



UNIVERSITI PUTRA MALAYSIA

ASSESSMENT OF CONSUMER PARTICIPATION IN "NO PLASTIC BAG CAMPAIGN" IN SELANGOR AND ITS ASSOCIATION WITH GREENHOUSE GASES (GHG) EMISSION AND HEALTH RISK

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ABSTRACT

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Introduction: In January 2017, Selangor state government launched the “No Plastic Bag Campaign” which effective 7 days a week to discourage the use of plastic bags among shoppers. This action prior to the environmental damage caused by plastic waste which take excessively long time to degrade and contributes to greenhouse gases (GHG) along with negative effects to human health. **Objective:** To assess consumer participation in the “No Plastic Bag Campaign” and its association with greenhouse gases emission and health risk in Selangor. **Method:** Non-participant quantitative observation was used to observe the participation level of 360 shoppers at 3 different stores in Seri Kembangan Selangor in the “No Plastic Bag Campaign” program. A structured observation form was used to record the important key behaviours of the consumers. **Result:** Majority of the consumers observed (N = 222, 62%) participate in the plastic bag campaign while 138 consumers (38%) were not participate. The highest number of participation was observed in the convenience store (N = 83, 69%), followed by hypermarket (N = 77, 64%) and supermarket (N = 62, 52%). Male were the majority participate in the campaign (N = 139, 64%). Majority of the Chinese (N = 61, 75%) participate in the campaign. Most of the shoppers who shopped alone participate in the campaign (N = 148, 60%), and most of them doing their shopping on weekdays (N = 67, 74%). Significant association between consumer participation with the type of retailers ($\chi^2 = 8.226$, $p=0.016$), where the highest participation was observed in the convenience store. The participation level also associated with the ethnic groups ($\chi^2=8.881$, and $p=0.012$) and days of shopping ($\chi^2=8.884$, $p=0.031$) where high participation was observed during weekdays (N = 67, 74.4%). The participation level was not associated with gender ($\chi^2=1.647$, $p=0.199$) and whether the consumer shopped alone or in group ($\chi^2=0.514$, $p=0.473$). The highest fraction of GHG emission from the plastic bag purchased was contribute by Carbon dioxide (CO₂) (96.9%) followed by Carbon monoxide (CO) (1.9%) and Sulphur dioxide (SO₂) (1%). The least GHG was Nitrogen dioxide (NO₂), Sulphur dioxide (SO₂), Methane (CH₄) and Nitrogen monoxide (NO). **Conclusion:** The plastic bag campaign in Selangor received high numbers of participation. The application of levy for plastic bag purchased probably has changed the shopper attitude towards more pro-environmental behaviours.

Keywords: *Plastic Bag, No Plastic Bag Campaign, Shoppers, Greenhouse gases, Health risk*

ABSTRAK

PENGLIBATAN PENGGUNA DALAM KEMPEN BEBAS BEG PLASTIK DI SELANGOR DAN KAITANNYA DENGAN GAS RUMAH HIJAU DAN RISIKO KESIHATAN

AHMAD SHAKIR BIN MOHD ISHAK

Pengenalan: Pada bulan Januari 2017, kerajaan Selangor telah melancarkan "Kempen Bebas Beg Plastik" yang berkuatkuasa 7 hari seminggu untuk mengurangkan penggunaan beg plastik dikalangan pembeli. Perkara ini kerana kemudaratan terhadap alam sekitar akibat daripada sisa beg plastik yang mengambil masa yang terlalu lama untuk lupus dan menyumbang kepada gas rumah hijau bersama-sama dengan kesan negatifnya kepada kesihatan manusia. **Objektif:** Untuk menilai penglibatan pengguna dalam "Kempen Bebas Beg Plastik" dan kaitannya dengan pelepasan gas rumah hijau dan risiko kesihatan di Selangor. **Kaedah:** Pemantauan kuantitatif tanpa penglibatan telah digunakan untuk menilai tahap penglibatan 360 pembeli di 3 kedai yang berlainan di Seri Kembangan Selangor dalam "Kempen Bebas Beg Plastik". Borang pemantauan berstruktur digunakan untuk merekodkan tingkah laku pengguna. **Keputusan:** Majoriti pengguna yang dipantau (N = 222, 62%) mengambil bahagian dalam kempen bebas beg plastik manakala 138 pengguna (38%) tidak mengambil bahagian. Jumlah penyertaan tertinggi dilihat di kedai serbaneka (N = 83, 69%), diikuti oleh pasar raya besar (N = 77, 64%) dan pasar raya (N = 62, 52%). Lelaki adalah majoriti yang menyertai kempen ini (N = 139, 64%). Majoriti etnik Cina (N = 61, 75%) mengambil bahagian dalam kempen ini. Kebanyakan pembeli yang membeli-belah secara berseorangan mengambil bahagian dalam kempen (N = 148, 60%), dan kebanyakan mereka membeli-belah pada hari bekerja (N = 67, 74%). Terdapat hubungkait yang ketara antara penglibatan pengguna dengan jenis peruncit ($\chi^2 = 8.226$, $p = 0.016$), di mana penglibatan tertinggi dapat diperhatikan di kedai serbaneka. Tahap penglibatan juga ada kaitan dengan kumpulan etnik ($\chi^2 = 8.881$, dan $p = 0.012$) dan hari membeli-belah ($\chi^2 = 8.884$, $p = 0.031$) di mana penglibatan tinggi dilihat semasa hari bekerja (N = 67, 74.4%). Tahap penglibatan tiada kaitan dengan jantina ($\chi^2 = 1.647$, $p = 0.199$) dan sama ada pengguna membeli-belah berseorangan atau dalam kumpulan ($\chi^2 = 0.514$, $p = 0.473$). Sebahagian besar pelepasan gas rumah hijau daripada jumlah beg plastik yang dibeli oleh pengguna disumbang oleh Karbon dioksida (CO₂) (96.9%) diikuti oleh Karbon monoksida (CO) (1.9%) dan Sulfur dioksida (SO₂) (1%). Gas rumah hijau yang paling kurang sumbangan ialah Nitrogen dioksida (NO₂), Sulfur dioksida (SO₂), Metana (CH₄) dan Nitrogen monoksida (NO). **Kesimpulan:** Kempen bebas beg plastik di Selangor mendapat penglibatan yang tinggi dari pengguna. Pengenalan caj tambahan untuk setiap beg plastik yang dibeli oleh pengguna mungkin telah mengubah sikap pengguna ke arah tingkah laku yang lebih pro-alam sekitar.

Kata kunci: *Beg plastik, kempen bebas beg plastic, pembeli, gas rumah hijau, risiko kesihatan*

TABLE OF CONTENTS

	Page
DECLARATION	ii
SIGNATURE OF SUPERVISOR/ INTERNAL EXAMINER	iii
ACKNOWLEDGEMENT	v
ABSTRACT	vi
ABSTRAK	vii
CONTENTS	viii
LIST OF TABLES	x
LIST OF FIGURES	xi
LIST OF ABBREVIATIONS	xii
CHAPTER 1: INTRODUCTION	
1.1 Background of study	1
1.2 Problem Statement	3
1.3 Study Justification	8
1.4 Definition Term	9
1.5 Conceptual Framework	11
1.6 Research Objective	15
1.7 Study Hypothesis	16
CHAPTER 2: LITERATURE REVIEW	
2.1 Municipal Solid Waste in Malaysia	17
2.2 Background of Plastic Bag	19
2.3 Plastic Bag and Environment	21
2.4 Plastic Bag and Greenhouse Gases (GHG)	22
2.5 Plastic Bag and Human Health	25
2.6 No Plastic Bag Campaign in Malaysia	28
2.7 Effectiveness of Plastic Bag Levy in Changing Consumers Behaviour	29
2.8 Existing Malaysia Solid Waste Management Policies	30
CHAPTER 3: METHODOLOGY	
3.1 Study Location	33
3.2 Study Design	33
3.3 Study Population	34
3.4 Sampling	
3.4.1 Sampling Method	34
3.4.2 Sample Size Estimation	35
3.4.3 Research Flow	37
3.5 Instrumentation	
3.5.1 Structured Observation form	39
3.6 Consumer Behaviour Observation	40
3.7 Calculation of GHG and its contribution to Health Risk	42

3.8	Statistical Analysis	43
3.9	Ethical Consideration	44
CHAPTER 4: RESULT		
4.1	Socio-demographic of Consumers Observed	45
4.2	Retailers Participation in the No Plastic Bag Campaign	46
4.3	Consumers Participation level in the No Plastic Bag Campaign by Type of Retailers, Socio-demographic and Days of Shopping	48
4.5	Association between Type of Retailers, Socio-demographic and Days of Shopping with Consumer Participation Level	55
4.7	Calculation for Plastic Bag GHG Emission	59
CHAPTER 5: DISCUSSION, CONCLUSION, RECOMMENDATION		
5.1	Discussion	
	5.1.1 Socio-demographic of Consumers Observed	61
	5.1.2 Retailer Participation in No Plastic Bag Campaign	62
	5.1.3 Consumer Participation level in No Plastic Bag Campaign	62
	5.1.4 Association between Type of Retailers, Socio-demographic and Days of Shopping with Consumer Participation Level	66
	5.1.5 Calculation of GHG and its Health Risk Associated	69
	5.1.8 Study Strengths and Limitations	70
5.2	Conclusion	71
5.3	Recommendation	72
REFERENCES		74
APPENDICES		81

LIST OF TABLES

		Page
Table 1.1	Waste composition generated per day in Peninsular Malaysia	19
Table 2.1	Potential pollutant generated from burning of plastic bags	24
Table 2.2	Global Warming Potential and Atmospheric Lifetime for Major GHGs	27
Table 3.1	Amount of air emissions produced by plastic bags	42
Table 4.1	The socio demographic background of consumers observed in three type of retailers.	46
Table 4.2	Descriptive summary of retailer participation in the “No Plastic Bag Campaign”	47
Table 4.3	Descriptive summary for consumer participation level in the no plastic bag campaign by type of retailers, socio demographic, and days of shopping.	51
Table 4.3.1	Descriptive summary for numbers of plastic bag purchased by consumers during the “No Plastic Bag Campaign”.	53
Table 4.4	Association between type of retailers, socio-demographic, and days of shopping with consumer participation level.	56
Table 4.4.1	Association between type of retailers, socio-demographic, and days of shopping with number of plastic bag purchased.	58
Table 4.5	Calculation for plastic bag GHGs emission based on amount of plastic bags purchased by consumers observed during the “No Plastic Bag Campaign”.	60

LIST OF FIGURES

		Page
Figure 1.1	Conceptual framework of study	14
Figure 3.1	Research flow of study	38
Figure 4.1	Alternatives method of carrying purchased items	49
Figure 4.2	The fraction of GHG emission (in percentage) from the number of plastic bag purchased	59



LIST OF ABBREVIATIONS

CIWMB	California Integrated Waste Management Board
GHG	Greenhouse Gases
HDPE	High Density Polyethylene
IPCC	Intergovernmental Panel on Climate Change
LDPE	Low Density Polyethylene
MDTCC	Ministry of Domestic Trade, Cooperatives and Consumerism
MPMA	Malaysian Plastics Manufacturers Association
MSW	Municipal solid wastes
UNEP	United Nations Environmental Program
USEPA	United States Environmental Protection Agency
WHO	World Health Organization

CHAPTER 1

INTRODUCTION

1.1 Background of Study

Plastic bags emerged as a well known product in the 1970's and remain popular for consumers until now (Equinox Center, 2013). Plastic bags mostly used by Malaysian when purchased something from the stores as a means of carrying goods (Asmuni, Hussin, Khalili and Zain, 2015). Plastics bags are made up of polyethylene, byproduct of natural gas and petroleum which is normally stable and resistant to degradation (Lajeunesse, 2004; Kamaruddin & Yusuf, 2012).

Plastic bags main issues in the modern world today is the issue where they release greenhouse gases during their degradation process and also during production process when crude oil and natural gases are being used to produce plastic bags (Martinez, 2013; Clean up Australia, 2009). Futhermore, littered plastic bags could be unsightly in addition to hazardous to wildlife where littering of plastic bags result in blockage of sewers and drainages which endanger biotic species and abiotic components when incinerated, buried or damped. Plastic bags also may acts as a habitat for vectors that transmits disease pathogens like mosquitoes, flies and rodents (Wachira, Wairire & Mwangi, 2014).

Plastic bags that are dumped into the ocean, rivers and waterways have the ability to cause harm to aquatic animals when they perceive the plastic bags as their food and ingest them which end up causing injury to their digestive system (Ayalon, Goldrath, Rosenthal, & Grossman, 2009). The global agricultural sectors also greatly affected by plastic bags where discarded plastic bags that end up in agricultural fields mixed with other decomposed materials. Since plastic bags do not decompose with soil, they will remain in the agricultural lands and blocks as well retard the progress of growth of agricultural plants (Jalil, Mian & Rahman, 2013).

These issues have forced governments across the world including Malaysia, to introduce policy on plastic bags ban to limit or reduce the usage of plastic bags. Ministry of Domestic Trade, Cooperatives and Consumerism (MDTCC) has instituted a nationwide 'No Plastic Bag on Saturday' Campaign beginning on 1st January 2011 (MDTCC, 2012). A survey done by Malaysia National Solid Waste Management Department on consumers perception and views on "No Plastic Bag on Saturday" Campaign in December 2011 shows that 67% of 270 respondents supported the campaign while 12% are otherwise. Only 10% of them willing to pay 20 sen per plastic bag, 9% had changed their shopping day and remaining 2% changed the shopping place.

In Selangor, policy on plastic bags ban already effective since 1st January 2010 which is one year before the campaign implemented nationwide. A survey done by Kamaruddin and Yusuf (2012) in Shah Alam, Selangor with a sample size of 100 respondents reveals that the acceptance level of Selangor households about the campaign is quite high where 66% respondents agreed that they are comfortable with the campaign,

and 90% respondents agreed that the campaign is at the right time. Majority of the respondents find it convenience to bring their own shopping bags. Majority of the respondents (89%) agree that the campaign helps to protect the environment and 75% respondents willing to participate in the campaign everyday (Kamaruddin & Yusuf, 2012)

Due to positive feedbacks from Selangor households towards the initial implementation of the campaign, starting from 1st January 2017 the campaign has been declared for every days, which is 7 days a week. The “No Plastic Bag Campaign” introduced an extra charge of MYR 0.20 (USD 0.06) per plastic bag in supermarkets and grocery stores. The primary objective of this campaign is to reduce the utilization of plastic bags in Selangor along with improving the awareness level of consumers on the negative impacts of plastic bags.

