walk, bike, car, or public transport), destination, time of arrival, and estimated distance. Another methodology of measurement was called “scale” which was applied to measure the frequencies of commuters in terms of using public transportation. According to Fujii & Kitamura (2003), six-scale criteria had been used:

1. Daily, several times per day
2. Daily, one to two times per day
3. Once every two days
4. Few times a week
5. Few times a month
6. Never

Thøgersen (2009) used the question of “the past ten travel modes” to evaluate the frequency of commuters’ travel modes. The application of the experimental research indicated the free-bus-pass policy was significantly influenced the choices of commuters. Especially the frequencies growth rates were correlated with the free-bus-pass with the rate of 145.8% (Bamberg et al., 2003), 121.3% (Fujii & Kitamura, 2003) and 100% (Thøgersen, 2009). However, even the frequency rate had been increasing dramatically, when the increase of total commuters was not significant (Lovelock et al., 1987; Verplanken, 1999). In other words, the effect was short-termed and temporary (Beale & Bonsall, 2007).

3. Data Collection

This research issued free-one-month travel pass as the instrument to evaluate the motorcyclists’ behaviors. Two stages of surveys had been constructed in Kaohsiung city, one was before the issuing of travel pass, and the other was after the revocation. The characteristic of electronic travel pass was tracked not only the bus-taking frequency, travel mirage, and travel time that traditional survey cannot achieve. Therefore, this research took the advantage of technology with scientific accuracy.

The data collection procedures used in this work was listed as follows:

3.1 The interviewees were asking as the accomplishment of the first-stage-survey. Targeting on the commuters, there were three questions involved:

1. Daily commute modes
2. Times of using bus as commute mode in past one week
3. If the free-bus policy has been implemented, the possibility of adopting bus as the

commute mode

After the accomplishment of survey, a free one-month bus pass was given without limitation of travel times and frequencies.

3.2. After one month, another free one-month-bus-pass was issued; another survey was conducted to get the retrieval data from each free pass.

3.3 At the first stage of survey, the target commuters were chosen from the geographical consideration (e.g. downtown, shopping mall, bus stops) because the accessibility of bus-taking. Only the match of questions, the first stage survey and a free-bus-pass were granted. Because the budget constraint, the sample is controlled within 100 free-bus-passes, 93 valid questionnaires were collected after two stages. The sample had been organized as Table 1

Table 1: The Demographic Characteristics of the Interviewees

Demographic variables		Number
Gender	Male	45
	Female	48
Age	Under 20	8
	20-24	29
	25-34	33
	35-44	14
	45-60	8
	Above 60	1
Occupation	Students	36
	Governmental employees	17
	Engineer/labor	9
	Service industry	26
	other	5
Educational background	Junior high school(or below)	2
	High school	18
	University(Junior College)	67
	Master or higher	6
Income/month (NT\$)	Less than 20,000	44
	20,001-30,000	25
	30,001-40,000	10
	40,001-50,000	4
	50,001-60,000	5
	More than 60,001	5

4. Results

In order to discover the effect of motorcycle commuters' willingness to change their travel mode, this section focused on the comparison of traditional surveys with

electronic data. Then, the discussion of the difference between two instruments was implemented.

A. Self-reported Data (Survey)

A.1 At the first stages, there were 93 interviewees involved, the comparison of first stage of switching travel to bus as the commuting purpose had been increase 5.4% after the trial period of free-bus-pass.

A.2 Regarding the commuting vehicle, the first stage showed 2.72 times of using bus as the travel mode that revealed an increase of 4.68 times (paired t-test value is 1.77), which was not shown significant difference.

A.3 Regarding the third question, free-bus-pass policy did not change the behavior of travel mode since 61% (57 people) of the interviewees were not willing to switch their behaviors. According to Table 2 (the right side of diagonal), it indicated that 26 interviewees (28%) were possible changers. It revealed a higher percentage than the first stage. Oppositely, 20 interviewees (21%, exhibited at the left side of diagonal) who had lower psychological cognition to change their travel modes, compared with the first stage.

