



A FRAMEWORK FOR ASSESSING THE WILLINGNESS TO PAY IN REDUCING PLASTIC BAG USE

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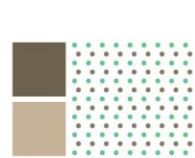
Abstract

The purpose of this paper is to provide a framework to determine the willingness to pay value (WTP) by using possible criteria that could reduce the plastic bag consumption. Currently, the Thai government has not imposed any regulations or laws prohibiting the use of these plastic bags, while the other countries in Asia have implemented stern regulations in controlling the use of plastic bags, such as charging price for a plastic bag. This paper reviews several literatures regarding the use of mathematical model to determine WTP and factors affecting the WTP. To determine the WTP, designing a survey will be an important process. The proposed survey has divided into two main sections. Section one is demographics and attitudes toward the use of plastic bags. In the section two, the survey provides the hypnotically situations that based on the idea of reducing plastic bags use. The number of survey will be given out to at least 300 respondents randomly. In addition, the Contingency Valuation (CV) method will be applied to determine the WTP.

Keywords : willingness to pay, reducing plastic bag, contingent valuation method

Introduction

Plastic bags are popular with consumers and retailers as they are a functional, lightweight, strong, cheap, and hygienic way to transport food and other products. After they used plastic bags, most of these are become to waste and some are recycled. Each year, plastic bags are consumed approximately 500 billion to 1 trillion in worldwide. That is over one million bags are consumed per one minute. Particularly in China, the total number of plastic bags used is 3 billion per day. According to the number of plastic bags used, it can be affected to the environment. Plastic bags create visual pollution problems and can have harmful effects on aquatic and physical animals. Also plastic bags are especially components of the litter stream due to their size and it takes a long time to completely degradation. The total number of year it takes for



plastic bag to degrade is 1,000 years. In recent years, many countries have policy to reduce plastic bags used by started to use reusable shopping bags which can be reused several times. It is often made from fabric such as canvas, woven, synthetic fibers, or a thick plastic that is more durable than disposable plastic bags, allowing multiple uses. The reusable shopping bags are a kind of carrier bag, which are available for sale in supermarkets and department stores such as Central, The mall.

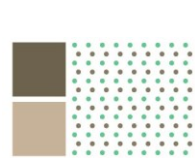
Nowadays there are many countries aware of using the plastic bags. Most of countries have recognized the efficiency of using market incentives to promote the use of reusable bags as a substitute for plastic bags. The countries that are currently concerned with reducing the use of plastic bags are South Africa, Australia, Bangladesh, China, India, Hong Kong, New Zealand, Taiwan, Denmark, France, Germany, Israel, Italy, Macedonia, Republic of Ireland, United Kingdom, United Arab Emirates, Canada, Mexico, United states, and many other countries.

According to the study titled plastic bag reduction around the world by Marrickville, (1968), South Africa government is prohibiting the use of high density polyethylene (HDPE) plastic bags, which are the thinner plastic bags (less than 30 micrometers thick). The reasons are this kind of bag is more widely used than the thicker bags, and it has a very poor quality and hard to be reused. Additionally, a tax on the thicker plastic bags has imposed. The law allows retailers to sell the thicker plastic bag because thick bags are very expensive and not many retailers can afford to supply them. The restriction of plastic bag use, in South Africa, is revealed because there are threats to wildlife. Plastic bags cause confusion to wildlife in order to find food as well as HDPE blocking drains affect killing marine wildlife.

In Australia, the government uses “Zero Waste” policy in order to reduce plastic bags use. The shops are forbidden to sell or to give away non-biodegradable lightweight plastic bag. Bangladesh was one of the first countries who banned plastic bag. Because of the country’s major flooding in 1998 when plastic bag litter blocked drains preventing the escape of water and the situation alerted the government to take an action.

In Asia, China introduced a ban on the distribution and the use of high density polyethylene plastic bags. Hong Kong has implemented an education campaign called “No plastic bag, please” and has forbidden retailers from give out plastic bags that are over a specified size to customers free of charge. Taiwan has banned free distribution of light-weight plastic bags (thickness less than 60 micrometers) and established an environmental levy at the retail level.