1.2 Problem Statement

According to Eusuf et al., (2011), rapid urbanization results in increasing number of municipal solid waste which now has become a serious issue for government departments and public in most of the developing countries. Industrialization along with rapid growth of population cause deterioration in the environment and places serious stress on natural resources. Furthermore, unsystematic solid waste disposal has been a major cause for degradation of environment in most developing countries around the world.

Aproximately 260 million tonnes of plastics are produced for various purposes worldwide on an annual basis (Thompson, Moore, Saal, & Swan, 2009). Thousands of

plastic factories around the world are generating plastic bags which are very popular among consumers for shopping purposes due to their properties which is easy to use, cheap and convenience of use, but their negative impact which is very hazardous is never highlighted or even openly discussed in a more serious tone (Moharam & Moqtari, 2014).

Malaysians on average produce 19,000 tonnes of solid waste annually and waste plastic represents 24% of the total solid waste (Asmuni, et.al., 2015). According to Malaysian Plastics Manufacturers Association (MPMA), average of 300 plastic bags have been used per person per year. In total, with a population of 30 million, it was estimated 9 billion plastic bags were used every year (MPMA, 2010).

Plastic bags that are recycled, disposed, or left in the environment as litter will undergo breakdown process and release harmful chemicals to surrounding. Burning plastic in incinerators discharge variety of toxic substances to the air, water, and ground that are significant sources of powerful pollutants, including Dioxin and other chlorinated organic compounds that are well known for their toxic effects on human health and the environment (Pavani & Rajeswari, 2014). Dioxins that end up on the crops and waterways will enter our food and the body system. These Dioxins are the lethal persistent organic pollutants (POPs) and its worst component, 2,3,7,8 tetrachlorodibenzo-p-dioxin (TCDD), which also known as agent orange is a toxic compound to human which can cause cancer, neurological damage, affect respiratory systems and disrupts reproductive thyroid (Verma, Vinoda, Papireddy, & Gowda, 2016). Plastic bags litter also become the breeding sites for mosquitoes when filled up with rainwater, which end up causing malaria

or dengues. It also acts as a habitat for vectors that transmits pathogens like flies and rodents that can spread the disease which can affect human health (Wachira et al, 2014).

Plastic bags litter contribute to Greenhouse Gases (GHG) emission. According to Equinox Center (2013), a single plastic bag generates 0.00003 tons of CO₂ which equivalent to 0.03 Kg of CO₂. Landfills have contributed to nearly 20% of Greenhouse Gases (GHG) which results in global warming that lead to climate change. Global warming give impact to human health where Patz and Kovats (2002), have identified six major areas of concern to human health in response to this ongoing climate change. They call this six major areas as the “hotspots in climate change and human health” which includes heat waves, rise in sea levels, flooding, drought, malnutrition, El Nino effects, and highland malaria. There are also some indirect effects of global warming, which can be very serious due to the rising global temperature such as more areas of the world will become favourable for the survival of tropical insects like mosquitoes (Nabi & Qader, 2009). Some species of mosquito act as disease vectors and are responsible for the spread of illnesses like Malaria, Dengue fever, and Yellow fever (Zell, 2004). Hence, global warming can increase the incidence of these diseases.

Furthermore, the incomplete combustion of polyethylene, during thermal utilization can cause high concentrations of carbon monoxide (CO) and noxious emissions. Besides that, burning of plastic bags releases chemicals into the air, causing serious lung damage and other long-term health problems. People with lung diseases such as asthma and chronic obstructive pulmonary diseases, single exposure to this smoke can worsen their disease (Verma et al., 2016).

Due to public concern over the serious negative impact on the human health, environment and agriculture, many countries around the world have banned plastic bags, especially, in agricultural countries, such as Yemen, Bangladesh, India, Pakistan, South Africa, etc. (Moharam & Moqtari, 2014). Malaysia Domestic Trade, Cooperatives and Consumerism Ministry launched the “No Plastic Bag on Saturday” Campaign which effective on 2011 nationwide, which forced consumers to pay MYR 0.20 (USD 0.06) for each plastic bag they needed (MDTCC, 2012). This action is intended to encourage retailers to participate in the effort of reducing the usage of plastic bags. However, the campaign has provoked a range of reactions from the public including consumers, policy makers, environmentalists and the plastic industry. A study done by Asmuni et al (2015) in peninsular Malaysia shows that participation of consumers in the “No Plastic Bag on Saturday” Campaign is moderate, given that almost 50% of consumers from a total of 560 observations collected willingly paid the charges (tax) for plastic bags. Another similar study conducted by Shin and Weng (2017) in Penang, Malaysia shows 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 behavior (do not use any plastic bag) and partially anti-consumption behavior (use plastic bag together with eco bag). These studies indicates public voluntary anti-consumption of plastic bags ranged from moderate to low.

Starting from 1st January 2017, Selangor government has implemented new changes to the “No Plastic Bag on Saturday” Campaign where the campaign are now effective everyday. Almost after 9 months of the campaign launched, it is remain a

question whether there has been a lifestyle change amongst Selangor population in plastic bags usage.

Therefore, this study was conducted to assess consumer participation in the “No Plastic Bag Campaign” in Selangor and the possible factors that influence their behaviors such as gender, ethnic group, and days of shopping. This study also observed whether the campaign had successfully reducing the consumption of plastic bags in the supermarket and groceries stores. The contribution of this campaign to greenhouse gas (GHG) emission reduction and health risk were measured in this study.

The present study used observational study method to observe and understand the behaviours of consumers during the campaign period. This study provides an informative results to the Selangor Environmental Department on the contribution of the “No Plastic Bag Day Campaign” in changing consumer behaviours as well as its contribution to reduce GHG and improve health. In addition, the data would assist the authority in Malaysia in developing alternative ways for plastic bags so that the usage of plastic bags in Malaysia can be reduced and plastic waste can be minimized.

1.3 Study Justification

While there are a number of studies (Kamaruddin & Yusuf, 2012; Zen et al., 2013; Nizam et al., 2016, Convery et al., 2007, Dikgang et al., 2012) that investigate the effectiveness of the plastic bag policy, none of these studies using an actual observation on consumers' purchase decision and buying behavior. This study extends the examination in the literature by focusing on consumer's pro-environmental behavior and decision during the "No Plastic Bag Campaign" period through the use of direct observation during purchases. Thus, it record actual decision and analyze during the observation. This help to add, widen and diverse the knowledge for the issue.

Findings from this study provide baseline information on the effectiveness of the campaign to change the consumer's behaviors and to what extent the plastic bag campaign contribute to the GHG emissions and health risk.

In addition, the data of this study hopefully helpful to the authority in Malaysia in developing alternative ways for plastic bags so that the usage of plastic bags in Malaysia can be reduced and plastic waste can be minimized as their negative impacts to the environment are very big.

1.4 Definition Term

1.4.1 Consumer

Consumer is defined in Irish law as a natural person who buys goods or a service for personal use or consumption from someone whose business it is to sell goods or provide services.

1.4.2 Participation

Involvement of the local population actively in the decision-making concerning development projects or in their implementation (White, 1981). In this study, participation refer to involvement of local population in no plastic bag campaign.

1.4.3 Plastic Bag

Plastic bags in this study consist of plastic bags that are used for containing and transporting goods purchased.

1.4.4 Campaign

An organized course of action to achieve a goal (Oxford).

1.4.5 Retailer

The activities involved in selling directly to the ultimate consumer for personal and non-business use (American Marketing Association). In this study retailer refer to hypermarket, supermarket and grocery store.

1.4.6 Waste Management

The collection, transport, processing, recycling or disposal and monitoring of waste materials

1.4.7 Hypermarket

Hypermarkets carry a wide variety of products which may include furniture, electrical and electronic products, outdoor equipment, automobile accessories, etc. Hypermarkets are commonly found in Big Box formats, due to the product variety they offer and the higher volume of inventory they carry. Hypermarkets dominate areas with lower population densities, where space is not an issue (DBS Research Group, 2015).

1.4.8 Supermarket

Supermarkets retail fresh and packaged food items and have retail space larger than convenience stores but smaller than hypermarkets. It is where consumers are able to replenish and stock up on the grocery items they use daily. They are typically self serviced,

more organised and offer more product variety than traditional grocery retailers. Supermarkets are well penetrated in high density areas such as city centres and high-density towns. (DBS Group Research, 2015).

1.4.9 Convenience store

Convenience stores offer more essential items and have a relatively narrower range of products compared to supermarkets and hypermarkets. Key products include tobacco, media, ready-to-eat and fresh food, packaged beverage, services, and personal/essential items. Many convenience stores operate 24 hours and operate on a smaller floor area (DBS Group Research, 2015).

1.5 Conceptual Framework

According to Thitame, Pondhe and Meshram (2009), solid waste were divided into two type which are organic waste and inorganic waste. Organic waste can be described as food scraps, yard (leaves, grass, brush) waste, wood, process residues. For inorganic waste, it can be further divided into five categories which are paper, glass, plastic, metal and non-metal. Among this 5 categories, plastic specifically plastic bag is a main concern in this study due to its highly negative effects to environment, animal and human health.

According to Sharma, Dhanwantri and Mehta (2014), there are 3 methods of solid waste management which are reduce, recycle and disposal. Waste reduction is a method of waste prevention. It eliminate the production of waste at the source of usual generation

and reduce the demands for large scale treatment and disposal facilities. Methods of waste reduction include manufacturing products with less packaging, encouraging customers to bring their own reusable bags for packaging, encouraging the public to choose reusable products such as cloth napkins and reusable plastic and glass containers, backyard composting and sharing and donating any unwanted items rather than discarding them. Waste recycling refers to the removal of items from the waste stream to be used as raw materials in the manufacture of new products. Recycling occurs in three phases: first the waste is sorted and recyclables collected, the recyclables are used to create raw materials. These raw materials are then used in the production of new products. For waste disposal, some of the methods being used today include subjecting the waste to extremely high temperatures, or dumping on land or land filling.

In Malaysia, the application of reduce method in management of plastic bags waste can be seen in the “No Plastic Bag Campaign” implemented nationwide for both consumers and retailers in order to influence consumers to reduce the usage of plastic bags while shopping. Thus, in this study we aim to assess the consumer participation in the “No Plastic Bag Campaign” in Selangor specifically. For assessment of consumer participation in the campaign, the methods of carrying purchased items and number of plastic bags purchased will be observed in our study. Besides, we also assess retailer participation in this campaign in terms of availability of in-store campaign information and role of cashier in reminding consumer about this campaign. From the number of plastic bag purchased by consumers, we will then calculate the emission of Greenhouse Gases (GHG) and relate it with consequences to human health risk.

The observational parameters in this study include type of retailers (hypermarket, supermarket and convenience store), socio-demographic (gender, ethnic group, shopped alone or in group), and days of shopping (weekdays, weekend, public holiday, payday) (Figure 1.1). On the other side, the cofounder for this study could possibly be age, marital status, income and level of education. For example, the level of education may vary between consumers so their knowledge about harmful effects of plastic bags to environment may vary between high level education consumers and low level education consumers. This information such as age, marital status, income and level of education cannot be collected because the method of this study is non-participant observation so researcher can only obtain data from what he can observe by his eyes.

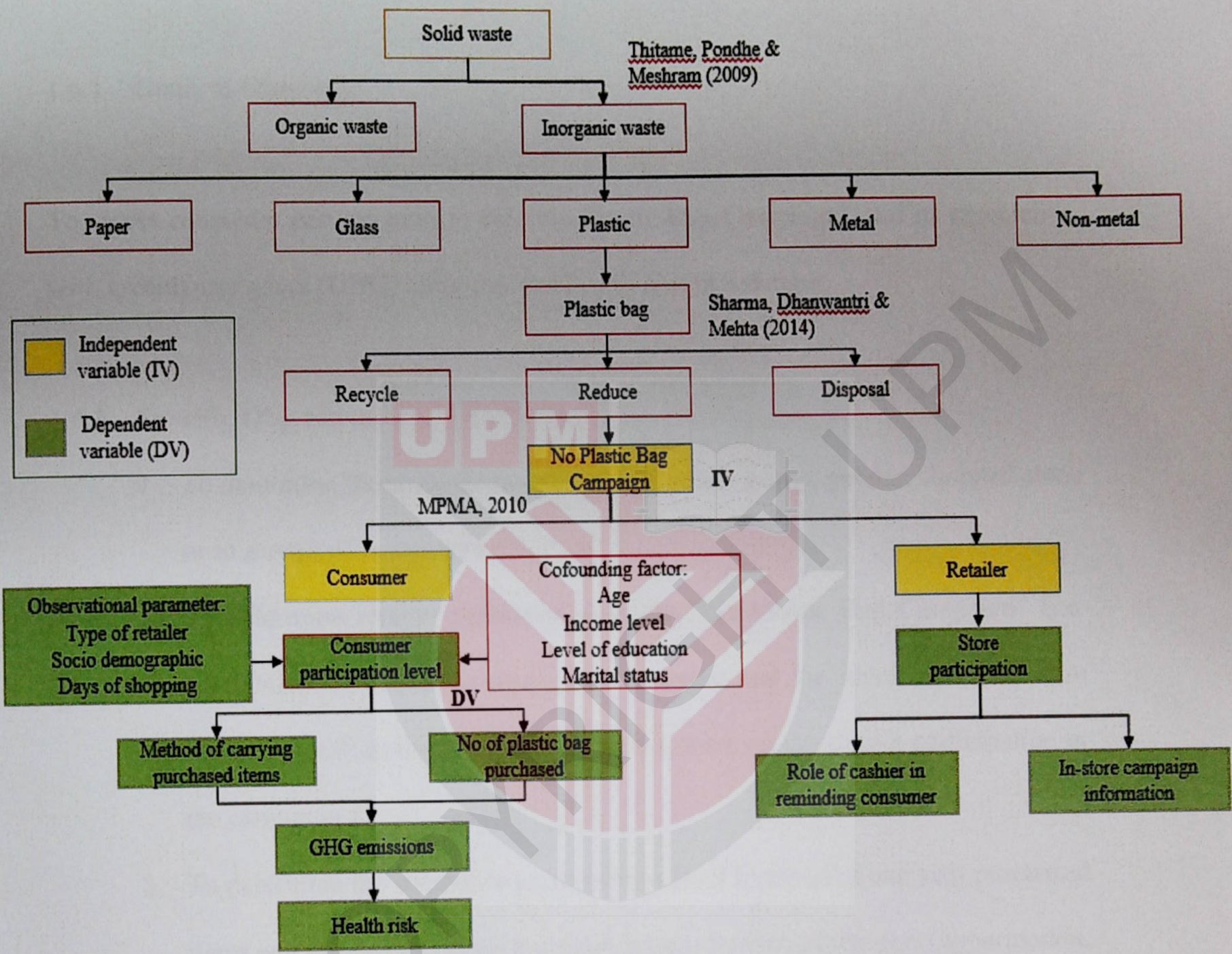


Figure 1.1: Conceptual Framework of the study

1.6 Research Objectives

1.6.1 General Objective

To assess consumer participation in the “No Plastic Bag Campaign” and its association with greenhouse gases (GHG) emission and health risk in Selangor.

