PAY FOR PLASTIC SHOPPING BAG: A CASE STUDY IN PENANG, MALAYSIA

Ong Ke Shin* and Chan Ngai Weng

School of Humanities, Universiti Sains Malaysia, 11800, Penang, Malaysia
**Email: keshinong@gmail.com*

ABSTRACT

The use of plastic bags has penetrated almost every facet of human life in all countries, especially in developing countries. Malaysia is no exception. The plastic bag is a very convenient and relatively cheap form of material for wrapping goods, packing food, carrying shopping items and is widely used in every state in Malaysia. Unfortunately, however, excessive use of plastic bags has created many environmentally negative consequences giving rise to its banning or at least restricted usage in some countries. In Malaysia, Penang State is the first to implement "No Plastic Bag Day" policy. This paper first presents an overview of the policy in controlling plastic bag usage in Penang. Based on observation studies, this study aim to examine response and alternative chosen by Penang shoppers during "No Plastic Bag Day". The result shows that Penang shoppers tent to choose existing alternative available at the supermarket, suggesting that the level of voluntary anti-consumption among Penang shoppers is low.

Keywords: Anti-consumption behaviour, no plastic bag day, plastic bag problem.

INTRODUCTION

The ubiquitous plastic bag appears to be a magical product that could not be left without in the lives of most of the people in the modern world. The once wonder product that was introduce in the beginning of 1980s has now attracted worldwide attention again due its negative environmental impacts. Disposable of plastic bags, be it in a whole, in small fragments or as microscopic plastic (microplastic) components that are partially broken down from plastic bags [1] are threatening and damaging the environment, both at the land and the sea.

Plastic bag in landfill

As plastic bag is designed for single-use, most of the plastic bags produced and used are destined to the landfill, with minimum of them being recycled. Even though some of the plastic bags are reused as bin liner, it will ultimately end up in the landfill [2]. While some countries ban plastic bags partially or totally, with the concern that plastic bags might take up the space of the landfill, a study shows that the volume and weight of plastic bags in the total solid waste is small [2]. It is highly compressible and compactable, able to fill the voids in the landfills, and thus account for only small proportion of total municipal waste. In countries such as Australia [3] and Israel [2], plastic bags comprise only 0.2% of the total solid waste volume. In Hong Kong, plastic bags account for around 3% of municipal solid waste [4] and it is only 5% of the weight of municipal solid waste in Ireland [2]. However, as it takes between 20 to 1000 years to be decomposed, there is concern that accumulation of plastic bags will increase the resource recovery operation expenses and landfill reuse cost [5].

Plastic bag impacts on the marine ecosystem

Plastic bags do not only contaminate land, they have also invaded the marine ecosystem and are now one of the most common and persistent pollutants in marine ecosystem. Plastic materials enter the marine environment through rivers and municipal drainage system when they are handled irresponsibly, such as accidentally lost or left behind by beach goers. Besides, raw material for plastic manufacture also ends up in the sea through accidental spillage and improper handling. Most of the plastic litter is in the form of packaging [6]. Plastic litter in the marine environment is not confined to the source of litter as it is easily dispersed and carried by the oceanic currents, increasing the potential to threaten other marine animal. Algalita Marine Research Foundation (AMRF) found that the amount of plastic debris in Pacific gyre is 6 times more than phytoplankton, which is the food for marine animal [6]. Other than the problems caused by littering, plastic bags in the marine ecosystem threaten 267 species worldwide; including 86% of all sea turtle species, 44% of all seabird species, and 43% of all marine mammal species [7]. Plastic bags in water column resembling jelly fish or squid can be mistaken as food and consumed by a wide range of marine species. Ingestion of litter such as plastic bags can cause physical damage to esophagus, blockage of the digestive system, and a false sensation of feeling full, causing problem such as infections, starvation and death [8]. Moreover, marine wildlife can be entangled in plastic bags and other marine debris prohibiting their normal behaviour such as feeding or to escape from predators [6]. Although most plastic debris are buoyant, it can stick and accumulate on the sea floor when sand is caught in their seams. Accumulation of plastic debris inhibits gas exchange at the sediments and affects the ecosystem on the sea floor [9]. In addition, plastic bags in marine ecosystem are also threatening the survival of the corals as plastic bags could entangle with the coral, smothering it, and breaking the coral head through wave motion. Furthermore, plastic bags prevent essential sunlight from reaching corals, affecting the photosynthesis process of algae inside the coral [10].