In Europe, Denmark established a tax on plastic bags paid by retailers. Retailers strongly promote the use of reusable bags. As a result, the use of plastic bags has been reduced by one third. In Germany, all stores that provide plastic bags have to pay a recycling fee to the government for enhancing recycling programs. On the other hand, Italy introduced a tax on plastic bags, but the tax was too small to have an effect. This policy did not have an impact on plastic bag consumption. Hence, Italy is currently in the process of introducing a ban on the use of non-biodegradable plastic bags. Macedonia has banned plastic bags from markets, retails and food sectors. The minimum thickness of plastic bags that can be used and purchased, in Macedonia, is 21 micrometers and only for items weighing more than 5 kilograms. Ireland was the first country to tax on plastic shopping bags. United Kingdom makes a voluntary agreement between the government and retailers to cut the use of plastic bags given out.



In the United States, San Francisco became the first city to introduce a ban on pharmacies and large supermarkets distributing non-biodegradable plastic bags, while the rest of California approved a law requiring supermarkets to take back plastic bags from consumers and to ensure recycling (Marrickville, 1968). Mexico City was approved a law to ban the use of non-biodegradable plastic bags.

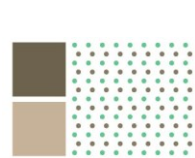
All these examples show that a huge numbers of plastic bags are used per day and it can lead to many environmental effects. Therefore, we have to cooperate to reduce using plastic bags.

Literature Review

Plastic bags are commonly used to carry merchandise. The usage of them has caused both convenience and inconvenience in daily routine. The disposal of plastic bags is an environmental hazard as most of plastic bags are not bio-degradable. It causes a lot of environmental damage and threat to animal life as it takes up to 1,000 years to decay completely (Eye on Earth, 2012). According to Ministry of Natural Resources and Environment, there is 1,800 tons of plastic bag use per day in Thailand. However, there is no implementation about reducing the use of plastic bags in Thailand. Therefore, we will study about reducing the use of plastic bags in Thailand with the objective to find an estimate of individuals' willingness to pay (WTP) for reduce plastic bag use. WTP is the maximum amount which the person would be willing to pay, sacrifice or exchange in order to receive a good or to avoid something undesirable.

Based on the study done by Bishop et al. (1995), Genius et al. (2006), and Mitchell et al. (1989), the factors that affect the WTP of individuals include environmental attitudes and perceptions, demographics, and several other variables which may influence the individuals' decision. There are currently many people using WTP in order to determine the price that should be set for a plastic bag. In Sweden, Berglund presented WTP to find households' perception of recycling efforts by having the factors of income, green moral index, gender, age, education, living, distance to recycling center, compulsory, profitable, do what other should, and pleasant. The study results show that the average hourly WTP for the sorting household waste at source was significantly lower than corresponding income after tax (Berglund, 2003). In Thailand, Chiaravutthi studies Thai consumers' WTP for products with Geographical Indication (GI) labels. The study suggests that Thai consumers' WTP are influenced by the origin of the product. However, the WTP of GI labels do not significantly differ from the WTP of labels which state the product's origin. This implies that Thai consumers value the product's origin, but do not recognize the importance of the GI label (Chiaravutthi, 2011).

Since there have not yet been many studies done in Thailand about WTP theory, it was decided that, in an effort to increase such research in Thailand, we have included it in this study. Also, as opposed to Chiaravutthi's method of using WTP to discern product origin, we are using WTP to research factors that influence plastic bag consumption. We use Contingent Valuation Method (CVM), which is widely used to estimate WTP. CVM was first introduced by Wantrup who expressed an opinion about the prevention of soil erosion generates some extra market benefits (Wantrup, 1947). Therefore, one possible way to estimate these benefits is to elicit the individuals' willingness to pay for these benefits through a survey method (Portney et al., 1994). The CVM has presently become an integral part of environmental assessment of developmental and basic project (Venkatachalam, 2004). The purpose of CVM is to motivate the individuals'