1.6.2 Specific Objectives

1. To determine the socio-demographic (i.e. ethnic group, gender, shopped alone or in group) of consumers observed.
2. To determine retailer participation in the “No Plastic Bag Campaign” (i.e. availability of in-store campaign information and the involvement of store cashiers in informing and reminding customers on the store’s participation in the campaign.)
3. To determine the consumer participation level (method of carrying purchased items and number of plastic bags purchased) by type of retailers (hypermarket, supermarket, convenience store) socio-demographic (i.e. ethnic group, gender, shopped alone or in group), and days of shopping (i.e. weekdays, weekend, public holiday, payday).
4. To assess the association between type of retailers, socio-demographic characteristics, and days of shopping with consumer participation level (method carry purchased items and number of plastic bags purchased) .
5. To calculate the Greenhouse Gas emission (GHG) from the plastic bag campaign and its contribution to health risk.

1.7 Study Hypothesis:

- 1. There is significant association between consumer participation level (method carry purchased items and number of plastic bags purchased) with type of retailers, socio-demographic characteristics, and days of shopping.**



CHAPTER 2

LITERATURE REVIEW

2.1 Municipal Solid Waste in Malaysia

Solid wastes can be described as materials that don't have any or less value to the real owner and thus planned to be thrown away. Those material are not necessarily be valueless, but whenever the owner throws the material away, it has become a waste. Municipal solid wastes (MSW) on the other hand, are the wastes generated in urban areas. Malaysia Solid Waste and Public Cleansing Management Act 2007 defined solid waste as any scrap material, unwanted surplus substance or rejected products that arise as a result of human activity, but excluding scheduled wastes, sewage and radioactive wastes (Agamuthu & Victor, 2011).

Management of MSW in Malaysia remains to be a major challenge in urban areas around the world, especially in the rapidly growing cities and towns of the developing world. Due to lack of an effective and efficient MSW management system, environment have to face the negative impact that it opposed. With population of over 31 million in 2016, Malaysian generates more than 25,000 metric tons of domestic waste per day (Nadzri, 2013).

Currently, the average per capita generation of MSW in Malaysia is about 0.85 kg/person/day depending on the economic and geographical status of an area. In big cities such as Kuala Lumpur, it is estimated that the generation of waste is about 1.5 kg/person/day (Budhiarta et al., 2011). Authorities in most major cities in Malaysia are working on finding for an alternative waste management approach as the landfill approach currently adopted are not suitable anymore due to rapid development and lack of new landfill spaces. Malaysian government through 10th Malaysia Plan (2011-2015), adopted waste recycling as a long-term strategy for MSW management in response to those issues. (Economic Planning Unit, 2010).

Among the 25,000 metric tons of waste generated daily, 45% are organic waste (food waste), 24% are plastics, 7% paper, 6% metal and 18% are glass and others (Table 1.1) (Budhiarta et al., 2011).

Table 1.1: Waste composition generated per day in Peninsular Malaysia (Economic Planning Unit, 2010)

Type of Waste	Percentage
Organic (Food)	45%
Plastics	24%
Paper	7%
Metal	6%
Glass & Others	18%
Total	100%

2.2 Background of Plastic Bag

Plastic bags was originally designed and made by Swedish engineer Gustaf Thulin in 1960s (Petru, 2014). The design was patented, internationally in 1965 by Celloplast (well established-company in plastics-processing), giving them monopoly on plastic bags industry and associated-materials production. The company set up several manufacturing plants across Europe and USA (Cherrier, 2006). From the mid-1980s onwards, plastic bags became popular among shoppers throughout the world for carrying groceries from the shop to home which eventually end up replacing the custom of using paper bags (Aadland & Caplan, 2006). Today, plastic bags have emerged and become one of the most successful consumer products worldwide. They are characterized to be functional, relatively-strong, cheap, lightweight, small in volume, hygienic way of transporting goods, versatile, convenient, and effortlessly disposable (Australian DoE, 2008; UNEP, 2004).

Between 2007 and 2012, the world population grew roughly 7%, while the plastic products-market had an extraordinary-increase of 165%, during the same-period (EuroMonitor International, 2013). It was estimated, that 100 billion to 1 trillion plastic-bags are produced worldwide per-year (Spokas, 2007), while the average-family uses 400 plastic-bags per year (USEPA, 2006). Worldwide, humanity is using plastic-shopping-bags a rate of 1 million bags every-minute (Cherrier et al., 2006).

Plastic-bags can be either degradable or non-degradable. Degradable-plastics are often grouped into biodegradable, oxo-degradable, and compostable plastics. Biodegradable polymers are capable of undergoing decomposition into carbon dioxide, methane, water, inorganic compounds or biomass by the actions of microorganisms (CIWMB, 2007). The oxo-degradable plastic bags are not biodegradable, but are designed to breakdown into small pieces, after exposure to oxygen. Compostable plastics, as materials, undergo degradation by biological processes, during composting, to yield Carbon dioxide, water, inorganic compounds, and biomass, at a rate consistent with other known compostable materials and that leave no visible distinguishable or toxic residue (CIWMB, 2007).

• Non-degradable plastic bags are made from polyethylene, derived from non-renewable natural gas and petroleum. High Density Polyethylene (HDPE) and Low Density Polyethylene (LDPE) are materials widely used for the manufacture of plastic bags. The plastic bags used by supermarkets are ideally produced out of HDPE (Lajeunesse, 2004).

2.3 Plastic Bag and Environment

Plastic bags can last for up to 1000 years. The vast majority of this life cycle is spent in the end-of-life phase, either in a landfill or as litter in the environment. A plastic bags extensive lifespan is the direct result of plastic's immunity to biodegradation. Plastics instead photodegrade over time, releasing any toxic additives they contain. In a landfill, these can leach out over time. In the environment, these can harm ecosystems (Equinox Center, 2013). Besides, extremely thin plastic bags made from less than 20 micron thick films are choking the drains of many cities causing uncontrolled floods during rainy season (Rustagi, Pradhan & Singh, 2011).

Plastic bags have vast negative effects to oceans life. According to United Nations Environment Programme (UNEP), 60-80 percent of marine debris are plastics. UNEP noted that plastic marine debris poses a global pollution problem due to its portability in ocean currents and long lifespan. Plastics have been reported to negatively impact between 180 and 660 species of animals, including birds, fish, turtles, and marine mammals, with a portion of these plastics presumably comprised of plastic bags. This happens when marine animals confuse plastic bags for food, which lead to blocked digestive tracts and eventual death (UNEP, 2013).

On the other hand, plastic bags also give impacts to agricultural sector. The agricultural impacts of plastic bags are very harmful in several aspects and consequently these bags become the very threat to our food and life. Since plastic bags is non-biodegradable, it remains in the soil for a long period of time and thus causing

unimaginable harms to the agricultural sectors (Jalil, Mian & Rahman, 2013). The most significant negative impacts of the plastic bags on agriculture are reduction in soil fertility, decrease in nitrogen fixation, huge loss of nutrients in the soil, decrease in crop harvest, and disparity in flora and fauna on soil. These negative impacts of plastic bags in fact reduce soil fertility to a great extent and thus reduce agricultural production to a great quantity (Jalil et al., 2013).

2.4 Plastic Bag and Greenhouse Gases (GHGs)

Greenhouse gases (GHGs) can be defined as gases that trap radiation in form of heat in the atmosphere causing a warming process called the greenhouse effect (USEPA, 2015). According to Integrated Carbon Observation System (ICOS), a number of GHGs occur naturally in the atmosphere including water vapour (H₂O), carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O), while others are man-made resulting from human activities (anthropogenic). Example of man-made GHGs include chlorofluorocarbons (CFCs), hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs), as well as sulfur hexafluoride (SF₆). Human activities risen up the atmospheric concentrations of natural and man-made GHGs. GHGs exist in the atmosphere for different amounts of time and some of them are more effective than others at warming the atmosphere (ICOS, 2018).

There are also some gases that do influence the global radiation budget. Tropospheric gases which include carbon monoxide (CO), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), and tropospheric (ground level) ozone (O₃) also influence the global

radiation budget even though they do not have direct radiative forcing effect. Tropospheric ozone is formed by two precursor pollutants, volatile organic compounds (VOCs) and nitrogen oxides (NO_x) in the presence of ultraviolet light (ICOS, 2018). On the other hand, Aerosols also can affect the absorptive features of the atmosphere and play a role in affecting cloud formation and lifetime, affecting the radiative forcing of clouds and precipitation patterns. Aerosols can be described as particles that are extremely small or suspended liquid droplets in the Earth's atmosphere that comprised of sulfur compounds, carbonaceous combustion products (e.g., black carbon), crustal materials (e.g., dust) and other human induced pollutants (Intergovernmental Panel on Climate Change IPCC, 2013).

Two features of atmospheric gases become determinant of the strength of their greenhouse effect. First one is the Global Warming Potential (GWP), a measure of the radiative effect of each unit of gas over a specified period of time, expressed relative to the radiative effect of carbon dioxide (CO₂). An amount of gas with high GWP will warm the Earth more than the same amount of CO₂. The second one is the atmospheric lifetime, which measures how long the gas remain in the atmosphere before natural processes (e.g., chemical reaction) remove it. A gas with a long lifetime can exert more warming influence than a gas with a short lifetime. The table below presents values for these two characteristics for major greenhouse gases (Gillenwater, 2010).

Table 2.1: Global Warming Potential and Atmospheric Lifetime for Major GHGs

Greenhouse gas	Chemical formula	Global Warming Potential, 100-year time horizon	Atmospheric Lifetime (years)
Carbon dioxide	CO ₂	1	100
Methane	CH ₄	25	12
Nitrous Oxide	N ₂ O	298	114
Chlorofluorocarbon-12 (CFC-12)	CCl ₂ F ₂	10,900	100
Hydrofluorocarbon-23 (HFC-23)	CHF ₃	14,800	270
Sulfur Hexafluoride	SF ₆	22,800	3200
Nitrogen Trifluoride	NF ₃	17,200	740

Source: Fourth Assessment Report (Intergovernmental Panel on Climate Change IPCC, 2007).

Plastic bags become one of the vital contributor for GHGs in our world. MSW including plastic waste is important contributor to greenhouse gas emissions via decomposition and life-cycle activities processes (Chalvatzaki & Lazaridis, 2010). Majority of these emissions are caused by landfilling, which remains the primary waste disposal strategy internationally (Lou, & Nair, 2009). Landfilling is one of the most common technique used to dispose MSW in developing countries. Air pollutants emitted from landfills contributes to the emission in the atmosphere of GHGs and lead to serious problems to the human health. Methane emission from landfill is serious environmental global concern as it accounts for approximately 15% of current greenhouse gas emissions (Chalvatzaki & Lazaridis, 2010). Futhermore, Clean Up Australia stated that when oil, gas and coal are used in the production process of plastic bags, they also emits dangerous

GHGs during the production process. Plastic are made from derivatives of petroleum and natural gas. The first step in plastic manufacture is the acquisition of derivatives from refined petroleum and natural gas, which results in process energy and non-energy GHG emissions from the extraction and refining of petroleum and natural gas. The petroleum and/or natural gas are then transported to plastic manufacturers, which results in transportation of GHG emissions (USEPA, 2015). According to Posen et al., 2017, plastics production is responsible for 1% and 3% of U.S. greenhouse gas (GHG) emissions and primary energy use, respectively.

2.5 Plastic Bag and Human health

Environmental pollution is responsible for 8.9 million deaths around the world annually, 8.4 million of which are in low and middle income countries (Suk et al., 2015). A single plastic bag generates 0.00003 tons of CO₂ which equivalent to 0.03 Kg of CO₂ (Equinox center, 2013). This CO₂ when released into the atmosphere will induce global climate change which could further worsen health risks from toxic environmental exposures by increasing concentrations of many chemicals in water, air, and sediment (Noyes et al., 2009). Climate change imposed additional stress to individuals' immune, endocrine, and neurological systems that may leave some even more sensitive to the pollutants they encounter (Hooper et al., 2013). Furthermore, World Health Organisation (WHO) estimated, in its "World Health Report 2002", that climate change was estimated to be responsible for approximately 2.4% of worldwide diarrhoea, and 6% of malaria in some middle-income countries. Besides that, Intergovernmental Panel on Climate Change (IPCC) states that climate change would cause increased heat-related mortality and

morbidity, decreased cold-related mortality in temperate countries, greater frequency of infectious disease epidemics following floods and storms, and substantial health effects following population displacement from sea level rise and increased storm activity (IPCC, 2001).

On the other hand, consumption of marine organism such as fish, which contains bioaccumulated plastic chemicals in their meat, can lead to chemicals transfer from the marine organism into human bodies (Seltenrich, 2015). Due to plastics hydrophobic nature, persistent organic chemicals including polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), polybrominated diphenyl ethers (PBDEs), dioxins, and DDT to preferentially sorb to plastics when they encounter them in the ocean (Muller et al., 2001). A study done by Browne et al., in 2011 showed that microplastics in the ocean which sized ranged from 3.0 and 9.6 μm in diameter can travel beyond a mussel's gut and into its circulatory system and hemocytes (immune cells) in human body where they may remain for a relatively long period of time. Another similar study conducted by Law and Thompson, 2014, showed that microplastics taken up by mussels resulted in a strong inflammatory response.

Meanwhile, the byproducts of plastic combustion which are airborne particulate emission (soot) and solid residue ash (black carbonaceous colour) possess a high potential of causing significant health impacts to human. The soot when generated is accompanied with volatile organic compounds (VOCs), semi-VOCs, smoke (particulate matter), particulate bound heavy metals, polycyclic aromatic hydrocarbons (PAHs), polychlorinated dibenzofurans (PCDFs) and dioxins and has the ability to travel thousands

of kilometers, depending on prevailing atmospheric conditions, before it can drop back on earth and enter into the food chain (Valavanidid, Iliopoulos, Gotsis, Fiotakis, 2008).