Plastic bag in human habitat

Other than the negative impact mentioned above, improperly discarded plastic bag also creates problems in human habitat.

In Nairobi, where the availability of toilets and the sewerage systems are scarce, plastic bags play an important role other than carrying goods. Residents living in the squatters defecate in plastic bag inside their house and throw the bags as far

away from their house as they can. These plastic bags containing human faeces often ended up on rooftops, in non-functional public toilet, on piles of other solid waste dump on any available open space, and into water drains and rivers [11]. Therefore the plastic bag is also known as 'flying toilets' in Nairobi. While these plastic bags have resolved the immediate problem of toilet inadequacy in the short term, it exposes the public to other health problems when they are discarded improperly. The plastic bags provide a breeding ground for mosquitoes, raising the risk of malaria transmission when there is water trapped inside them [12]. Besides, improperly disposed plastic bags have also been linked to flooding in Bangladesh and Mumbai as they block up drains and sewage systems, exacerbating flood [3,4].

This phenomenon has prompt many researchers, policy makers and government agencies to scramble in finding solutions in solving this problem. As a result various countries such as Ireland, Taiwan, China, South Africa, India, Australia, Malaysia and etc. has taken action to reduce plastic bag usage. A wide variety of schemes such as prohibition of production, levied on producer and customer as well as voluntary approached to be implemented in order to discourage the manufacturing and consumption of plastic bags. Among the policy instrument, economic instrument is the most widely applied.

"No plastic bag day" in penang, malaysia

In Malaysia, policy to reduce plastic bag consumption is not implemented nationally but at state level. The Penang state government is the first state among others to implement a policy on plastic bag reduction in Malaysia. Prior the implementation of "No Plastic Bag Day" in Penang, six major groups of supermarket and hypermarket in Penang distributed 25.2 million pieces of plastic bags or 2.5 million per month in the year 2008 to their customers [13]. This amount does not include the other millions of plastic bags used by the retailers, hawkers and other businesses. In response to the concern over the environmental impact of plastic bag, the current Penang State Government targets to reduce plastic bag usage as one of the campaigns of "Cleaner, Greener Penang". Shoppers requesting for plastic bags have to pay RM0.20 for each plastic bag requested [13]. Similar to PlasTax implemented in Ireland, the levy implemented in Penang is not Pigouvian Tax , where the tax does not aim to internalize the externalities caused by plastic bag but to induce behaviour change among the shoppers. However, the difference between the levies implanted between Penang and Ireland is that all the money collected from PlasTax will be used to help in environmental issues and in the case of Penang, the money collected will be donated to the state's Partners against Poverty Campaign. The implementation of plastic bag campaign in Penang can be divided into three phases.

Phase 1:

The campaign started in July 2009 when every Monday of the week was declared as "No Plastic Bag Day". The first phase was initiated and derived after a consensus was reached in a meeting jointly organized and attended by 6 major supermarkets/ hypermarkets in the state.

Phase 2:

In the 2nd phase (January 2010 – December 2010), implementation of "No Plastic Bag Day" increased from a single day of Monday to three days in a week, i.e. Monday to Wednesday. The campaign expanded to involve speciality retail outlet namely PADINI - garment and apparel, POPULAR - a book and stationery speciality store, convenient stores, supermarket and etc. Retailers that do not support the campaign or did not comply with the directive would not get their individual business license renewed under the Local Government Act and Municipal Council of Penang Island [14].

