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RESEARCH ARTICLE

The knowledge, awareness, attitude and motivational analysis of plastic waste and household perspective in Malaysia

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Abstract The focus of this study is to analyze the level of knowledge, awareness, and attitude toward plastic waste and to distinguish the key drivers that encourage the households in Kuala Lumpur, Malaysia, to participate in "No plastic campaign," This study used the logistic regression model to explain the factors that may affect the willingness to participate (WTP) of households in the campaign. In this study, it is found that 35 % of households are willing to participate in the campaign. The results of the study also indicate that people who are more informed and more convinced of their knowledge have a more positive attitude toward recycling than their counterparts do. Furthermore, this study provides additional evidence of the level and classification of importance of motivating factors for plastic recycling, using the modified average and coefficient of variation of the models. From the analysis, the factor "helps reduce landfill use" is found as the most important factor and the factor of "raising money for charity" is found as the least important factor that motivates households to participate in recycling. The determinations of the study suggest some strategies that could hold implications for government and households to boost them to participate in the campaign "No Plastic Bag."

Keywords No plastic bag campaign · Knowledge · Awareness · Attitude · Motivational factors · Logistic regression

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Introduction

Recycling means turning waste materials into financial, environmental, and societal resources (US Environmental Protection Agency 2012). Recycling has been widely accepted and recognized as a method of managing solid waste, because of its power to protect the environment, cut down transport costs and disposal of solid waste, and protract the life of landfills (Moh and Manaf 2014).

In any country's public perception, posture and behavior are significant elements that determine the success of the recycling program (Delistavrou et al. 2005). Although recycling is becoming mainstream in developing countries, consumer participation is yet far from the desired standards in these countries (Tilikidou 2001; Delistavrou 1999). In recent years, numerous research papers have recognized the significance of public perception, knowledge, awareness, attitude, and behavior toward environmental problems. They also reported that there was a breach between public perception, awareness, cognition, and behavior (Masud et al. 2015). In this sense, Schultz and Oskamp (1996) and Patchen (2006) studied the importance of cognition and attitudes as keys to better public adequate natural environment features. Leiserowitz (2007) also gave importance to public perception and attitude because of their part in future policies on environment and evolution. Attitudes are important measurements that mimic how people study their immediate surroundings

and respect environmental issues. Nevertheless, there have been few studies on how we can deal with the problems of awareness and fundamental knowledge.

Clearly, a suitable research to better understand consumer behavior recycling is needed, so that local authorities can proceed with segmentation and channel marketing efforts effectively (Shrum et al. 1994). Research outcomes are valuable for public offices because they can help design creative recycling strategies (McCarty and Shrum 1994; Tilikidou 2001); Gamba and Oskamp (1994). The immense bulk of research has been done in the USA and Western Europe. Attempts have been prepared to answer the query on how to propel consumers to reuse. However, few studies have been conducted in developing nations like Malaysia. Thus, this work points to present the existing state of knowledge and awareness of households and their attitude toward plastic waste and to identify important motivators that encourage households in Kuala Lumpur, Malaysia, to recycle plastic waste.

Background of the study

In the markets, plastic bags for shopping have been practiced widely by consumers. It is conceived as a consumer right and an important commercial appropriate component (Suh et al. 1994). Individual consumers prefer to hold plastic bags because they can easily bring their goods purchased without the load of carrying around reusable bags. But their improper disposal of plastic bags can do damage to the environment. Sometimes, plastic bags' emission of poisonous smoke is very dangerous to our health. It is also decreasing the ozone layer and creating the greenhouse gas effect. As a consequence, it directly increases the temperature of the global atmosphere.

Denmark was the first country which introduced compulsory levies on manufacturers of plastic bags in 1994. The policy is regarded as a smashing success because it is able to burn down the use of plastic bags by 66 % (Akullian 2006). In 2002, Ireland instituted a tax on suitcases. Nevertheless, unlike Denmark, Ireland introduced a rate of 15 cents in plastic bags to consumers at the point of sale. According to Convery et al. 2007, the calculated demand for plastic bag reduction was about 90 % over the following twelvemonth. More lately, several other European and Middle Eastern nations (France, Paris, Belgium, and Israel) and countries have stacked in rules or encouraged voluntary initiatives to determine the use of plastic bags. Australian and British governments have also commended that the supermarket should increase the price of plastic bags or face legislation if their use does not significantly decrease. In Portugal, a study comparing consumer behavior in supermarkets has instituted a nominal charge of 2 cents a shopping bag with consumer behavior in others that do not, and it has been found that consumers utilize far fewer bags and do them to a capacity when there is an explicit tax on the use (Luis and Spinola 2010).

USA also introduced a plastic ban in some urban centers. For instance, in New York and Toronto, tariffs have been levied on the utilization of plastic bags of 6 pence and 5 pence, with effect from November 2008 and June 2009, respectively. Legislators have assigned to fund a higher rate to facilitate a move toward a new exchange traded fund product development. Other cities in North America and San Francisco (2007), Oakland (2010), and Mexico City (2010) have imposed the policy of plastic bag ban. Akullian et al. (2006) stated that in Rhode Island, USA, a customer receives a funded retail 3 cents for each bag a customer brings to the discount shop. However, the authors argue that the incentive structure of the amendment is poorly designed and does not meet the needs of the bag problem of plastic in Rhode Island, where the total societal cost of a plastic bag is estimated at more than 11 cents. Rather, they suggest that the regime imposes a tax of 11 cents if the consumers use the plastic bags in order to get a significant internalization of the externality.