Table 2.2: Potential pollutant generated from burning of plastic bags (Valavanidid et al, 2008).

Pollutant	Health Effects
Carbon Monoxide	Causes dizziness, headaches and slow reflexes. Affects mental function, visual acuity and alertness
Dioxins and Furans	May cause cancer; causes growth defects; affects DNA; affects immune and reproductive systems
Polynuclear Aromatic Hydrocarbons (PAHs)	Cancer causing agent in most animal species including mammals, fish and birds
Volatile Organic Compounds (VOCs)	Directly toxic including problems ranging from cancer risks to nervous disorders. Causes respiratory irritation/illness, chronic lung disease
Particulate Matter (PM)	Irritation of respiratory tract, aggravated asthma, contributes to chronic obstructive pulmonary disease
Aldehydes	This is a animal carcinogen. Causes eye and respiratory illness and headaches

2.6 No Plastic Bag Campaign in Malaysia

Malaysia effort to minimize the usage of plastic bags began with Penang state back in 2009 where Penang banned the use of plastic bags from shopping stores on Mondays (Penang State Government, 2009). The campaign to stop giving free plastic bags was increased to 3 days a week (Monday, Tuesday and Wednesday) in 2010. Penang Chief Minister (CM) Lim Guan Eng announced that from January 2011, no free plastic bags will be given out to shoppers and 20 sen will be charged for those shoppers who did not bring their own reusable bags (Malaysia Plastic Manufacturer Association, 2010).

Selangor state followed Penang action to banned plastic bags when Selangor State Government launched “Say No to Plastic Bag” campaign on every Saturday for all retailers in January 2010 (Malaysia Plastic Manufacturer Association, 2010). The latest effort from Selangor State Government in reducing the usage of plastic is when the Selangor State Government has implemented the “Bebas Plastik dan Polistirena Policy” effective January 1, 2017. This policy applies to all businesses in the State of Selangor, all week long (Majlis Daerah Sabak Bernam, 2017).

The federal government through the Ministry of Domestic Trade, Cooperative and Consumerism (MDTCC) in 2011 launched the “No Plastic Bag Day” campaign throughout Malaysia for each Saturday. The aim of this campaign is to reduce the use of plastic bags in order to minimize its negative impact on the environment. All retail outlets, supermarkets, and hypermarkets followed to impose the ban. However, they allowed the use of plastic bags for wet markets, restaurants and night markets for hygiene purposes

when carrying wet groceries and food (Zen, Ahamad, & Omar, 2013). This campaign were reinforced with a charge or levy of MYR 0.20 or 20 sen, which is equivalent to USD 0.06 for every plastic bag requested by a retail store customer. The use of the environmental tax as a disincentive to deter from certain behavior that may lead to environmental degradation. The tax collection money is either channeled to charity (Hong, 2011) or the stores used to implement environmental conservation activities.

2.7 Effectiveness of Plastic Bag Levy in Changing Consumer Behaviour

The effectiveness of plastic bag charge are conventionally linked with modification or change in behavior of consumers. A study by Asmuni et al. (2015) in Peninsular Malaysia concluded that the charge for plastic bags has been 52.3% effective in making consumers avoid the use of plastic bags as this percentage represents those who resort to using reusable grocery bags or other means of carrying purchase items. Another study conducted by Zen et al. (2013) concluded that the plastic bag levy has not been effective as consumers continue to forget to bring their own plastic bags for shopping.

Jakovcevic et al. (2014) in a study in Argentina concluded that plastic bag levy cause a greater increase in consumers use of own bag after the charge was introduced in supermarkets where the policy was introduced, in comparison to control supermarkets where the charge was not introduced, or was introduced later in time. On the other hand, a study in Ireland by Convery et al. (2007) showed that the effect of plastic bag levy on the use of plastic bags in retail outlets has been spectacular where a reduction in use in the

order of 90%, and an associated gain in the form of reduced littering and negative landscape effects.

Dikgang, Leiman, & Visser, (2012) measures the price elasticity of demand for plastic bags in order to determine the effectiveness of the plastic bag levy in South Africa. They made a conclusion that plastic bag levy is not effective since consumers are unaware of changes in price of plastic bags and plastic bag substitutes are very few and do not serve all purposes. In Wales, England, they considered the levy (charge) very effective as the habit of bringing own bag rises from 62% to 82% when they introduced the charge (Poortinga et al., 2013).

2.8 Existing Malaysia Solid Waste Management Policies

The increasing solid waste generation in the country has led to the development of solid waste management (SWM) policies in Malaysia. These policies have evolved from simple informal policies to the Action Plan for a Beautiful and Clean Malaysia (ABC) in 1988, the National Strategic Plan for Solid Waste Management (NSP) in 2005, the Master Plan on National Waste Minimization (MWM) in 2006, the National Solid Waste Management Policy in 2006, the Solid Waste and Public Cleansing Management Act (SWMA) in 2007, the Solid Waste Corporation Strategic Plan (2009-2013) and finally to the Tenth Malaysian Plan (2011-2015) which has articulated the Malaysian government's commitment to sustainable waste management (Agamuthu & Victor, 2011).

Through the SWPCMC Act 2007 the Federal Government of Malaysia has taken over the responsibility of municipal waste management from state local authorities and privatised them to concession companies. The Federal Government undertook this measure due to several factors including lack of human and financial resources to manage waste and non-standardised approach to MWM. Therefore, the aim of the privatisation exercise is to improve the quality of service, promote efficiency, provide better facilities and to have an integrated and holistic approach to Malaysian MWM (Yahaya and Larsen, 2008)

On top of that, the new laws also took into consideration waste minimisation, reuse, material recycling, energy recovery and landfill. While under the 9th Malaysia Plan, waste treatment facilities such as transfer stations, thermal treatment plants and waste to energy production facilities (WTE) were also earmarked as alternative treatment methods of municipal waste management potentially to be adopted in the near future (Zainu & Songip, 2017).

The most recent policy of mandatory recycling in Malaysia has just been put into full effect. Called the Mandatory Waste Separation Program, the legal Act focuses on getting Malaysians to separate recyclables from garbage. This implementation is pursuant to regulations under Solid Waste and Public Cleansing Management Act 2007 (Act 672) enforced in the following states and Federal Territories; Kuala Lumpur, Putrajaya, Johor, Melaka, Negeri Sembilan, Pahang, Kedah and Perlis .The rules are simple where household just have to sort garbage into different bags where paper goes in a blue bag, plastic in a white, and glass, aluminum and electronics in green. Leftover household waste

is to be bagged and put into bins provided by the garbage companies. Appointed collection companies will make collection based on the 2+1 concept. If those rules aren't followed, a fine of RM1,000 (\$230) will be apply to household. This new recycling policy has been mandatory since September 1, 2015. (Ministry of Urban Wellbeing, Housing and Local Government, 2015).



CHAPTER 3

METHODOLOGY

3.1 Study Location

This study was conducted at Seri Kembangan, Selangor. The number of population in this city is 150,000, which largely made up of entrepreneurs, businessmen, professionals, government servants who are working in Putrajaya and other multinational corporations employees located in Cyberjaya. Seri Kembangan is a business hub where the area is mostly residential and light industrial mix (Bin, 2011).

3.2 Study Design

In this study non-participant observation was used to study behaviour when the subjects are unaware of being measured (Shin & Weng, 2017). Through observation, characteristic of consumers (such as the method of carrying purchased, amount of plastic bag purchase), was recorded. The use of this technique is to allows researcher to observed subjects in their normal social situations and thus avoid the “Hawthorne Effect” (Denzin and Lincoln, 2000). It is a change in behaviour as a motivational response to the interest, care, or attention received through participant observation or assessment (Denzin and Lincoln, 2000). Besides that, researcher can be more open minded as they're an outsider looking in the behaviors of subjects observed.

This study limitation are in term of obtaining accurate results may be hard to gain as researcher also watch subjects behaviour from a distance, plus this method is time consuming and costly. In addition, this study design does not allow the researcher to investigate the meanings subjects attach to the behaviour that is being observed, so data produced may only reflect the assumptions and interpretations of the researcher (Denzin and Lincoln, 2000).

3.3 Study Population

The population for this study consists of consumers in Seri Kembangan, Selangor. It is near and familiar to the residence of observer thus make it easier for observer to selected retailer stores and collected samples of observations from hypermarket, supermarket and convenience stores located closed to the area of residence of observer.

3.4 Sampling

3.4.1 Sampling method

The sampling method used in this study was convenience sampling where samples of observations from hypermarket, supermarket and convenience stores located closed to the area of residence of observer are selected because of its convenient accessibility and proximity to researcher. There are several strength and weakness of convenience sampling. The strengths are it is affordable, easy and the subjects are readily available; while the weaknesses of convenience sampling are it is likely to be biased and also the problem of outliers (Etikan, Musa & Alkassim, 2016).

Samples of observations were taken from Giant hypermarket, Big supermarket and 99 Speedmart convenience store located close to the area of residence of observer. The reason why these different type of stores were chosen is to allow the researcher to determine the difference of consumer participation level by types of stores since convenience store such as 99 Speedmart caters to the low income and migrant worker population in high-density neighborhoods while hypermarkets, particularly market leaders such as Giant, are likely to benefit from a growing base of price-sensitive consumers as they are able to provide a wide product offering, competitive prices and expansive distribution network (DBS Research Group, 2015).

3.4.2 Sample size estimation

The sample size was calculated using Hansen, Winkel & Jorgensen (1997) group comparison sample calculation formula as follows :

$$n = \frac{\left\{ Z_{1-\frac{\alpha}{2}} \sqrt{2P(1-P)} + Z_{1-\beta} \sqrt{P_1(1-P_1) + P_2(1-P_2)} \right\}^2}{(P_1 - P_2)^2}$$

Where,

P = $(P_1 + P_2)/2$

P_1 = Estimated proportion of consumer participation in No Plastic Bag Campaign (69.8%) based on study done by Nizam, Mansor & Ahmad (2016) in Melaka.

P_2 = Estimated proportion of consumer participation in No Plastic Bag Campaign (52.3%) based on study done by Asmuni et.al., (2015) in Peninsular Malaysia.

$Z_{1-\frac{\alpha}{2}}$ = Standard error associated with confidential interval
(Here we decided to use 95% confidential interval = 1.96)

$Z_{1-\beta}$ = Standard error associated with power
(Here we decided to use 80% of power = 0.842)

$$n = \frac{\left\{ 1.96 \sqrt{2(0.611)(0.389)} + 0.842 \sqrt{0.698(0.302) + 0.523(0.477)} \right\}^2}{0.031}$$

$$n = \frac{(1.351 + 0.571)^2}{0.031}$$

$$n = \frac{3.694}{0.031}$$

$n = 120$ subjects per store.

The total numbers of respondents by each store was 120. The number of subjects was multiplied by 3 type of retailers (120 x 3 retailers) and the total subjects observed was **360**.

3.4.3 Research flow

The present study consists of five stages. The first stage was the sampling process of retailers where researcher selected 3 different types of retailers which were hypermarket (i.e. Giant), supermarket (i.e. Big supermarket) and convenience store (i.e. 99 speedmart) located in Seri Kembangan, Selangor. The second stage was data collection where observation at selected stores was conducted. Consumer participation in the “No Plastic Bag Campaign” was observed in terms of method of carrying purchased items and the number of plastic bag purchased. Besides, store participation in the campaign also was observed in terms of availability of in-store campaign information and the role of cashier in reminding consumers of the campaign. The third stage involved process of analyzing the data collected. Statistical analysis was done using SPSS version 22 (Statistical Package for Social Sciences). Next, stage 4 is where the interpretation of data analyzed was took place. The data interpreted was included in the discussion part of this research. Lastly, stage 5 was the process of reporting this research.

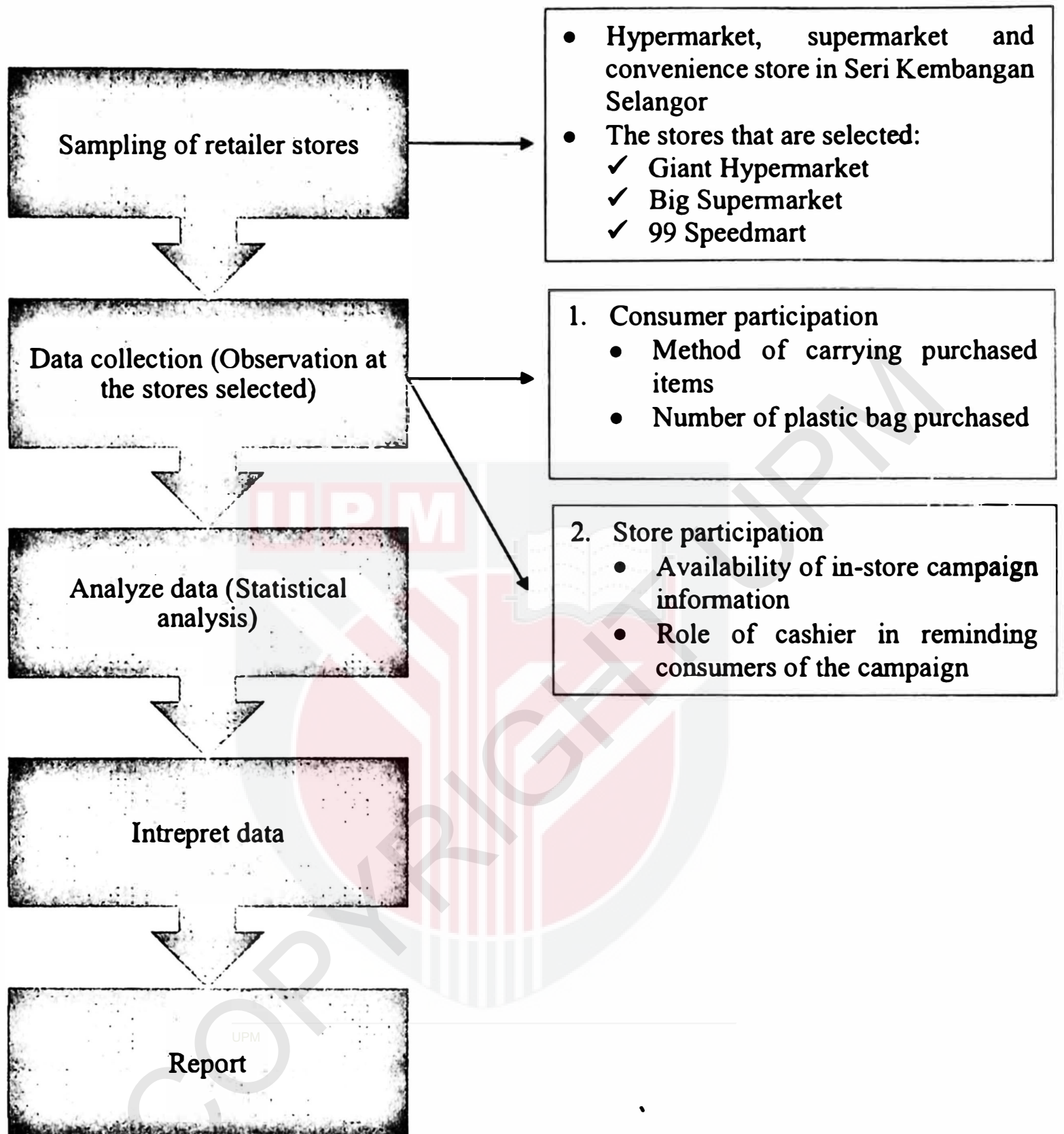


Figure 3.1: Research flow of the study

3.5 Instrumentation

3.5.1 Structured observation form

A structured observation form was designed and developed bearing the essential criteria for study to identify important key behaviours and that consumers behaviour could be easily noted and recorded. This structured observation form allows ease and standardization of documenting the information. The observation form was adopted and modified from a study done by Asmuni et al. (2015). This observation form comprised of 4 parts where the first part collect general information such as date, time, location, type of retailer, weather and also days of shopping. The next following parts were divided into 3 sections which are section A, B, and C. Section A collect data on socio-demographic of consumers such as gender, ethnic group and whether they come alone or in group. Section B collect data on store participation in the campaign in terms availability of in-store campaign information and the involvement of store cashiers in informing and reminding customers on the store's participation in the campaign. Section C collect data on consumers participation in the campaign where observation on method of carrying purchased items and numbers of plastic bag purchased will be recorded in the form.