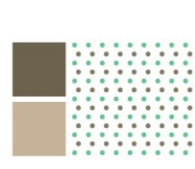
preferences in the monetary terms, and to change in the quantity or quality of non-market environment resources. The valuation of this method is depending on a hypothetical situation by which a sample of population is interview and individuals are asked to state their maximum WTP (Bakopoulou et al., 2010). The advantage of CVM is that it is very flexible and can be used to estimate the economic value of virtually anything. It is the best method to estimate values for goods and services that are easily identified, understood by users, and measurable by units (e.g. user days of reaction); this method can be used even when there is no observable behavior available to predict values. Further, sufficient survey data is obtained through the CVM method in order to achieve strong and defensible estimates. Finally, CVM has been used in a great deal of research and made results more valid, reliable, and we better understand strengths and limitations. The disadvantage of CVM is that its measures are based on responses to hypothetical markets, rather than observed market behavior. People often find that CVM questions are difficult to answer and the WTP response often seem to be constructed from a variety of consideration (Schkade et al., 1994).

Several studies have been undertaken using the concept of CVM. In Taiwan, Tan uses CVM to elicit the WTP for a drug abuse treatment program by the general public. The result shows that the benefits of drug abuse treatment were equal to around 0.15% of Taiwan's GDP for that year (Tan et al., 2007). In China, Wang and his associates studied about the air quality assessment by using the CVM. A conclusion of the research showed a result from the questionnaires that, 87.9% were valid which indicated urban residents' great concern about the problem of air quality. More than 40% of the respondents have no incentive to carry the costs of air quality improvement (Wang et al., 2009). Most of them think that the government should cover the bill, thus they indicated a low awareness of environmental protection.

In 2001, CVM is used to study about demand for health care in Denmark. They used WTP to elicit values for private insurance covering treatment for four different health problems. The way to obtain these values is to test the viability of the CVM and econometric techniques, as means of eliciting and analyzing values from the general public. As a result of the study, it gives a confidence in the WTP estimates obtained more generally in CVM as a means of valuing publicity provided goods and in econometrics as a tool for analyzing WTP results containing many zero responses (Gyldmark et al., 2001).

In Korea, the value of reductions is determined in risks from occupational radiation exposure and car accidents by using CVM. The monetary values associated with predefined reductions in risks from occupational radiation exposure and car accidents have been experimentally determined in a comparative analysis by determining WTP values for employees in nuclear institute and nuclear power plants. The study found that income does not actually influence WTP for car accidents and radiation exposure. The risk perceptions do influence the WTP for radiation exposure reduction, but the risk perceptions do influence the WTP for radiation exposure reduction (Choi et al., 2001).

Dunn estimated the WTP for continued use of plastic grocery bags and Willingness to Accept (WTA) for switching completely to reusable bags. Both WTP and WTA are calculated by using CVM survey method. He demonstrates a surveying method to collect the data to obtain tax levels for plastic grocery bag usage. A conclusion of the research showed that, tax rates on plastic bags



are strongly elastic. Even a small tax will yield significant results when the desired result is a reduction in the use of plastic grocery bags. The marginal social cost of the bags would determine the tax rate which is estimated to be approximately \$0.10 per bag. According to the result of the research suggest that, the tax could be set much lower than this and achieve the desired reduction in consumption (Dunn, 2012).

In summary, CVM is the most widely accepted method for estimating total economic value, including all types of non-use, or “passive use,” values. Therefore, we will use CVM method to estimate WTP for reducing plastic bags use. There has not been any research or analysis using WTP about reducing plastic bags use in Thailand. This paper attempts to use CVM to analyze WTP for reducing the use of plastic bags in Thailand. The studies include several factors which are gender, occupation, income, age, education, mode of transportation, frequency, peer group, green moral index, profitable, convenience, behavior and attitude, types of stores, laws, campaigners, and price of plastic bag.

