

Environmental behaviors and obstacles in practice

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### Abstract

This study aims to reveal environmental behaviors of the general public in Taiwan. Stratified sampling was applied following the age and gender distributions of the population in three metropolitan areas in Taiwan. Total valid samples were 481. The general public has a strong tendency toward recycling but possesses a relatively slight tendency toward materialization and consumerism. The findings provide implications that information disseminated to encourage the general public to take actions to be environmentally friendly. Especially, waste avoidance and conservation in consumption need to be strengthened in attitudes to reduce the impact of materialization to the environment. Findings in this study can be beneficial for administration in strategic marketing for promotion in an effort to reduce negative impact to the environment.

**Key words:** *Environmental behavior, General ecological behavior scales, Survey, Taiwan*

### 1 Introduction

Climate change, resource shortage, and the loss of biodiversity are urgent environmental issues. Many environmental problems are rooted in human behaviors (Vlek and Steg, 2007), and can be managed by changing relevant behaviors to reduce environmental impact (Steg, Bolderdijk, Keizer, and Perlaviciute, 2014). Understanding the determinants of individuals' actions is critical and important in changing behaviors (Klöckner, 2013). By understanding environmental behaviors, government administrative agencies can have environmental awareness campaigns effectively (Gregory and Leo, 2003).

According to Environmental Implementation Intention Survey (EPA, 2013), more than 80 percent of citizens in Taiwan agree that their living environment needs urgent protection and they are willing to sacrifice their comfortableness to sustain the environment. The results of that survey indicate Taiwanese possess positive attitudes toward environmental protection.

Environmental behavior is defined as "behavior that consciously seeks to minimize the negative impact of one's actions on the natural and built world" (Kollmuss and Agyeman, 2002, p. 240). Stern (2000) divides pro-environmental behaviors into four categories: environmental activism (e.g. active involvement in environmental organizations), non-activist behavior in the public sphere (e.g. stated approval of environmental regulations), private-sphere environmentalism (e.g. purchasing recycled product) and behavior in organizations. Among these four categories of environmental behaviors, private-sphere behavior is the most reflective of consumption (Rice, 2006). Hence, private-sphere behavior is selected in this study to examine environmental behaviors of the general public in Taiwan.

People often struggle to identify "the right thing to do" because some environmental behaviors (e.g. taking paper or plastic bags or idling versus restarting engines while waiting in vehicles) are not always intuitive (Kennedy, Beckley, McFarlane, and Nadeau, 2009). Stern (2000) states environmental behaviors are undertaken with certain intentions to alter the environment.

The objective of this study intends to reveal the common environmental behaviors of the general public in Taiwan. What are the barriers for them to practice pro-environmental behaviors? The contribution of this study is to provide an understanding of environmental behaviors for government administrative agencies to enhance effectiveness of public education. Findings in this study can be beneficial for administration in strategic marketing for promotion in an effort to reduce negative impact to the

environment. Findings in this study can also be applied to other societies with similar cultural backgrounds and can be used as a baseline for further research.

## 2 Methods

### 2.1 Measurement in environmental behaviors

Environmental behavior scale is a subset of items taken from a general ecological behavior scale developed by Kaiser, Doka, Hofstetter, and Ranney (2003). While the original scale was composed of 65 items, 28 items from the scale are selected to abridge the structure of the statements (Table 1). Criteria of item selections are based on whether the statements can be applied in Taiwan. For those statements not applicable in Taiwan are removed from the list of items. The items selected from the general ecological behavior scale represent five commonly recognized domains of environmental behavior: energy conservation, mobility and transportation, waste avoidance, consumerism, and recycling. Some items are slightly modified to ensure that conditions mentioned in the statements were suitable for local respondents. Respondents are asked to report their environmental behaviors on six-point scales.