3.6 Consumer behavior observation

1. In the observation, the researcher observed the behavior of consumer and his or her interaction with the cashier of the store during purchase transaction. The element that was observed in this study are as follow:
 - i. The consumer participation level in the “No Plastic Bag Campaign“ was observed in terms of method of carrying purchased items and number of plastic bag purchased.
 - ii. The retailer participation in the campaign also was observed in terms of the availability of in-store campaign information, the involvement of store cashiers in informing and reminding customers on the store’s participation in the campaign.
 - iii. The consumer participation also was observed by the socio-demographic characteristics such as ethnic group, gender and whether consumer shopped alone or in group. According to Lakshmi, Niharika & Lahari (2017), gender is one major factors that can influence a consumer’ purchasing behavior where men and women approach shopping with different motives, perspectives, rationales, and considerations. A study by Lee (2009) in Hong Kong shows that female adolescents scored significantly higher in environmental attitude, environmental concern, perceived seriousness of environmental problems, perceived environmental responsibility, peer influence and green purchasing

behavior than male adolescents in Hong Kong. On the other hand, Vida, Dmtirovic & Obadia (2008) stated that ethnic group has a direct effect on both consumer ethnocentrism and on domestic purchase bias.

- iv. The consumer participation also was observed by the days of shopping (i.e. weekdays, weekend, public holiday, payday). According to Anic and Radas (2006), shopping day does influence purchasing outcomes in such way that shoppers coming to store on Saturday purchased more items and spent more money than consumers shopping on other days.
2. The observation information was recorded on a structured observation form that allows ease and standardization of documenting of the information. During the observation, observer stands or sits very close to the counter or store cashier and observes the communication and behavior of the store cashier and consumer during transaction of merchandise purchased. An observation began when a consumer approached the counter and ended when the consumer left the counter after they purchased the goods. The observers completed the observation form by filling it in based on what he or she observed (Asmuni et al., 2015).
 3. The following criteria were used for applying observation as a research technique (Shin & Weng, 2017):
 - i. The phenomenon under investigation is a social process or a mass activity;
 - ii. The phenomenon under investigation is easily observable;
 - iii. The phenomenon under investigation occurs at a subconscious level; and

- iv. The consumer under investigation is either unable or unwilling to communicate directly with the research.

3.7 Calculation of GHG and its contribution to health risk

1. Calculation of Greenhouse Gases (GHG) emission was made based on inventory data of plastic bag air emissions by Ruban, 2012.
2. Table 3 below shows the amount of air emissions produced by plastic bags which are presented in kilograms (kg) related to the production of 1000 units of plastic bags

Table 3.1: Amount of air emissions produced by plastic bags

No.	Air emissions	Amounts (kg)
1.	Carbon monoxide (CO)	0.0081
2.	Carbon dioxide (CO ₂)	0.4094
3.	Methane (CH ₄)	3.2629×10^{-5}
4.	Nitrogen monoxide (NO)	1.5657×10^{-5}
5.	Nitrogen dioxide (NO ₂)	0.0041
6.	Sulfur dioxide (SO ₂)	0.0005

3. The calculation for amount of plastic bag GHG emission by consumers observed during the “No Plastic Bag Campaign” is as follows:

Plastic bags GHG Emission

*= Numbers of plastic bag purchased by consumer X amount of plastic bag air emissions
(CO, CO₂, CH₄, NO, NO₂, SO₂)*

4. Based on the result of GHG calculation obtained, the health risk associated with the highest amount of air emission obtained will be further discussed in the discussion part.

3.8 Statistical Analysis

All data has been analyzed using software SPSS version 22 (Statistical Package for Social Sciences). The descriptive statistical analysis was performed to obtain frequency and percentage for socio-demographic variables, retailer participation, and consumer participation (method carry purchased items and number of plastic bag purchased). Chi-square test was used to determine the association between consumer participation (method carry purchased items and number of plastic bag purchased) with type of retailers, socio-demographic and days of shopping.

3.9 Ethical Consideration

The ethical approval was obtained from the Ethic Committee for Research Involving Human Subject, University Putra Malaysia (JKEUPM). The consumers involved in this study was not approached by researcher during their purchasing session since this study is a non-participant observational study. No videos or pictures of consumer was taken in this study. Lastly, no biological sample was taken from the subjects of this study.



CHAPTER 4

RESULT

4.1 Socio demographic of consumers observed.

Table 4.1 shows the socio demographic background of consumers observed in three type of retailers which are hypermarket (i.e. Giant), supermarket (i.e. Big 10), and convenience store (i.e. 99 Speedmart) in this study. In total, 360 consumers (120 consumers for each retailers) were observed. Majority of the consumers observed were male (N = 216, 60%) compared to female (N = 144, 40%).

Majority of the consumers observed in this study were Malay (N = 235, 65%), followed by 23% Chinese (N = 81) and 12% Indian (N = 44). From the observation, most of the Malays in the study area were shopped at the hypermarket (40%) and supermarket (38%) while the Chinese (59%) and Indian (50%) mainly do their shopping at the convenience store.

Majority of the consumers shopping alone (N = 245, 68%), especially in the convenience store (N = 100, 41%). Meanwhile, 115 consumers or 32% observed in this study were shopped in group especially in the hypermarket (N = 71, 62%). The Chi-square test shows significant difference of the ethnic group ($\chi^2 = 47.880$, $p = <0.001$) and shopping alone or in group ($\chi^2=61.663$, $p<0.001$) by type of retailers.

Table 4.1: The socio demographic background of consumers observed in three type of retailers.

		Total (N = 360)		Type of retailer						χ^2 (p value)
				Hypermar ket (n=120)		Supermar ket (n=120)		Convenience store (n=120)		
		n	%	n	%	n	%	n	%	
Gender	Male	216	60	71	59.2	68	56.7	77	64.2	1.458 (0.482)
	Female	144	40	49	40.8	52	43.3	43	35.8	
Ethnic group	Malay	235	65	95	40	90	38	50	22	47.880 (<0.001)**
	Chinese	81	23	18	22	15	19	48	59	
	Indian	44	12	7	16	15	34	22	50	
Shopped alone or in group	Alone	245	68	49	20	96	39	100	41	61.663 (<0.001)**
	In group	115	32	71	62	24	21	20	17	

**p-value <0.001 is statistically significant, Chi-square test of comparison.

4.2 Retailers participation in the “No Plastic Bag Campaign”.

Table 4.2 shows the retailers participation in the “No Plastic Bag Campaign”. Three parameters were assessed as retailers participation consist of the availability of in-store campaign information, the involvement of store cashiers in informing and reminding customers on the plastic bag purchase. Throughout the observation, cashiers in all retailers have informed the customer that no plastic bag is given and they need to purchase for the plastic bag in the 360 observations in this study.

As for the in store campaign, the information was available for the hypermarket and supermarket stores. However, no campaign information was observed available in the convenience store.

Table 4.2: Descriptive summary of retailers participation in the ‘No Plastic Bag Campaign’ (N = 360).

Variables	Type of retailers		
	Hypermarket (n=120)	Supermarket (n=120)	Convenience store (n=120)
Does cashier ask customer if he/she want <u>plastic bag</u>?	Yes	Yes	Yes
Does cashier informed customer that no plastic bag is given/customer has to pay 20 sen for a <u>bag</u>?	Yes	Yes	Yes
Is there any in store campaign information?	Yes	Yes	No

4.3 Consumer participation level in the “No Plastic Bag Campaign” by type of retailers, socio demographic and days of shopping.

Table 4.3 shows the descriptive summary of consumer participation in the plastic bag campaign. Majority of the consumers observed (N = 222, 62%) participate in the plastic bag campaign while 138 consumers (38%) were not participate. The highest number of participation was in the convenience store (N = 83, 69%), followed by hypermarket (N = 77, 64%) and supermarket (N = 62, 52%). Male were the majority participate (N = 139, 64%). Among the ethnic group, majority of the Chinese (N = 61, 75%) participate in the campaign followed by Malays (N = 138, 59%) and Indian (N = 23, 52%). Most of the shoppers who shopped alone participate in the campaign (N = 148, 60%). The highest number of shoppers who participate in the campaign were doing their shopping on weekdays (N = 67, 74%) followed by payday (N = 54, 60%), weekend (N = 52, 58%) and public holidays (N = 49, 54%).

Majority of consumers who participate in the campaign carry their purchased item with bare hand (N = 146, 66%). Other method that was used was cart (N = 55, 25%) and eco-friendly bag (N = 21, 9%) (Figure 4.1).

**ALTERNATIVES METHOD OF CARRYING
PURCHASED ITEMS BY CONSUMERS (N=222)**

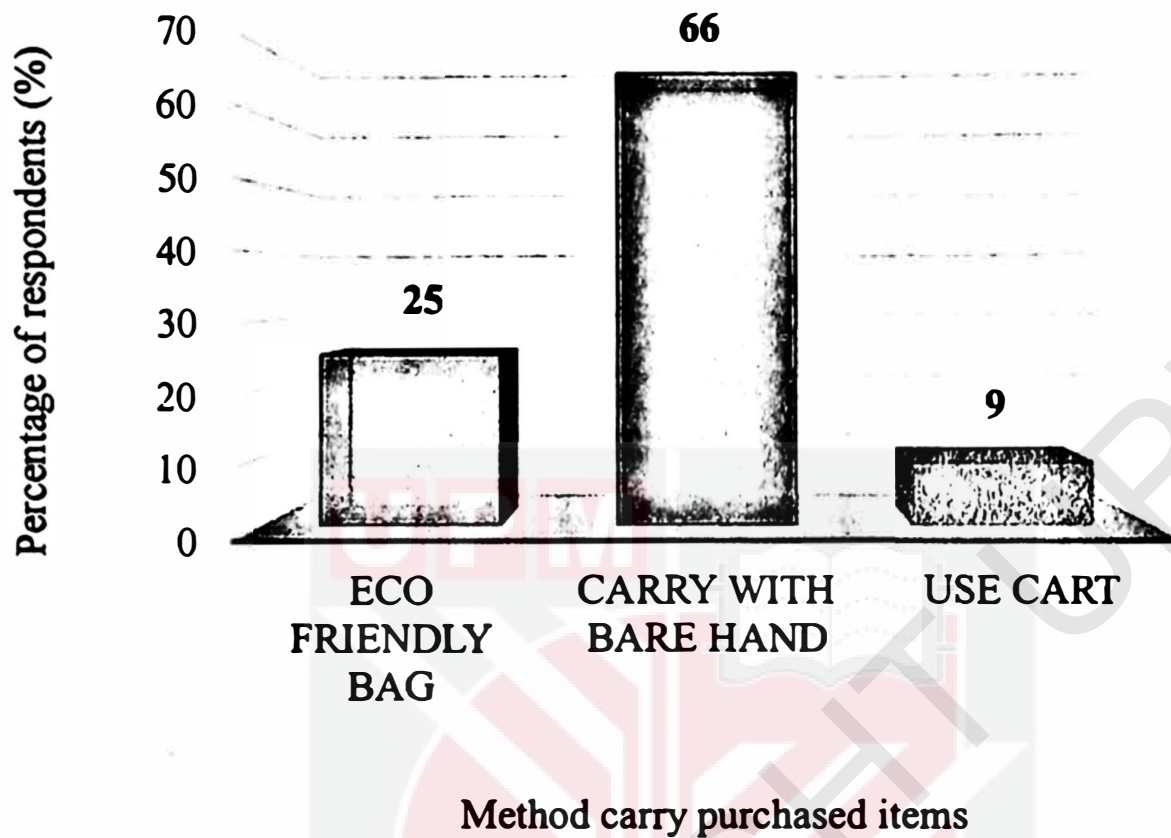


Figure 4.1: Alternatives method of carrying purchased items

From the total consumers who carry purchased items with bare hand, most of them shopped at the convenience store (N = 79, 95%). Male are those in this group (N = 95, 68%). Consumers who shopped alone (N = 123, 83%) more preferred to carry purchased items by bare hand compared to consumers who come in group (N = 23, 31%). Most of these consumers were shopping on the weekdays (N = 42, 63%).

Majority of the consumers who used cart to carry their purchased items were observed in the hypermarket (N = 49, 64%). Most of them are male (N = 31, 22%) and Malay (N = 38, 28%). Consumers shopped in group were more preferred to use cart (N =

38, 51%) compared to consumers who come alone (N = 17, 12%). The highest number of consumers who carry purchased items with cart were doing their shopping on weekdays as well (N = 19, 28%).