Phase 3:

Due to the successful implementation of the phase 1 & 2, the 3rd phase (January 2012 onwards) was launched with every day of the week becoming "No Plastic Bag Day". The campaign targeted implementation at major supermarkets / hypermarkets with the exception that stand-alone retailer having to choose at least one day of the week of their choice in their participation of the campaign.

Previous research on plastic bag usage

Many countries have taken measures on the management and control of plastic bags but there is limited research on plastic bag policy. On the other hand, research on other environmental policies such as recycling, household waste management and climate change has been extensively studied. The plastic bag policy is considered as a de-marketing effort to promote anti-consumption behaviour that is grounded on behavioural studies. Many existing studies employed self-reported measures to examined factors affecting shopper's intention to reduce plastic bag usage [15]; [16]; [17], while observational approach on the shopper's actual behaviour are less applied [18]. Hence, this research aim to investigate shopper's responses towards "No Plastic Bag Day" in Penang and the alternative chosen by them when plastic bags are no longer provided free.

METHODOLOGY

Observation method can be quantitative or qualitative in nature. Quantitative observation method is usually structured to generate findings and is statistical in nature. Contrary to this, qualitative observations method is often highly exploratory in nature [19]. As the purpose of observation in this study is to obtain the general characteristic of shoppers (such as the number of consumers who bring their own bag, purchase plastic bag and alternative use by the shopper to replace plastic bag), observation is used quantitatively in this study. Observation can be classified into different groups depending on the method used. In this study non-participant observation is used to study behaviour when the subjects are unaware of being measured.

Criteria of observation

The following criteria are used for applying observation as a research technique [19]

1) The phenomenon under investigation is a social process or a mass activity;
2) The phenomenon under investigation is easily observable;
3) The phenomenon under investigation occurs at a subconscious level; and
4) The consumer under investigation is either unable or unwilling to communicate directly with the research.

In this study, plastic bag purchasing behaviour is a behaviour and physical activity taking place in public. Thus, it is easily observed by the researcher. Besides, it is also undoubtedly a mass activity that demonstrates a pattern of activity. These phenomena are not occurring at a subconscious level nor can it be said that the consumer are unwilling to communicate directly with the researcher. However, there is a possibility that the individual does not intend to reveal his/her behaviour when his/her is being accessed with other research methods. Hence, physical observation of the shoppers' actual behaviour on plastic bag usage at the check-out counter is observed and will provide more accurate information on the shopper's plastic bag usage behaviour. Although the above mentioned criterion was not fully fulfilled, it is still reasonable to apply observation in the research as observation method can be applied when at least one of the criteria is being fulfilled [19].

Data collection

The study was carried out during the second phase of the plastic bag ban, where charges are being applied upon the commencement of the "No Plastic Bag Day" campaign. Non participant observation was carried out at five different locations which include supermarket and hypermarket in Penang. A total of 12 hours observation was carried out at each individual location which includes 6 hours on "No Plastic Bag day" and the another 6 hours on other days (i.e. non campaign days). A structured observation form was designed and developed bearing the essential criteria for study to identify important key behaviours and that shoppers' behaviour could be easily noted and recorded. Behaviours observed include whether plastic bags were claimed/purchased, how they transport their purchased goods, if personal carry bag or packaging was brought along etc. In order to ensure the accuracy of information being recorded, the researchers approached the checkout counter whenever possible or required.

RESULT

From the total of 1281 observations, 67.1% of the shoppers are female, and 32.9% are male. Majority of the shoppers are Chinese (62.1%) and followed by Malays, Indians and Foreigners. More shoppers were observed on normal day (63.7%) compared to 36.3% on "No Plastic Bag Day". The detail of demographic profile of shoppers observed is presented in Table 1.

Table 1. Demographic profile of shopper.