**Table 1** General Ecological Behavior Scales

No.	Statements
1.	I use energy-efficient bulbs.
2.	I own energy-efficient household devices.
3.	I wait until I have a full load before doing my laundry.
4.	In hotels, I have the towels changed daily.*
5.	In wet weather, I use a clothes dryer.*
6.	In winter, I keep the heat on let indoor temperature feel well.*
7.	In summer, the air conditioner is shut off until I get up in the morning.*
8.	I prefer shower rather than to take a bath.
9.	In winter, I let water run until it is at the right temperature.*
10.	I will turn off the engine while temporarily parking.
11.	When I have same destination with others (i.e. go on a tour), I will choose a carpool.
12.	I ride a bicycle or take public transportation to work or school.
13.	In nearby areas, I prefer ride motorcycle or drive car rather than walk.*
14.	If I am offered a plastic bag in a store, I take it.*
15.	I will bring my own cup while buying beverage.
16.	I buy products in refillable packages.
17.	I will bring my own chopsticks while eating outside.
18.	I reuse my shopping bags.
19.	I use fabric softener with my laundry.*
20.	I use a chemical cleaning spray to clean my oven.*
21.	I kill insects with a chemical insecticide.*
22.	I buy seasonal produce.
23.	I use rechargeable batteries.
24.	I will do recycle.
25.	I put dead batteries in the garbage.*
26.	After meals, I dispose of leftovers in the garbage.*
27.	I will use restaurant offered tissue thriftily while eating outside.
28.	If product is over-packing, I will choose not to buy it.

Note: Original scales are developed by Kaiser, Doka, Hofstetter, and Ramney (2003)

\* indicate the item is negatively formulated behavior

### Difficulties of practicing environmental behaviors

Twelve items are used in this study based on the literature of Lee, Kurisu, and Hanaki (2013) to measure the reasons prevent people from practicing environmental behaviors. Nine items are selected from original 13-item scales and additional 3 items are added. These items include “bothersome,” “time consuming,” “cost,” “forget,” “not necessary,” “no consideration,” “no recognition,” “nobody doing,” “not cool,” “not correspond with self-image,” “do not know how to do,” and “no intention to do.” Respondents are asked to answer “yes” or “no” to each statement.

### 2.3 Data collection

Data were collected using a structured questionnaire. In order to ensure the questions were understandable for respondents, this study conducted a pilot survey using the draft questionnaire with 12 respondents and revised the questionnaire based on their suggestions. The formal survey was administered in Taipei, Taichung, and Kaohsiung metropolitan areas from December 2013 to February 2014 using personal interviews. This study utilized stratified sampling following the age and gender distributions of the population between the ages of 18 to 59 by the end of October 2013. The total respondents were 500. Nineteen observations were eliminated due to incomplete answers. The final valid samples were 481, including 232 male respondents (48.23%) and 249 female respondents (51.77%) (Table 2).

**Table 2** Valid Respondents by Age and Gender Groups (number of persons and %)

Locality	Gender	18-29	30-39	40-49	50-59	Total
Taipei City	Male	17	20	17	18	72
	%	3.53%	4.16%	3.53%	3.74%	14.94%
	Female	18	23	22	21	84
	%	3.74%	4.78%	4.57%	4.37%	17.46%
	Sum	35	43	39	39	156
	%	7.28%	8.94%	8.11%	8.11%	32.43%
Taichung City	Male	24	22	20	15	81
	%	4.99%	4.57%	4.16%	3.12%	16.84%
	Female	21	22	21	19	83
	%	4.37%	4.57%	4.37%	3.95%	17.26%
	Sum	45	44	41	34	164
	%	9.36%	9.15%	8.52%	7.07%	34.10%
Kaohsiung City	Male	21	20	19	19	79
	%	4.37%	4.16%	3.95%	3.95%	16.42%
	Female	19	23	20	20	82
	%	3.95%	4.78%	4.16%	4.16%	17.05%
	Sum	40	43	39	39	161
	%	8.32%	8.94%	8.11%	8.11%	33.47%
Subtotal	Male	62	62	56	52	232
	%	12.89%	12.89%	11.64%	10.81%	48.23%
	Female	58	68	63	60	249
	%	12.06%	14.14%	13.10%	12.47%	51.77%
	Sum	120	130	119	112	481
	%	24.95%	27.03%	24.74%	23.28%	100.00%

Source: Department of Household Registration, M.O.I., Taiwan (Republic of China)

### 3 Results

### 3.1 Demographics

Female respondents (51.77%) are slightly more than male respondents (48.23%). More than sixty percent of the respondents are married (64.67%). The average age of respondents is 38.49. Over 75% of respondents have educational levels of college (60.29%) or graduate schools (17.05%). Almost a quarter of respondents work in the business sector (24.48%). Average monthly personal income is 1,277.94 USD. Average monthly household income is 3,071.80 USD. The average household size is 4 persons.