For consumers who used eco-friendly bag, majority of them were observed in the hypermarket (N = 19, 25%). most of them are male (N=13, 9%). Malay is dominant (N = 17, 12%). Consumers who shopped in group (N = 17, 18%) use eco-friendly bag more compared to consumers who come alone (N = 8, 5%). Most of them were shopped during payday (N = 7, 13%).

Meanwhile, the highest non-participation of the plastic bag campaign was observed in the supermarket (N = 58, 48%), followed by hypermarket (N = 43, 36%) and the least at the convenience store (N = 37, 31%). Female were among the highest not participate in the campaign (N = 61, 42.4%). Among the ethnic group, majority that did not participate in the campaign were Malay (N = 97, 41%) followed by Indian (N = 21, 48%) and Chinese (N = 20, 25%). Out of 245 consumers who came alone, 40% (N = 97) of them did not participate in the campaign while 36% out of 115 consumers (N =41) who came in group, did not participate. The highest number of non-participation was observed on the public holidays (N = 41, 46%), a slightly higher value compared to the weekend (N = 38, 42%) and payday (N = 36, 40%).

Table 4.3: Descriptive summary for consumers participation level in the no plastic bag campaign by type of retailers, socio demographic, and days of shopping.

Variables		Not participate (n=138)		Participate (n = 222)		Bring own eco-friendly bag (n = 21)		Carry with bare hand (n = 146)		Use cart (n = 55)	
		n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
		Type of retailer	Hypermarket (n=120)	43	35.8	77	64.2	19	24.7	9	11.7
	Supermarket (n=120)	58	48.3	62	51.7	1	1.6	58	93.5	3	4.9
	Convenience store (n=120)	37	30.8	83	69.2	1	1.2	79	95.2	3	3.6
Gender	Male (n=216)	77	35.6	139	64.4	13	9.4	95	68.3	31	22.3
	Female (n=144)	61	42.4	83	57.6	8	9.6	51	61.5	24	28.9
Ethnic group	Malay (n 235)	97	41.3	138	58.7	17	12.4	83	60.1	38	27.5
	Chinese (n=81)	20	24.7	61	75.3	2	3.3	44	72.1	15	24.6
	Indian (n=44)	21	47.7	23	52.3	2	8.7	19	82.6	2	8.7
Come alone or in group	Come alone (n=245)	97	39.6	148	60.4	8	5.4	123	83.1	17	11.5
	In group (n=115)	41	35.7	74	64.3	13	17.5	23	31.1	38	51.4
	Weekdays (n=90)	23	25.6	67	74.4	6	9.0	42	62.7	19	28.3
Days of shopping	Weekend (n=90)	38	42.2	52	57.8	4	7.7	36	69.2	12	23.1
	Public Holiday (n=90)	41	45.6	49	54.4	4	8.2	33	67.3	12	24.5
	Payday (n=90)	36	40.0	54	60.0	7	13.0	35	64.8	12	22.2

Table 4.3.1 shows the numbers of plastic bag purchased by consumers during “No Plastic Bag Campaign” by type of retailers, socio demographic and days of shopping. Overall, the analysis has shown that the number of plastic bag purchased in all observations was low, ranged between 1 to 2 plastic bags. Out of 138 of consumers who purchased plastic bag while shopping, majority of them purchase a minimum 1 plastic bag (N = 102, 74%), followed by 19.5% or 27 consumers observed purchased 2 plastic bags and only 8 of the consumer used more than 3 plastic bags.

Most of the consumers who purchased a minimum 1 plastic bag were observed at the supermarket (83%), followed by the convenience store (78%) and hypermarket (58%). They are mostly male (77%). Consumers who shopping alone purchased a minimum 1 plastic bag more (85%) compared to those who come in group (49%). Most of them shopped on payday (89%) and weekend (87%).

Consumers who purchased 2 plastic bags are mostly shopped at the hypermarket (26%), followed by convenience store (22%) and hypermarket (14%). They are mostly female (23%). Large part of consumers who purchased 2 plastic bags were Chinese (30%), followed by Malay (20%) and Indian (10%). They shopped alone (14%) and mainly shopped on public holiday (32%).

Table 4.3.1: Descriptive summary for numbers of plastic bag purchased by consumers during the “No Plastic Bag Campaign

Variables		Numbers of plastic bag purchased (N = 138)									
		1 plastic bag (n = 102)		2 plastic bag (n = 27)		3 plastic bag (n = 6)		4 plastic bag (n = 2)		5 plastic bag (n = 1)	
		n	%	n	%	n	%	n	%	n	%
Type of retailer	Hypermarket (n=43)	25	58.1	11	25.6	4	9.3	2	4.7	1	2.3
	Supermarket (n=58)	48	82.8	8	13.8	2	3.4	0	0.0	0	0.0
	Convenience store (n=37)	29	78.4	8	21.6	0	0.0	0	0.0	0	0.0
Gender	Male (n=77)	59	76.6	13	16.9	3	3.9	1	1.3	1	1.3
	Female (n=61)	43	70.5	14	23.0	3	4.9	1	1.6	0	0.0
Ethnic group	Malay (n=97)	71	73.2	19	19.6	5	5.2	1	1.0	1	1.0
	Chinese (n=20)	13	65.0	6	30.0	1	5.0	0	0.0	0	0.0
	Indian (n=21)	18	85.7	2	9.5	0	0.0	1	4.8	0	0.0
Come alone or in group	Come alone (n=97)	82	84.5	14	14.4	0	0.0	0	0.0	1	1.0
	In group (n=41)	20	48.8	13	31.7	6	14.6	2	4.9	0	0.0
	Weekdays (n=23)	20	87.0	3	13.0	0	0.0	0	0.0	0	0.0
Days of shopping	Weekend (n=38)	28	73.7	7	18.4	2	5.3	1	2.6	0	0.0
	Public Holiday (n=41)	22	53.7	13	31.7	4	9.8	1	2.4	1	2.4
	Payday (n=36)	32	88.9	4	11.1	0	0.0	0	0.0	0	0.0

4.4 Association between type of retailers, socio-demographic, and days of shopping with consumer participation level.

Table 4.4 shows the association between the participation level with type of retailers, socio-demographic, and days of shopping. There is significant association between consumer participation with the type of retailers ($\chi^2 = 8.226$, $p=0.016$), where the highest participation was observed in the convenience store. The participation level also associated with the ethnic groups ($\chi^2=8.881$, and $p=0.012$) where Chinese was observed participate more on the campaign (N = 61, 75.3%). Days of shopping was associated with the participation level ($\chi^2=8.884$, $p=0.031$) where high participation was observed during weekdays (N = 67, 74.4%).

The statistical analysis shows no significant association was obtained between participation with gender ($\chi^2=1.647$, $p=0.199$) and whether the consumer come alone or in group ($\chi^2=0.514$, $p=0.473$).

Table 4.4: Association between type of retailers, socio-demographic, and days of shopping with consumer participation level.

Variables		Consumer participation, n(%)		χ^2	p-value
		Yes	No		
Type of retailers	Hypermarket	77(64.2)	43(35.8)	8.226	0.016*
	Supermarket	62(51.7)	58(48.3)		
	Convenience store	83(69.2)	37(30.8)		
Gender	Male	139(64.4)	77(35.6)	1.647	0.199
	Female	83(57.6)	61(42.4)		
Ethnic groups	Malay	138(58.7)	97(41.3)	8.881	0.012*
	Chinese	61(75.3)	20(24.7)		
	Indian	23(52.3)	21(47.7)		
Come alone or in group	Come alone	148(60.4)	97(39.6)	0.514	0.473
	In group	74(64.3)	41(35.7)		
Days of shopping	Weekdays	67(74.4)	23(25.6)	8.884	0.031*
	Weekend	52(57.8)	38(42.2)		
	Public Holiday	49(54.4)	41(45.6)		
	Payday	54(60)	36(40)		

*p-value <0.05 is statistically significant, Chi-square test.

Table 4.4.1 shows the association between type of retailers, socio demographic and days of shopping with the number of plastic bag purchased during the observations period. From the total of 138 observations, 129 of the consumers purchased 2 or less plastic bags, and only 9 consumers purchased more than 3.

There is a significant association between type of retailers and number of plastic bag purchased ($\chi^2=17.736$, $p=0.001$) where consumers in the supermarket were the highest group (N = 56, 43.4%). Significant association also was observed between the number of bag purchased with the condition of the consumers whether they shopped alone or in group ($\chi^2=16.024$, $p<0.001$). Consumers who shopped alone was among those who significantly purchased a minimum 2 plastic bags (N = 96, 74.4%) during the observation.

Days of shopping ($\chi^2=17.964$, $p=0.006$) also was associated with the number of plastic bag purchased where those who shopped during payday (N = 36, 27.9%), weekend (N = 35, 27.1%) and public Holiday (N = 35, 27.1%) lead the numbers.

There is no significant association between gender ($\chi^2=1.647$, $p=0.439$) and ethnic group ($\chi^2=9.145$, $p=0.058$) with the number of plastic bag purchased.

Table 4.4.1: Association between type of retailers, socio-demographic, and days of shopping with number of plastic bag purchased.

Variables		Number of plastic bag purchased		p-value
		Buy < 2 plastic bags (n = 129)	Buy > 3 plastic bags (n = 9)	
Type of retailers	Hypermarket	36(27.9)	7(77.8)	17.736 0.001**
	Supermarket	56(43.4)	2(22.2)	
	Convenience store	37(28.7)	0	
Gender	Male	72(55.8)	5(55.6)	1.647 0.439
	Female	57(44.2)	4(44.4)	
Ethnic groups	Malay	90(69.8)	7(77.8)	9.145 0.058
	Chinese	19(14.7)	1(11.1)	
	Indian	20(15.5)	1(11.1)	
Come alone or in group	Come alone	96(74.4)	1(11.1)	16.024 <0.001**
	In group	33(25.6)	8(88.9)	
Days of shopping	Weekdays	23(17.8)	0	17.964 0.006*
	Weekend	35(27.1)	3(33.3)	
	Public Holiday	35(27.1)	6(66.7)	
	Payday	36(27.9)	0	

*p-value <0.05 is statistically significant, Chi-square test.

4.5 Calculation for plastic bag GHGs emission based on amount of plastic bags purchased by consumers observed during the “No Plastic Bag Campaign”.

Figure 4.2 shows the fraction of greenhouse gases (GHGs) emission from the total number of plastic bag purchased by the consumer in the observation. Overall, the highest fraction of GHG was contribute by Carbon dioxide (CO₂) (96.9%) followed by Carbon monoxide (CO) (1.9%) and Sulphur dioxide (SO₂) (1%). The least GHG was Nitrogen dioxide (NO₂), Sulphur dioxide (SO₂), Methane (CH₄) and Nitrogen monoxide (NO).

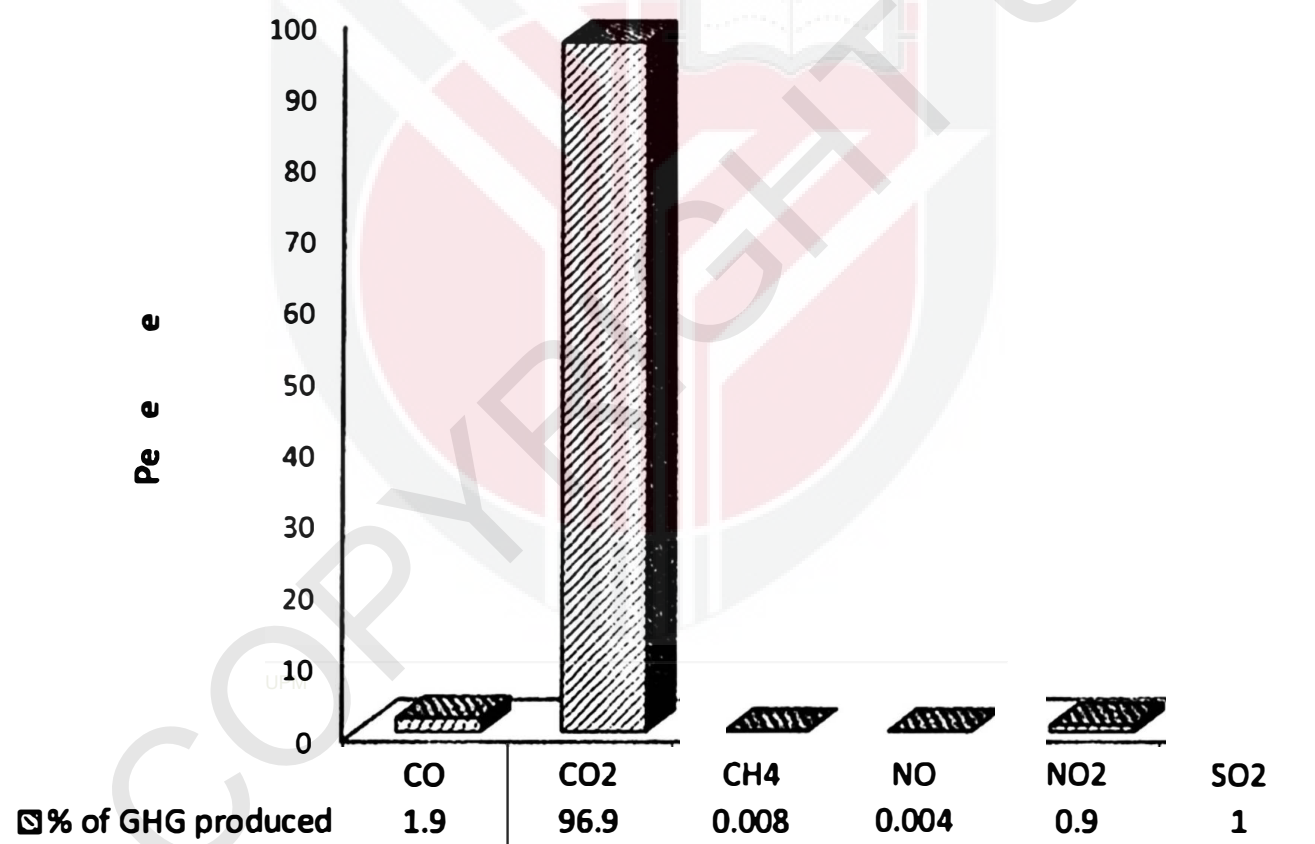


Figure 4.2: The fraction of GHG emission (in percentage) from the number of plastic bag purchased

Table 4.5: Calculation for plastic bag GHGs emission based on amount of plastic bags purchased by consumers observed during the “No Plastic Bag Campaign”.