Demographic		Frequency	Percentage (%)
Gender	Male	422	32.9
	Female	859	67.1
Ethnic Group	Malay	347	27.1
	Chinese	795	62.1
	Indian	112	8.7
	Others/ Foreigners	27	2.1
Observed on	"No Plastic Bag Day"	465	36.3
	Normal Day	816	63.7

The shoppers observed behaviours comprised of categories according to their bag use behaviour as described by Sharp *et al.* (2010), namely (i) fully anti-consumption – who do not use any plastic bag, (ii) partially anti-consumption – who use plastic bag together with eco bag and (iii) non anti-consumption – who are completely reliant on plastic bag. The overview of the behaviour observed can be found in Figure 1.

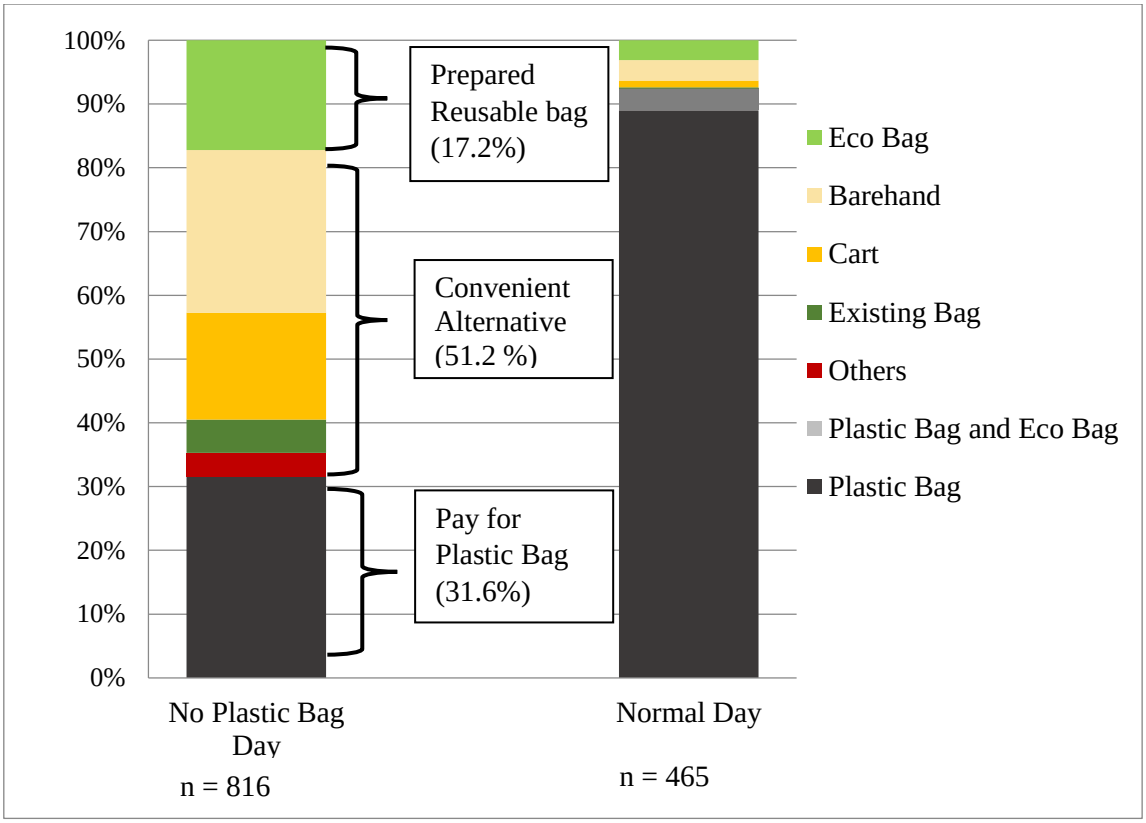

Figure 1. Ways of carrying purchased items on "No Plastic Bag Day" and normal day.

From the observation study, it is observed that during normal days, most of the consumers (89%) show non anti-consumption by using plastic bags when it is given out freely, while 3.4% show partial anti-consumption by carrying their goods with plastic bag and eco bag and only a small portion of shoppers demonstrated their fully anti-consumption behaviour by carrying the items with bare hands (3.2%), carry their goods with eco bag (3.1%), placing the purchased items directly in the shopping cart (1.1%) or using existing bag to carry their purchase item (0.2%).