### 3.2 Environmental behaviors

Five commonly recognized domains of environmental behaviors are examined in this study. This section contains sixteen positively and twelve negatively formulated statements. For each positively formulated item in behavioral questions, respondents get points corresponding to their reported frequencies (always=1, frequently=0.8, occasionally=0.6, seldom=0.4, rarely=0.2, never=0). Responses to negatively statements are properly recoded in reverse values. Table 3 displays means of each statement. In general, respondents tend (Means=0.7106) to do recycling. They are likely to conserve energy (Means=0.6537) and take public transportation (Means=0.6007). Respondents have relatively low tendency to practice waste avoidance (Means=0.5899) and consumerism (Means=0.5755). Specifically, results reveal that respondents have relatively high tendency to take shower than take bath (Means=0.9110), recycling (Means=0.8312), buying seasonal produce (Means=0.8166), reusing shopping bags (0.7792) and recycling dead batteries (Means=0.7704). However, there are behaviors that respondents have slight tendency to perform in general; for example, utilize the shower water before the right temperature (Means=0.3297), bring their own cups while buying beverages (Means=0.3480), clean oven with non-toxic cleaning spray (Means=0.3941), ride bicycles or take public transportation (Means=0.4750) and refuse to take plastic bags in stores (Means=0.4806).

**Table 3** General Ecological Behavior Scale

Category	Question statement	Means	Sub-category means
<b>Energy conservation</b>	I use energy-efficient bulbs.	0.7247	
	I own energy-efficient household devices.	0.6661	
	I wait until I have a full load before doing my laundry.	0.7279	
	In hotels, I have the towels changed daily.*	0.4816	
	In wet weather, I use a clothes dryer.*	0.6835	
	In winter, I keep the heat on let indoor temperature feel well.*	0.7496	
	In summer, the air conditioner is shut off until I get up in the morning.*	0.6087	0.6537
	I prefer to shower rather than to take a bath.	0.9110	
In winter, I let water run until it is at the right temperature.*	0.3297		
<b>Mobility and transportation</b>	I will turn off the engine while temporarily parking.	0.7033	
	When I have same destination with others (i.e. go on a tour), I will choose a carpool.	0.7189	
	I ride a bicycle or take public transportation to work or school.	0.4750	0.6007
	In nearby areas, I prefer ride motorcycle or drive car rather than walk.*	0.5051	
<b>Waste avoidance</b>	If I am offered a plastic bag in a store, I take it.*	0.4806	
	I will bring my own cup while buying beverage.	0.3480	
	I buy products in refillable packages.	0.6952	

	I will bring my own chopsticks while eating outside.	0.5076	
	I reuse my shopping bags.	0.7792	0.5899
	I will use restaurant offered tissue thriftily while eating outside.	0.7367	
	If product is over-packing, I will choose not to buy it.	0.5817	
<b>Consumerism</b>	I use fabric softener with my laundry.*	0.6203	
	I use a chemical cleaning spray to clean my oven.*	0.3941	
	I kill insects with a chemical insecticide.*	0.5546	0.5755
	I buy seasonal produce.	0.8166	
	I use rechargeable batteries.	0.4916	
<b>Recycling</b>	I will do recycling.	0.8312	
	I put dead batteries in the garbage.*	0.7704	0.7106
	After meals, I dispose of leftovers in the garbage.*	0.5318	

Note: \* indicate the item is negatively formulated behavior

#### Difficulties in practicing environmental behaviors in segments

Median values are utilized as cutoff points in this study to segment respondents into two groups of environmentally friendly levels. Difficulties in practicing pro-environmental behaviors are classified into five categories: "inefficiency," "disconnection with life," "no need," "no information," and "image." Then, t test is utilized to examine statistical differences of difficulties between two segments (Table 4).