Table 2 Two Stages of Survey: Willingness to Change Travel Mode

second stage \ first stage	Never Change	Possible Change	Will Change	Total
Never Change	1	10	13	24
Possible Change	9	50	3	62
Will Change	2	9	6	17
Total	12	69	22	93

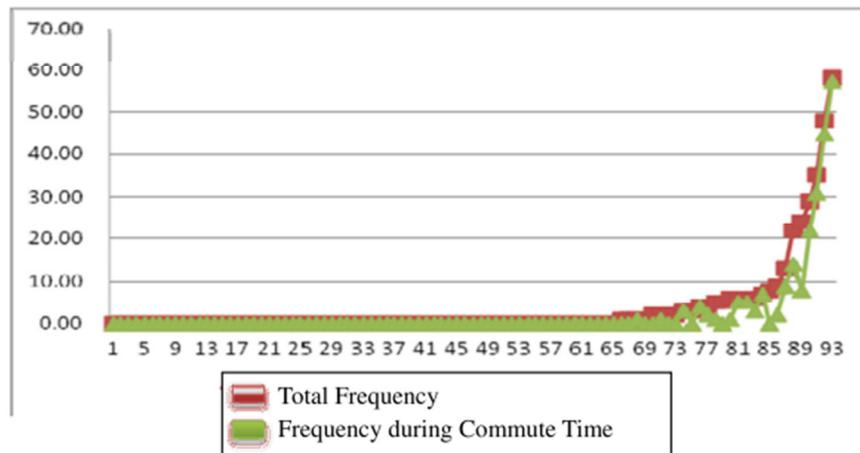
Remark: vertical axis is the first stage survey and the horizontal axis is the outcome of second stage.

B. Automatic Response (Electronic Data)

The automatic-response data from the E-bus-pass has been analyzed on Table 3. There were 65 citizens (69.9%) never took bus as a travel mode which also revealed there were approximately 70% of the motorcyclist never considered bus as a choice. 28 citizens (30.1%) had the experiences of taking bus, among them there were 21 citizens (22.6%) who were classified as “1-10 times experience”, and 7 citizens (7.5%) was considered as “more than 10 times”. Totally, 313 frequencies had been recorded.

Another variable was the working days (Monday to Friday), especially the commute time for commuters (6:00-9:00 am, 16:00-19:00 pm), there were 221 frequencies had been recorded. In other words, 70.6% of the frequencies were happened during the commute time. 19 citizens contributes 221 times of bus taking frequencies, 1-20 times were recorded from 15 interviewees, 21-40 times were recorded form 2 citizens, as well as 41-60 times were another 2 people (Graph 2). In addition, 4 people contributed more than 20 times of frequencies in terms of bus-traveling, the travel

modes changed dramatically.



Graph 3: Records of Changing Travel Mode from Motorcyclist to Bus-commuters from Electronic Data

C. Comparison of Self-reported Frequency and Automatic-response Frequency

First of all, the comparison of two instruments when examining the commuters' choice and willingness to change the travel mode, 88 citizens remained to choose motorcycles as the major instruments when commuting in the second stage survey. Among those five candidates who were willing to change travel mode to bus, three of them were recorded more than 20 times during the trial period (22 times, 45 times, and 57 times respectively). Two people were taking less than 20 times (7 times, and 8 times respectively). Overall, the finding of applying survey and E-pass were 96.8% consistent (90 people), 3.2% were not consistent (3 people).

Besides, according to the data from the e-pass, the frequencies have been used to compare with the second-stage survey data. We concentrate on the subjective replies from the interviewers; and conclude the average times of survey: 4.68 times while the e-pass got only 2.38 times as the average. Table 3 is the data which is organized from the e-pass, the diagonal line indicates the 64.4% is consistent (59 people) and 36.6% is not consistent (34 people) when different measurement instrument has been applied for data collection. 14% (13 people) shows the inconsistent times that is as higher as 12 time or even more.