During "No plastic Bag Day", 31.6% of the shoppers demonstrated non anti-consumption behaviour by purchasing plastic bags for RM0.20 each, while the rest of the shoppers (68.4%) demonstrated fully anti-consumption behaviour and no partially anti-consumption behaviour was observed. However, it is interesting to note that shoppers who show anti-consumption are made up of 17.2% who prepared their own reusable bag and brought along to the supermarket and majority of the shoppers (51.2%) who use other alternatives that are available, convenient and cost no money to them, which include using bare hands 25.5%, placing the purchased items directly in the shopping cart (16.8%) or with existing bags they have (5.2%). There were also other behaviours (3.7%) that were not seen via the observation study during normal day, but were seen only during "No Plastic Bag Day", manners including using boxes, bringing their own plastic bags and using thin plastic bags for packing vegetables were observed.

Relationship between campaign implemented and plastic bag usage

A Chi-Square test of independence was performed to examine the relationship between "No Plastic Bag Day" and plastic bag consumption. The relationship between these variables was significant, X^2 (1, N = 1281) = 448.953, p <.01 and the effect size was large, Φ = .592 (Table 2). The result suggests that shoppers use more plastic bags on normal day in comparison to "No Plastic Bags Day". Hence, it is obvious that the policy has a large effect in reducing plastic bag usage. This phenomenon has also been observed in Ireland where the plastic bag consumption was significantly reduced after PlasTax was introduced, i.e. a plastic bag levy that charge each plastic bag for EUR0.15 on each bag required (GHK. 2007).

Table 2. Percentage distribution and chi square of plastic bag use on "No Plastic Bag Day" and normal day

		No Plastic Bag Day	Normal Day	X^2	df	p value
Plastic Bag usage	Yes	147 (31.6)	426 (89)	448.953	1	$p < 0.001^{***}$
	No	318 (68.4)	90 (11)			

Note: *** p < 0.001, ** p < 0.01 and * p < 0.05

Relationship of gender and alternative chosen during "no plastic bag day"

To explore whether there was a significant relationship between alternative chosen to replace free plastic bag and gender, a chi-square test was undertaken for each of the alternatives, namely pay for plastic bag, bring their own reusable bag and convenient alternative. The results of the chi square test are presented in Table 3. The results indicate that gender was significantly related to the shopper's behaviour to bring their own reusable bag, X^2 (1, N = 465) =10.684, p <.05 and the

effect size was small, Φ = .152. Also, gender was significantly related to the shopper's behaviour of using convenient alternative available to replace plastic bag. X^2 (1, N = 465) =14.229, p <.05 with small size effect, Φ = .175. However, there is no significant relationship between shopper behaviour of purchasing new plastic bag and gender. X^2 (1, N = 465) = 1.962, p >.01. Male shoppers are more likely to use convenient measure (64.9%) as compared to female shoppers (45.6 %) while female shoppers (20.8%) are more likely to bring their own reusable bag as compared to male shopper (8.2 %).

Table 3. Percentage distribution and chi square of alternative chosen by gender

		Gender				
		Male	Female	X^2	df	p value
Convenient	Yes	87(64.9)	151(45.6)	14.229	1	p< 0.001***
	No	47(35.1)	180(54.4)			
Reusable Bag	Yes	11(8.2)	69(20.8)	10.694	1	0.001**
	No	123(91.8)	262(79.2)			
Purchase	Yes	36(26.9)	111(33.5)	1.962	1	0.161
	No	98(73.1)	220(66.5%)			

Note: *** p < 0.001, ** p < 0.01 and * p < 0.05

DISCUSSION OF OBSERVATION RESULT

The onsite observation study revealed shoppers' behaviour of plastic bag usage and alternatives chosen to replace free plastic bag. Generally, it has shown that the policy implemented has successfully reduced the usage of plastic bag significantly. It is obvious that consumers are forced to seek for alternatives when they are not being provided with free plastic bags.