**Table 4** Difficulties in Practicing Environmental Behavior between Two Segments

Category	Item	Less Environ- mentally Friendly (n=239)	More Environ- mentally Friendly (n=242)	t-value	p-value
		Means			
Inefficiency	Bothersome Time consuming Cost	0.6011	0.3981	5.83***	0.0001
Disconnection with life	Nobody doing Forget No consideration	0.6402	0.3678	7.69***	0.0001
No need	Not necessary No intention to do	0.1255	0.0785	2.08**	0.0383
Not enough information	No recognition Don't know how to do	0.6151	0.5000	3.17***	0.0017
Image	Not cool Not correspond with self-image	0.0502	0.0289	1.49	0.1375
Total	All items	0.4265	0.2873	7.77***	0.0001

Note: \*\*p<.05; \*\*\*p<.01

Results indicate that overall mean values of difficulties in practicing environmental behavior are significantly higher (t-value=7.77, p<.01) for those in the segment of less environmentally friendly

respondents. Less environmentally friendly respondents report that the biggest barrier for them is “disconnection with life.” On the contrary, more environmentally friendly respondents seem to need more relevant information in overcome barriers in pro-environmental behaviors.

Respondents in the segment of more environmentally friendly level are mostly females who are older and married. There are no statistical differences in personal income, household income, and household sizes between these two segments (Table 5).

[Insert Table 5 about here]

Category	Less	More	Test	p-value
	Environ- mentally Friendly (n=239)	Environ- mentally Friendly (n=242)		
	Means			
Gender (% of males)	56.90	39.67	14.30 <sup>b</sup>	0.0002***
Marriage (% of married)	57.98	65.29	5.09 <sup>b</sup>	0.0781*
Average age (years)	36.56	40.38	-3.59 <sup>a</sup>	0.0004***
Education level (%)			2.33 <sup>b</sup>	0.5066
Junior high school	3.77	4.13		
Senior high school	18.41	19.01		
College	63.81	57.44		
Graduate school	14.64	19.42		
Occupation (%)			16.21 <sup>b</sup>	0.0126**
Public/Military/Education	13.39	15.90		
Agriculture	0.00	0.42		
Manufacture	13.39	10.88		
Business	30.54	18.41		
Housewives	7.95	15.48		
Students	13.81	13.39		
Others	20.92	25.52		
Average monthly personal income (USD) <sup>c</sup>	1254.54	1301.08	-0.56 <sup>a</sup>	0.5747
Average monthly household income (USD) <sup>c</sup>	3068.33	3075.24	-0.04 <sup>a</sup>	0.9668
Average household size (persons)	3.90	4.09	-1.52 <sup>a</sup>	0.1294

Note: a t-test statistics; b Chi-square statistics; c Exchange rates of the N.T. Dollar against the U.S. Dollar is 30.377 in February 2014 (Central Bank of the Republic of China (Taiwan)) \* $p < .10$ , \*\* $p < .05$ ; \*\*\* $p < .01$

#### 4. Conclusion

This study aims to examine environmental behaviors and difficulties in practicing pro-environmental behaviors of the general public in Taiwan. A survey using personal interviews was administered in Taipei, Taichung, and Kaohsiung, from December 2013 to February 2014. Stratified sampling was used according to the age and gender distributions of the population between the ages of 18 to 59 by the end of October 2013. The total valid samples were 481 out of 500 surveyed respondents, including 232 male samples and 249 female samples.

People have strong tendency toward recycling and energy conservation. For example, they prefer to shower rather than to take a bath. They tend to turn off the engine while parking temporarily and carpool with others. People have slight tendency toward waste avoidance and consumption, such as purchase environmentally friendly products or bring own cups while buying beverages. The results also

indicate that women and older people are more likely to have pro-environmental behaviors, which is in accordance with findings in previous studies (Clark and Finley, 2007; Lee, Kurisu, and Hanaki, 2013).

Based on findings in this study, three strategic implications are provided as follows.

1. The general public wants to do better in environmental behaviors. Information disseminated to encourage the general public to take actions and to be environmentally friendly cannot be overemphasized.
2. The results indicate that the general public has a strong tendency towards recycling and energy conservation. However, waste avoidance and conservation in consumption need to be strengthened in attitudes to reduce the impact of materialization to the environment.
3. People may be aware of seriousness in environmental issues, but only when they have learned the importance in changing their habitual behaviors and how these changes can help with environmental sustainability, the value of being environmentally friendly is acknowledged and pro-environmental behavior can be formed into a lifestyle.

The limitation of this study is related to the survey. Sampling frame of the survey was restricted to the general public living in three metropolitan areas. Future research could include rural areas to identify whether different regional development will have different influential factors or environmental behavior patterns.

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