Bil.	Types of air emission	Calculation	Amount GHGs emission	Percentage (%)
1.	Carbon monoxide (CO)	= 187×0.0081 kg	1.51 kg	1.9
2.	Carbon dioxide (CO ₂)	= 187×0.4094 kg	76.56 kg	96.9
3.	Methane (CH ₄)	= $187 \times (3.2629 \times 10^{-5})$ kg	6.10×10^{-3} kg	0.008
4.	Nitrogen monoxide (NO)	= $187 \times (1.5657 \times 10^{-5})$ kg	2.93×10^{-3} kg	0.004
5.	Nitrogen dioxide (NO ₂)	= 187×0.0041 kg	0.77 kg	0.9
6.	Sulfur dioxide (SO ₂)	= 187×0.0005 kg	0.09 kg	0.1
Total GHG emission			78.94 kg	100

CHAPTER 5

DISCUSSION, CONCLUSION & RECOMMENDATION

5.1 Discussion

5.1.1 Socio-demographic of consumers observed.

The first objective of this study was to determine the socio-demographic of the consumers in three type retailers in the study area. Through our observation, majority of the consumers were male, Malay, and shopped alone. This is normal population obtained in Selangor as according to Department of Statistic Malaysia, male population in Selangor is higher compared to female. The Malays was the predominant ethnic group in Peninsular Malaysia which constituted 63.1 % (Department of Statistic Malaysia, 2011). Most of the consumers shopped alone due to several reasons such as the convenience and comfortability of shopping alone and time factor. According to Borges, Chebat and Babin (2010) in their study about whether a shopping companion enhance the shopping experience in North America, they found out that consumers who shopping in groups visit more areas in a store and also make more purchases compared to those shopping alone. This prove that shopping in group will take more time since shoppers will tend to visit more areas in a store and make more purchases and maybe due to this factor the shoppers in our study prefer to shopping alone compared to in group because they want to take lesser time while shopping especially in rush hour.

5.1.2 Retailers participation in the “No Plastic Bag Campaign”.

The second objective of this study was to assess retailer participation in the “No Plastic Bag Campaign” through availability of in-store campaign information and the involvement of store cashiers in informing and reminding the customers about the campaign. From the observation, the in-store campaign information was available only in the hypermarket and supermarket stores in a form of posters. This was a good effort from the stores that can be implemented by the convenience store. According to Laurens (2012), program information is one way pro-environmental behavior can be encourage among consumers for them to participate in the campaign. The information about the campaign can generate awareness on the harmful effects of plastic bags and the problems caused by plastic bags and in turn can affect consumer’s behavior to be more cooperative and supportive to the program.

Cashiers at all stores were observed constantly reminding their customers about the campaign that were accompanied by their stores and the charge of the plastic bag they requested. This indicates the cashiers and the management of the stores are complies with the campaign's instructions from the authorities. This possibly derived from the continuous reminder and enforcement by the authority.

5.1.3 Consumer participation in the “No Plastic Bag Campaign”

The third objective of this study was to assess the consumer participation level by observing the method of carrying purchased items by different type of retailers

(hypermarket, supermarket, convenience store), socio-demographic factors (i.e. ethnic group, gender, come alone or in group), and days of shopping (i.e. weekdays, weekend, public holiday, payday).

The study found consumers' participation in the campaign in this study was relatively high given that about 62% out of 360 consumers observed were participated in the plastic bag campaign. The highest number of participation was in the convenience store and male were the majority participate. Among the ethnic group, majority of the Chinese participate in the campaign. Majority of the shoppers who come alone and shopped on weekdays participate in the campaign.

High participation level was probably due to the effect of plastic bag levy on the plastic bags purchased in the retail outlets. This was widely discussed in previous research as one of the successful approach that influences consumer behavior. For example, Asmuni et al., (2015) concluded that the charge for plastic bag has been 52.3% effective in making consumers to avoid the use of plastic bags in the Peninsular Malaysia as this percentage represents those who use reusable grocery bags or other means of carrying purchase items. Jakovcevic et al. (2014) in a study in Argentina also reported the plastic bag levy had caused a greater increase in consumer use of their own bag after the policy was introduced, in comparison to a supermarket where the charge was not introduced, or was introduced later in time.

A study in Ireland by Convery et al. (2007) also reported the effect of plastic bag levy on the use of plastic bags in retail outlets has been spectacular where a reduction in

the use was 90%, and an associated gain in the form of reduced littering and negative landscape effects. A study in Wales, England, considered the levy (charge) as very effective as the habit of bringing own bag has risen from 62% to 82% when they introduced the charge (Poortinga et al., 2013).

Despite of the success behavior change, few researchers also have reported that plastic bag levy is not effective in their study. For example, Dikgang, Leiman, & Visser, (2012) have measured the price elasticity of the demand for plastic bags in order to determine the effectiveness of the plastic bag levy in South Africa. They have made a conclusion that plastic bag levy is not effective since consumers were unaware of changes in price of plastic bags and plastic bag substitutes are very few and do not serve all purposes. Zen et al. (2013) in their study in Malaysia also conclude that the plastic bag levy has not been effective as consumers continue to forget to bring their own plastic bags for shopping.

Despite of the plastic bag levy, high participation in the campaign also could possibly due to the awareness on the harmful effects of plastic bag towards environment and human health among the consumers. However, this theory need to be further tested in future assessment as its not being studied in our observation. Respondent's interview and survey could possibly strengthen the theory of this factor in the participation of the campaign.

This study has observed that male have higher percentage of participation (64%) in the campaign compared to female. This result is contradict to a study by Lee (2009), in

Hong Kong which has conclude the female is significantly higher in environmental attitude, environmental concern, perceived seriousness of environmental problems, perceived environmental responsibility, peer influence and green purchasing behavior than male. Futhermore, according to a study by Wahab and Abdo (2010) about the effects of socio-demographic factors on environmental awareness in Oman, males show higher level of knowledge about environmental issues compared to females. This study also found that males were more concerned about environment and tend to engage more in environmental behaviors than females (Wahab and Abdo, 2010).

Consumers who shopping alone (67%) have higher participation in the campaign compared to those shopping in group (33%). This maybe due to the effects of social influence where consumers who shopping in group tend to be influenced by their shopping partners to not participated in the campaign. Futhermore, according to Borges et al., 2010, consumers who shopping in group usually make more purchases compared to those shopping alone thus required plastic bags to carry those purchased items.

For days of shopping, the highest number of shoppers who participate in the campaign were doing their shopping on weekdays (74%). This is contradict to a study by Anic and Radas (2006) about the impact of situational factors on purchasing outcome in Croatian hypermarket where it shows shoppers who coming to store on Saturday (weekend) purchased more items and spent more money than consumers shopping on other days. This study assess how store environment, social surroundings, time of purchase, shopping task and situational dimensions influence the amount of money spent and number of items purchased by shoppers (Anic and Radas, 2006). Shopping on

weekdays shown the respondents were in 'rush hour' mode compared to if they are shopped on weekend or holidays where they are more relaxed and more items being purchased that is difficult to carry without plastic bag.

In general, the number of plastic bag purchased in all observations was low, ranged between 1 to 2 plastic bags. This result may be influenced by the levy charged for each plastic bag (MYR 0.20 for a bag) thus make them think twice before purchasing plastic bags from the store. With the application of levy, consumers will aware the amount they need to pay if they purchase more plastic bags thus make them consider thoroughly before making any purchases of plastic bag from store. Consumers who purchased this plastic bags mostly come from consumers who shopped at supermarket and hypermarket. This shows that the levy charged for plastic bags may not considered as burden to them since the consumers who shops here maybe from the middle to high income group.

5.1.5 Association between type of retailers, socio demographic and days of shopping with consumer participation level

This study also assessed the association between type of retailers, socio-demographic characteristics, and days of shopping with consumer participation level. Results have determined significant association between consumer participation with the type of retailers, where the highest participation was observed in the convenience store. The location of the convenience store which is in a close distance to the residences area probably make it easier for the consumers to carry the purchased item without plastic bag. The convenience store is smaller and less variety of product and services compared to the

supermarket and hypermarket. It provides daily basic needs to cater certain small area in the residence area. The consumer who came in this store probably bought item in small quantity that makes it possible for them to carry without plastic bag or using their own bag.

They also may think that it is not worth to pay for the plastic bag levy since they can just carry their purchased items without plastic bag. According to DBS Research Group (2015), convenience store cater to the low income group and migrants population. There is also a possibility of the influence of the household income factors that influence this behavior as maybe they are in low-income groups and the application of levy for plastic bag considered as burden thus they avoided of paying the levy. However, further assessment need to be done to proof this.

The participation level also was associated with the ethnic groups where Chinese was observed participate more on the campaign. This finding similar to a study by Asmuni et al, 2015 in their study about public participation in no plastic bag day program in peninsular Malaysia where they concluded that Chinese have the highest participation since they are the most likely to bring own bag compared to Malay and Indian. The reason why Chinese have the highest participation in the campaign probably related to the value that has been in their daily life. This was supported by Fontaine and Richardson (2005) in their study about comparison of cultural values among major ethnic groups in Malaysia where they concluded that there are few significant differences in cultural-values between major ethnic groups in Malaysia (Malay, Chinese and Indian) which may affect their daily

life. This values mentioned by the study includes self-discipline, moderate, honouring parents, preserving public images, devout and reciprocating favours.

Days of shopping were associated with the participation level where high participation was observed during weekdays. Shopping on weekdays shown the respondents were in 'rush hour' mode compared to if they are shopped on weekend or holidays where they are more relaxed and more items being purchased that is difficult to carry without plastic bag. This probably explain the research findings where 74.4% who participate in the campaign were shopped on weekdays while majority of those who are not participate were shopped on weekend (N = 38, 42.2%), public holiday (N = 41, 45.6%) and payday (N = 36, 40%).

The statistical analysis shows no significant association was obtained between participation with gender and whether the consumer shopped alone or in group.

There is a significant association between number of plastic bag purchased with type of retailers (high in supermarket), the condition of the consumers (shopped alone) and days of shopping (payday, weekend, public holiday). Hypermarket is popular among consumers with middle and high level income. Since they can afford the levy charged for plastic bag and find it is not a burden to them, this may derived them to not participate in the campaign by purchasing plastic bag from the store. Consumers who shopped alone was among those who significantly purchased a minimum 2 plastic bags (N = 96, 74.4%). There is no significant association between gender and ethnic group with the number of plastic bag purchased.

5.1.7 Calculation of GHGs and Health risk associated

The last objective of this study was to calculate the Greenhouse Gas emission (GHG) from the plastic bag purchased and its contribution to health risk. Each plastic bag purchased by consumers will end up releasing GHGs emission to the atmosphere since plastic bag take a very long time to degrade and release this harmful gases during the degradation process. Calculation of GHGs emissions was made from the total amount of plastic bag purchased by consumers. Fraction of GHG contributed by CO₂ is the highest (96.9%).

According to Union of Concerned Scientist (2017), CO₂ remains in the atmosphere longer than the other major heat-trapping gases. High concentration of CO₂ in the atmosphere can lead to various problems since it is not only a gas which affects heat flow to and from the atmosphere of the earth, but is also a serious pollutant in its own right. Breathing too much CO₂ results in high levels of CO₂ in the blood (hypercapnia) associated with a decrease in blood pH (increased acidity) resulting in a condition known as acidosis. Blood and tissue pH produce effects on the respiratory, cardiovascular, and central nervous systems (CNS). (Bierwirth, 2016).

Futhermore, GHGs also contributed to global warming. Global warming give impact to human health where Patz and Kovats (2002), have identified six major areas of concern to human health in response to this ongoing climate change. They call these the “hotspots in climate change and human health” which includes heat waves, rise in sea levels, flooding, drought, malnutrition, El Nino effects, and highland malaria. Most of the

above mentioned effects are a result of the direct consequences of global warming. However, there are some indirect effects of global warming as well, which can be very serious due to the rising global temperature. One of the indirect effects is more areas of the world will become favourable for the survival of tropical insects like mosquitoes (Nabi & Qader, 2009). Some species of mosquito act as disease vectors and are responsible for the spread of illnesses like Malaria, Dengue fever, and Yellow fever (Zell, 2004). Hence, global warming can increase the incidence of these diseases.

5.1.8 Study strengths and limitations

The strength of this study is it used quantitative observation method, where researcher was allowed to observe the subjects in their normal social situations and to avoid the “Hawthorne Effect”. Hawthorne Effect is a change in behaviour as a motivational response to the interest, care, or attention received through participant observation or assessment (Denzin and Lincoln, 2000).

Findings of this study provide baseline information to the authority on the effectiveness of the campaign in changing consumer’s behaviours to reduce the usage of plastic bags. It also assists the authority in developing alternative ways or an improved campaign to encourage further reduction of the plastic bag used.

While conducting this research, we have come across with some limitations. One of the limitation is the difficulty in obtaining the accurate information since the researcher only observed the subjects behaviour from a distance, without interviewing them for

further information, so the data may only reflect the assumptions and interpretations of the researcher. The subjects observed have various personalities and characteristic different from one another which may affect their behaviours but the researcher only can observed from what he saw only. Lastly, with large amounts of subjects to be observed (360 consumers), limited time became a constraint to researcher to collect the data for the study.

5.2 Conclusion

- a) In conclusion, the “No Plastic Bag Campaign” in Selangor can be considered successful as high numbers of participation (62% out of 360 consumers) was observed from consumers while only 32% not participate. This shows that the application of levy for plastic bag somehow have changed shoppers attitude to-wards more pro-environmental behaviours.
- b) There is significant association between consumer participation participation with the type of retailers, where the highest participation was observed in the convenience store, the ethnic groups where Chinese was observed participate more on the campaign and days of shopping where high participation was observed on weekdays.
- c) There is a significant association between number of plastic bags purchased with type of retailers where consumers in the supermarket were the highest group, consumers who shopped alone was among those who significantly purchased a minimum 2 plastic

bags, and days of shopping where those who shopped during payday, weekend and public holiday lead the numbers.

- d) Lastly, fraction of GHG from the plastic bags purchase was contributed by CO₂ (96.9%) followed by Carbon monoxide (CO) (1.9%) and Sulphur dioxide (SO₂) (1%). The least GHG was Nitrogen dioxide (NO₂), Sulphur dioxide (SO₂), Methane (CH₄) and Nitrogen monoxide (NO).