However, it is interesting to note that despite the focus on the research of reusable bag use behaviour as an alternative to free plastic bag, with the perception that it is a main alternative to free plastic bag [15,20], majority of the shoppers choose to use convenient alternatives such as bare hands, cart, boxes, existing bag and others to replace free plastic bags. Using reusable bag is a learnt behaviour which required time [20], those who use convenient measures might not be as prepared as those who bring bags, as they choose to use whatever convenient and available means when plastic bags are not provided free. It also reflects that they prefer alternatives that are convenient and require less effort. It is proven studies that people are more likely to choose the pro-environmental behaviours that demand the least cost in terms of economic sense, time and effort [21,22]. Besides, a study also show that "Modern retail shopper" who shops at supermarket and hypermarket are more concern in the convenience of shopping as compared to those who frequent traditional markets [23]. Hence, it helps to explain the phenomenon where by the majority of shoppers observed in supermarkets and hypermarkets chose to substitute the plastic bag with other convenient alternatives, which required less effort or are readily available. In terms of gender, it is noticed that females are more likely to bring reusable bags for shopping. A similar observation was also noted in [16] who suggested this could be due to the reason that female shopper can keep the reusable bag in their handbag but most men (who do not carry handbags) cannot do this.

To address to this problem, a successful deposit basket system was implemented in the AEON Co., Ltd., a chain of supermarkets in Japan. It is suggested that this method can be introduced locally. Shoppers who do not bring their own reusable bag, can opt to purchase a basket and bring it home together with their purchases and may choose to use it for subsequent shopping trips, hence, not limiting its usage. When they no longer need the basket, they can return it and have their deposit returned. Also, to prevent leakage from some of the wet items purchased, the shoppers can also purchase a deposited tray and put it at the bottom of the basket. An example of the deposit basket system is illustrated in Figure 2.

Also, it is noticed that many choose to carry purchases with bare hands during "No Plastic Bag Day". Hence, a practical suggestion to reduce plastic bag usage is to redesign and reinvent the packaging designs that enable shoppers to carry their purchases without having to claim for additional plastic bags. For example, product packaging which is equipped with handle that can be carried like a bag can encourage shoppers to use less plastic bag (Figure 3). This idea is not new and has been applied in many packaging designs, as several products such as diapers and toilet papers are often equipped with packaging bag that comes with a handle. Certain mineral water bottles and soft drink bottles too, are fitted with carrying device and electrical appliances which are kept in a box fitted with handle, also allow shoppers to carry their purchased item home without additional plastic bag. In addition, it would be wise if compact design reusable bag are introduced and marketed. Reusable bag design which is made into a keychain or keychain-like device allows shoppers constantly to carry the reusable bag conveniently with them may encourage the shopper to have the habit of bringing own reusable bag. This is especially true in the case of male shoppers, who are less likely to bring along their own reusable bag for shopping.

Figure 2. Deposit Basket System supplied by AEON , Japan.
(Source: http://www.aeon.info/environment/maieco/ecobag_001/)

Figure 3. Example of packaging with handle

Lastly, while the policy banned the permission of free plastic bags to be provided on No plastic bag day, some shoppers still craftily find ways to seek for free plastic bags, such as thin plastic bags for vegetables and fruits (3, 0.2%) which are offered free by outlets and not banned under the plastic bag policy. Although the number is not high, this should be noted as it shows that there is a loophole in the policy. Consumers can avoid paying yet have the opportunity to take free plastic bags at most supermarket and hypermarkets.

CONCLUSION

The conclusion derived from the answers collected was that not many shoppers brought along their reusable bag, and would rather resort to use whatever that is available on the spot. Many opted for the convenient solution, which clearly indicates that they have yet to change their behaviour and the tendency to resort to the old habits is relatively high if policy is not being implemented or enforced. Also, it is noticed that the alternative chosen is related to factors such as gender and race. Future policy planning and demarketing approach should consider these factors and issues identified.

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