Methodology

After we have all of the possible factors that will affect the WTP, we start to develop the questionnaire survey to collect the data. The survey will be distributed to 300 individuals. In this research, we are focusing on a group of peoples that are living in the urban area of Bangkok. We will distribute the survey experiment via online-survey, and written survey. In order to create online-survey our group has created an online link for people to visit and fill in the survey. The link will be posted on the social network to introduce our website inclusively to many peoples. The second way that we will be able to reach our target group is by giving out written survey to each individual. The questionnaire is divided into two parts. The first part is asked about demographic and plastic bag use’s behavior question. The second part is asked about the attitude of reducing plastic bag use. After we have obtained the data from surveying, we will be able to analyze each independent variable that will have an effect on the dependent variable. As a result, we have come up with an empirical model of the willingness to pay (WTP).

The Empirical Model of willingness to pay (WTP):

$$WTP = \beta_0 + \beta_1 Income + \beta_2 Age + \beta_3 Education + \dots + \beta_{16} Price$$

For this equation, we set:

WTP = Dependent Variable

β = Coefficient (can be positive value, or negative value)

(Income, Age, etc.) = Independent Variables (exhaustive list below)

Table 1 Parameter Descriptions for the Willingness to Pay in Questionnaire

INDEPENDENT VARIABLE	Question in the survey
Income	What is your monthly income?
Age	What is your age?
Education	What is your education's level?
Occupation	What is your occupation?
Green Moral Index*	Providing a given situation to rank the priority of each choice.
Profitable	Suppose you go to a shopping mall where it campaign and environmental concern in reducing plastic bag. What would you prefer to profit from the supplier by not getting plastic bag?
Gender	What is your gender?
Mode of transport	What kind of transportation do you usually take when you go shopping?
Convenience	As you can see now a day in Thai society that not many people carry reusable bag, therefore, we would like to know the reason that you consume plastic bag?
Peer group	Please identify who influences you to reduce plastic bag use?
Behavior and attitude	Do you bring reusable bags/cloth bags to shop?
Frequency	What is your estimate of carrier plastic bags that you use per day?
Types of Store	Please rank frequencies of plastic bag use from which types of the store do you usually receive.
Law	What kinds of rule would you like to see from the government?
Campaign	What do you think of the following offer; if you attend the campaign we will provide free cloth bag for participant and receive discounts when you use it instead of plastic bag?
Price of plastic bags	Do you think increasing the price of each plastic bag will help to reduce the number of users?

*Green Moral Index or GMI can be described as the warm feeling that many feel when contributing to the environment. This is confirmed by respondents, who answered that they (activities in questionnaire that used for measuring how green they are) contribute to a better environment because they want to and not because they feel forced to or for some other material rewarded. In the questionnaire, certain statements related to plastic bag use and the environmental issue will be asked. Respondents will be asked to state how strongly they agree or disagree with each statement. In addition, respondents are asked to rate the importance of certain actions related to personally reducing plastic bag use. By evaluating their responses, we will be able to assess the GMI of the respondents.

Expected Results

The research can encourage people to reduce the use of plastic bags in Thailand. We develop this research because many people know that plastic bags cause a lot of environmental damage and are a threat to animal life. We would like to motivate them to concern more about the environment and see a significant of reducing plastic bag use. Therefore, we would like to find what factors can lead people to change their behavior from using plastic bags to using reusable bags. This research also aims to find the willingness to pay to reduce plastic bag use. We expect to identify significant factors that affected to the willingness to pay of Thai people to reduce plastic bag use. In addition, the exactly amount that most of people are willing to pay will be determined.



Conclusion

It has been widely known that Thailand has the significant waste problem especially from discarded plastic bags. Many campaigns toward reducing plastic bag use have been implemented, none of them is successful. Hence, it is necessary to learn about factors influenced consumers' behavior for reducing plastic bag use. The policy impacts on plastic bag consumption should be predicted.

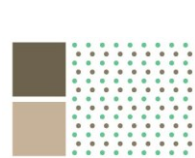
One of the aims is to investigate the incentives on reducing plastic bag consumption in Thailand. In addition, a review a great deal of literature, summarize and analyze previous researches related to willingness to pay is discussed. An early development of the questionnaire is presented. In the end, we expect that the implications for applying the plastic bag regulation should be derived.

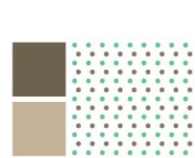
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