5.3 Recommendation

For future research, to strengthen this study, researcher suggest that there is a need of respondents interview and collection of personal informations through survey directly from the respondents since in our study we can only collected data based on what we observed so the data only reflected what the researcher views. Informations gained from the interviews and surveys from the respondents could possibly strengthen the theory on why consumers participate in the campaign since researcher can directly ask the consumers why they attached to that behaviour. Futhermore, through interview and survey, socio-demographic data such as educational background, age and income level which might affect the participation in the campaign can be assessed. Researcher also suggest that future study measure the intention why consumers decided to participate or not participate in the campaign since intention may reflect actual behaviour. In addition, we suggest that in future this study should be done in states where the campaign has not been implemented yet so that a comparison on participation of consumer in the campaign

can be made between the states that have implemented the campaign and states who doesn't.

At present, the public are broadly debates on the management of plastic bag levy imposed on the public, whether they are returned to the environment or otherwise. A major concern has been raised on this issue that has been demanding for further clarification from the authority. This is also to avoid misuse of funds and injustice to the consumers. Thus, the authorities are advised to search for a suitable method for channelling this plastic bag levy to conserve the environment and provide this information to consumers so that the process is can be more transparent and provide the consumers with confidence to continue supporting this campaign.

This campaign should be continued and improved so that the environmental deterioration from the harmful effects of plastic bag towards our environments along with human health can be further minimized. Researcher believed that consumer participation in the campaign can be further increased if awareness program about plastic bag is increased. Some ideas is to build a culture of bringing own bags when shopping among consumers. Futhermore, the usage of social media can be effective to educate the public on the effects of plastic bags towards our world and the importance of changing their habit towards using less plas-tic bags. Lastly, retail stores in Malaysia should adopt the deposit basket system which was implemented in the AEON Co., Ltd., in Japan where shoppers can purchase a basket and bring it home together with their purchases and when they no longer need the basket, they can return it and have their deposit returned (Shin & Weng, 2017).

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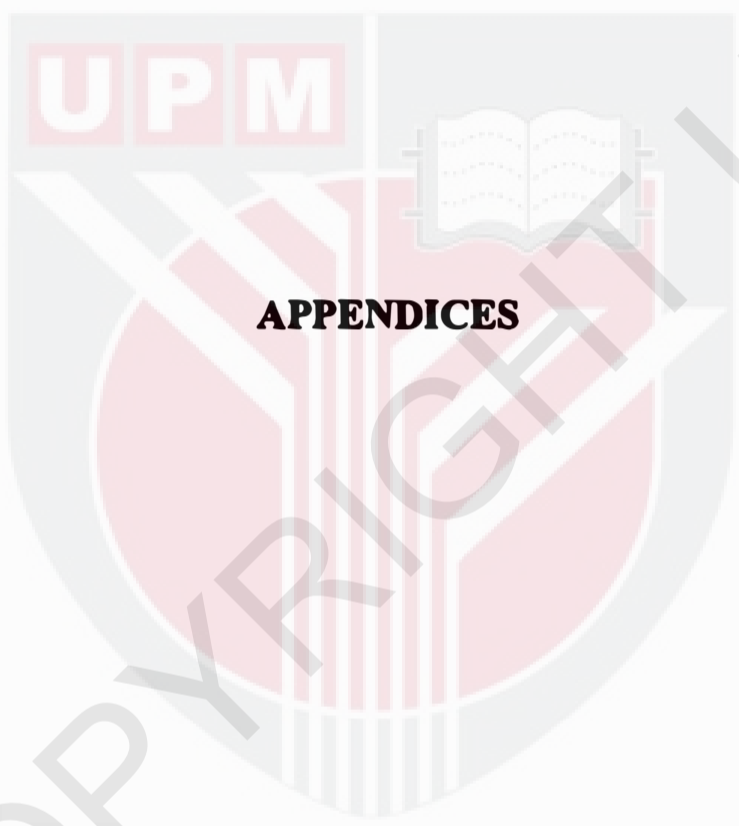
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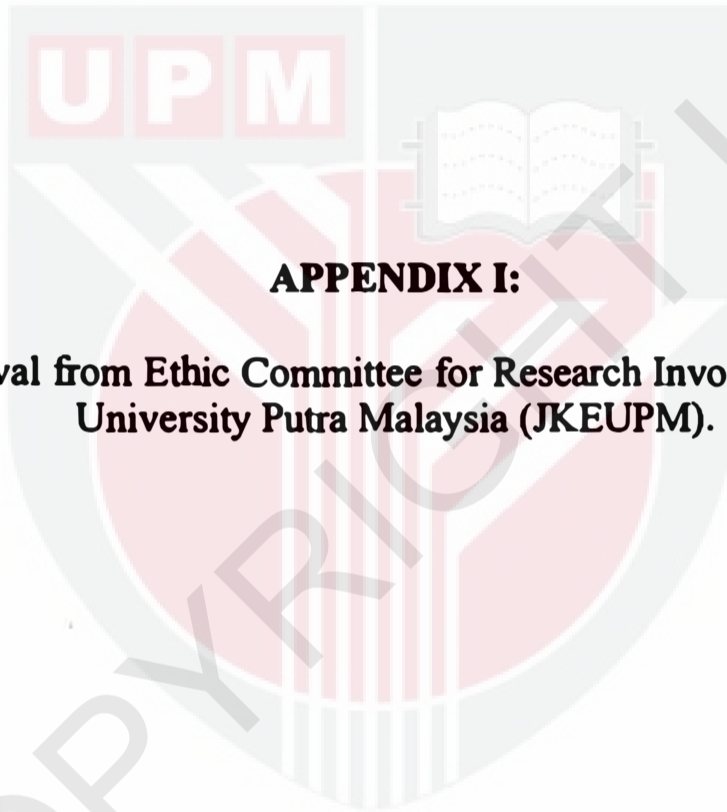
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APPENDICES

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APPENDIX I:

**The ethical approval from Ethic Committee for Research Involving Human Subject,
University Putra Malaysia (JKEUPM).**



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**ETHICS COMMITTEE FOR RESEARCH INVOLVING HUMAN SUBJECTS
(JKEUPM)
UNIVERSITI PUTRA MALAYSIA**

Research title	: Assessment of Consumer Participation in ' No Plastic Bag Campaign' in Selangor, Malaysia
Study Site	: Selangor, Malaysia
JKEUPM Ref No.	: JKEUPM-2017-213
Researcher	: Ahmad Shakir bin Mohd Ishak
Supervisor	: Dr. Sharifah Norkhadijah Syed Ismail

Documents received and reviewed with reference to the above study:

1. Ethics Application Form, Version 1 dated 17/11/2017
2. Proposal (English), Version 1 dated 17/11/2017
3. Curriculum Vitae of:
 - a. Dr. Sharifah Norkhadijah Syed Ismail

The University Research Ethics Committee, Universiti Putra Malaysia (JKEUPM) operates in accordance to the ICH-GCP Guidelines:

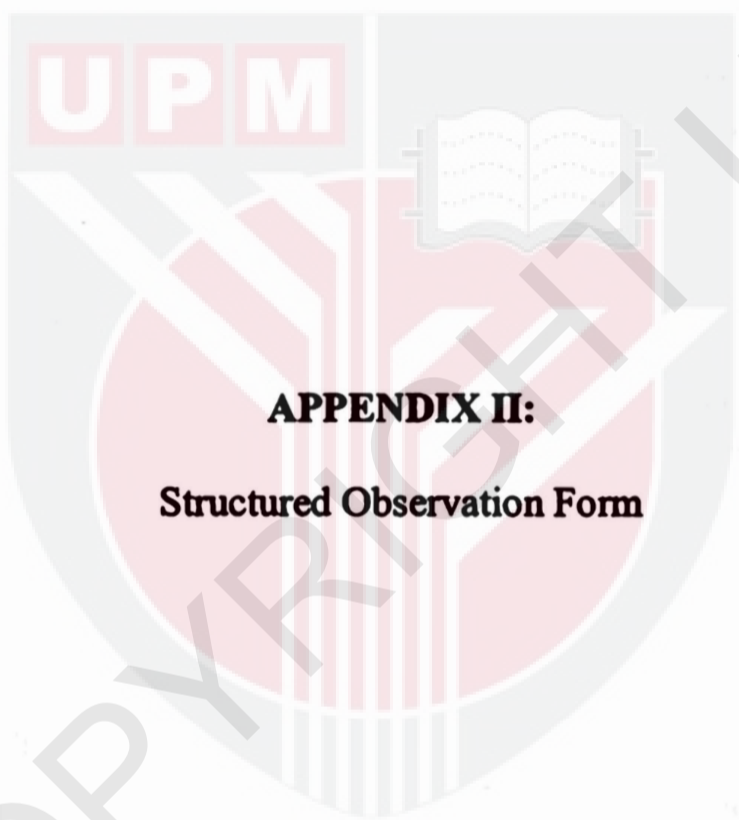
Decision by JKEUPM:

- Approved
- Permission MUST BE OBTAINED** from the respective hospitals/ institutions before conducting the research
- Disapproved

Please note that the approval is **VALID UNTIL 8 DECEMBER 2018**

Researchers should comply with the following:

- I. Complete a Study Final Report upon study completion (Form 3.2).
- II. Ethical approval is required in the case of amendments/ changes to the study documents/ study sites/ study team.
- III. Applicable for Clinical Trial Studies and Clinical interventional Studies only: Progress Report has to be submitted to JKEUPM at every 6 months from the date of approval (Form 3.1). Report occurrences of all Serious Adverse Events (SAEs), Suspected Unexpected Serious Adverse Reaction (SUSARs) and Protocol Deviation/ Violation at all JKEUPM approved sites to JKEUPM. SAEs are to be reported within 15 calendar days from awareness of event by



APPENDIX II:
Structured Observation Form

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STRUCTURED OBSERVATION FORM (CHECKLIST) FOR ASSESSMENT OF CONSUMER PARTICIPATION IN “NO PLASTIC BAG CAMPAIGN” AND ITS ASSOCIATION WITH GREEN HOUSE GASES EMISSION AND HEALTH RISK IN SELANGOR, MALAYSIA.

Date : _____	Time : _____	Location : _____
Type of retailer :	<input type="checkbox"/> Hypermarket <input type="checkbox"/> Supermarket <input type="checkbox"/> Mini market	
Days of shopping :	<input type="checkbox"/> Weekdays <input type="checkbox"/> Weekend <input type="checkbox"/> Public Holiday <input type="checkbox"/> Payday	
Weather :	<input type="checkbox"/> Sunny <input type="checkbox"/> Rainy	

SECTION A (SOCIO DEMOGRAPHIC)

1. Gender of consumer

Gender observation	Tick (✓)	Remarks
Male		
Female		

2. Ethnic group of consumer

Ethnic group observation	Tick (✓)	Remarks
Malay		
Chinese		
Indian		
Others		

3. Come alone or in group

Observation	Tick (✓)	Remarks
Come alone		
Come in group		

SECTION B (STORE PARTICIPATION IN CAMPAIGN)

Observation	Yes	No	Remarks
Does cashier ask customer if he/she wants plastic bag			
Does the cashier inform the customer that ‘no plastic bag is given’/‘customer has to pay 20 cents for a bag’?			
Are there any in-store “No Plastic Bag Campaign” information? (i.e; poster, pamphlet, etc)			

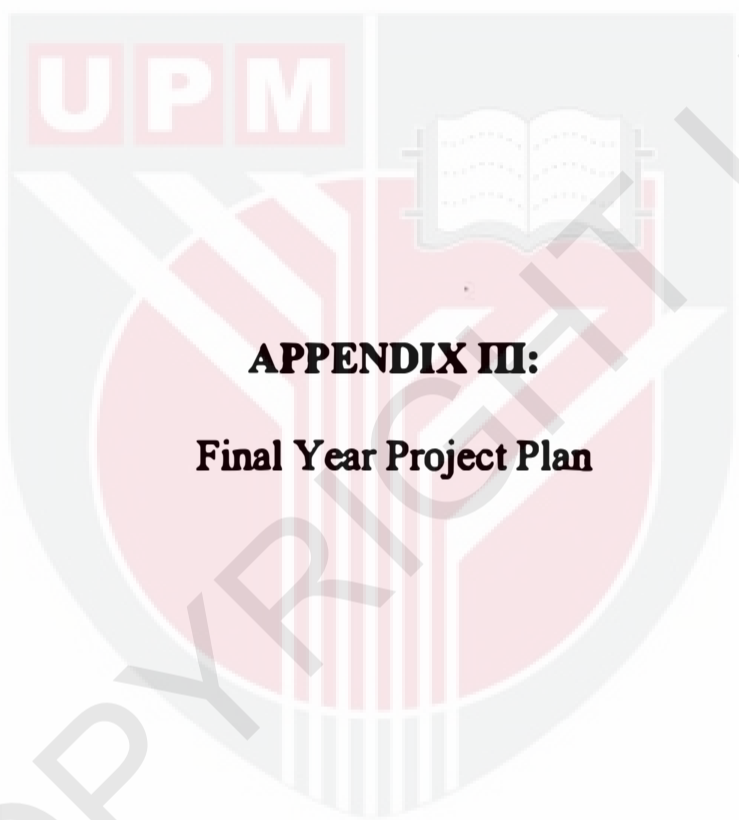
SECTION C (CONSUMER PARTICIPATION IN CAMPAIGN)

1. Method of carrying purchased items

Observation	Tick (✓)	Remarks
Consumer pays for the plastic bag (tax)		
Consumer brings own eco-friendly bag		
Consumer buys eco-friendly bag from the store		
Consumer use both plastic bag and eco-friendly bag		
Consumer do not pay for a bag and leave without a bag (Carry with bare hands)		
Consumer do not pay for a bag and leave without a bag (Carry items with cart)		

2. Number of plastic bag purchased & total levy paid

Observation	Tick (✓)	Remarks
No plastic bag purchased (MYR 0.00)		
1 plastic bag (MYR 0.20)		
2 plastic bags (MYR 0.40)		
3 plastic bags (MYR 0.60)		
4 plastic bags (MYR 0.80)		
5 plastic bags (MYR 1.00)		
More than 5 plastic bags (Above MYR 1.00)		



APPENDIX III:
Final Year Project Plan

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FINAL YEAR PROJECT PLAN (GANTT CHART) 2017/201

Month/Planning	September	October	November	December	January	February	March	April	May	June
Propose title for the project	✓									
Analyze title	✓									
Preparing proposal		✓	✓							
Proposal presentation				✓						
Data collection					✓	✓				
Analyze data						✓	✓			
Thesis writing								✓	✓	✓
Thesis submission										✓

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