Table 3 Comparison of Electronic Data Records and Surveys

E-pass Survey	Frequency Ranges											合計
	0	1~4	5~8	9~12	13~16	17~20	21~24	24~28	29~32	33~36	>36	
0	56	7	2	2	0	2	3	0	0	0	2	74
1~4	5	2	1	0	0	1	0	0	0	0	0	9
5~8	2	0	0	0	0	0	1	1	0	0	0	4
9~12	1	0	0	0	0	0	0	0	0	0	0	1
13~16	1	0	0	0	0	0	0	0	0	0	0	1
17~20	0	0	0	0	0	0	0	0	0	0	0	0
21~24	0	0	0	0	0	0	0	0	0	0	1	1

24~28	0	0	0	0	0	0	0	0	0	0	0	0
29~32	0	1	0	0	0	0	0	0	0	0	0	1
33~36	0	0	0	0	0	0	0	0	0	0	0	0
>36	0	1	0	0	0	0	0	0	0	0	1	2
total	65	11	3	2	0	3	4	1	0	0	4	93

Remark: The vertical axis is the times of bus-taking from the E-pass records at the commute time of commuting (Monday to Friday, 6:00-9:00 am and 16:00-19:00 pm), and the horizontal axis is data from traditional survey

D. The Willingness of Changing Travel Mode

The last part of the discussion is focused on the psychological cognition in terms of changing travel mode. Therefore the question was designed in the first stage as “if there were free-bus policy, the possibility of changing travel mode?” We compare the survey data with the e-pass data which is shown on table 4. It indicates there were 14 interviewees who response as “never change” and two of them had been recorded as more than 20 times of bus taking during the experimental period. 17 interviewees who answered as “will change,” but the e-record showed 15 of them had less than 20 times bus taking, and 13 of them even had no record in taking bus during the experimental period. In other words, the survey did not accurately reflect the actual behavior even the interviewees recognized it was an advantage. The researchers interpret the result as the inconsistent of objective survey data with objective scientific data.

Table 4 Psychological Cognition vs. E-pass Records

	Never Change	Possibly Change	Absolutely Change	Total
0	11	50	13	74
1	1	3		4
2		2		2
3		2		2
4		1		1
5		2		2
7		1		1
8			1	1
9		1		1
14			1	1
22	1			1
31			1	1
45			1	1
57	1			1
Total	14	62	17	93

5. Discussion

Among those experimental researchers who studied the effect of free-bus-pass policy, most of them focused on the car-drivers instead of motorcyclists as the research samples. But in the Asian countries where motorcycles serve as the major commuting vehicles, the research finding is not fitted for policy makers to reference. The major

reason is utility cost of the motorcyclist is far low than the car driver (Lai & Lu, 2007). Thus the practical persuasion to motorcyclist for switching the travel mode by using the discount incentive seems not as effective as expected. Therefore, using the free-bus-taking strategy to encourage motorcyclists to change commuting vehicle has to be carefully evaluated. Moreover, the previous experiments of applying the self-reported data as the major analytical information were testified to be biased in this research. The subjective recalled-data should be replaced by objective automatic-response data to increase the accuracy.

The effect of free-bus-pass policy can be evaluated from two waves of traffic climax for confirming the daily commuting vehicles adoption. From the results of self-reported finding that indicates that 5.4% of the motorcyclists are changing to bus-taking when the moderators involved. The times of using bus as commute record have increased from 2.72 times to 4.68 times. There is a 72.1% increased which is shown from the traditional self-reported records.

However, when automatic-response data are used to measure, the comparison of these two mechanisms has little difference: 3.2%. But when it comes to the scale test to evaluate the frequency of bus taking, those two instruments has clear difference, 4.68 times (self-reported) vs. 2.38 times (automatic response). It is almost two times. Further research regarding those figures, we find out that 34 interviewees (36%) are not consistent between the self-reported and automatic-response frequency. Furthermore, the psychological cognition of changing commuting vehicles, there are significant difference between these two surveys instruments especially the objective willingness to change reveals significant difference.

Overall, the free-bus policy could have insignificant effects on the increase of frequency of adoption by taking city-bus. Moreover, after the promotional period, the recovery of switching will offset the positive effect on the bus-taking behavior (Fujii & Kitmaura, 2003; Thogersen, 2009). Thus, the public transportation should consider service improvement more crucial than marketing promotion (e.g. transportation networking, fast and speedy public transit, intensive trips and qualitative rid facility and etc. Lai, 2011). It could increase the intention of taking public transit willingly and beneficially. Improving the public transportation system should be adopted as the primary strategy in order to increase the effects of bus-taking, and reduce motorcycle commuters for better environmental and societal consideration might work as well.

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