Among Asian nations, both Taiwan and China have introduced regulations on plastic bag use during the final few years. In both cases, the national government has asked retailers to ask price for the plastic bags from the consumers. These laws took effect in Taiwan in 2003 and in China in 2008. In the case of China, a survey that recorded the plastic bag ban policy resulted in a 49 % decline in new plastic bag use and a substantial increase in the number of times old bags were reused (Li et al. 2016). In the case of Taiwan, researchers have found that the benefits of the plastic bag policy went beyond a reduction in plastic bag usage. The greater environmental awareness created by the policy has resulted in an overall reduction in the core of all types of solid waste generated by households (Kuo and Perrings 2010).

Producing nations in Asia, such as Bangladesh and Bhutan, have introduced policies prohibiting the use of plastic bags for exclusive purposes (Gupta and Somanathan 2011). Both these countries, accordingly, were not able to continue the initial decrease in the utilization of plastic bags, failing to follow the law. More latterly, the city of Pokhara in Nepal banned the use of plastic bags in 2010. In India, as well, several states like Chandigarh (in October 2008), Delhi (January 2009), and Rajasthan (in 2010) have instituted bans of the use of plastic bags. These countries are not successful in putting through the ban of plastic bag use because of weak legislation and consumer support for this policy. In this instance, consumers' support, attitude, and awareness are very important factors for the success of plastic ban policy.

All the households in Malaysia produce 19,000 metric tons of waste which constitutes solid waste and plastic waste per year, representing 24 % of all solid waste (Department of Statistics 2012). In Malaysia, supermarkets, grocery stores, and restaurants are using plastic bags widely (reduction of

plastic bag worldwide 2009; Porter 2010). According to the Malaysian Plastics Manufacturers Association (MPMA), the sales of flat plastic bags and plastic bag rubbish have been increased by 30 %. This situation is causing environmental degradation. In this position, plastic bags cannot be considered as priceless; the load must be levied on plastic bags (Boo 2011; Edwards 2000). Amin et al. (2011) reported that due to the climate change in Malaysia, the temperature is getting up, but is steady during daytime, and as a result, the seawater level is also increasing. For this reason, Malaysia is facing occurrences of flooding very frequently. Being aware of the possible dangerous effects of plastic bags on the environment in Singapore, Malaysia has already launched a no plastic bag campaign in some areas in 2011.

In Malaysia, the "No plastic bag campaign" has been launched by the Ministry of Domestic Trade Co-operatives and Consumerism (MDTCC) in January 2011 (MDTCC 2012). The goal of the movement was to control the excess and extravagant use of plastic bags and to reduce the environmental damages caused by plastic waste. The movement was executed by selecting shopping centers each Saturday. The consumers have to pay MYR 0.20 to buy plastic bags for shopping each Saturday. Zen et al. (2013) reported that the campaign is not friendly to the regulatory framework for the time being. It is noted that the government can implement environmental programs by using the income from plastic bag levy (Hoggard 2010). The campaign currently launched in Malaysia seemed ordinary and was not considered an acceptable practice by the consumers. It creates anger from the consumers during the first 3 to 6 months of the campaign (Zen et al. 2013). For Malaysia, the research on households' recycling behavior began practically late compared with other states. Most efforts discussed relations between attitudes and recycling behavior and selected demographic and psychographic characteristics of recyclers, as expressed for instance in the works of Zen and Siwar (2015), Akil et al. (2014), Mohamad et al. (2012), Balqis (2009), and Agamuthu et al. (2007). Zen and Siwar (2015) analyzed the acceptance of household recycling schemes (CRS) in residential areas in Kuala Lumpur, Federal Territory (KLFT). The results of their survey reported that 90 % of the respondents are willing to separate the garbage but only 34 % of them are willing to give the costs of the program. The analysis found that the Chinese old people supported the CRS recycling system and showed a positive attitude toward recycling. Hence, there is a necessity for a more suitable recycling system with required facilities or public service return and private recycling at the household level.

Akil et al. (2014) investigated the impact of socioeconomic factors that could influence recycling practices in Malaysia. The results revealed that the elderly showed pro-environmental behavior than the youth did. Mohamad et al. (2012) investigated the role of the spiritual community in recycling behavior. They found that although recycling activities of religious communities may be initially motivated by moral concerns, it is more motivated by institutional initiatives. Several studies on family participation in recycling/redemption at designated centers show a depressed output. A study by Balqis (2009) on the recycling program in the residential area of Pandan Indah in KLFT showed the inconsistency between the hours of operation of the recycling center/refund due to high operating costs. The waste was managed by Alam Flora Sdn. Bhd. (AFSB), a private solid waste concessionaire with the responsibility of managing, gathering, and discarding solid waste. Another problem was the difficulties in locating recycling bins in a study of residential areas in Selangor, Ampang Jaya, and Subang Jaya (Zen et al. 2014). A statistical study of the factors affecting recycling activities in a middle-class neighborhood of Malaysia in Subang Jaya, Selangor, recommended that consciousness must be highly regarded (Otitoju and Seng 2014). Some other studies also recommend that monetary incentives may increase recycling activities of households (Agamuthu et al. 2007).

None of these locally undertaken studies investigated, in particular, the awareness, knowledge, and motivating factors that can move the recycling behavior of Malaysians in the context of plastic waste. The only attempt that included motivation as one of the independent variables—as a possible determinant of behavior recycling in Malaysia—was by Zen et al. (2013). However, this study examined the type of incentives that can best motivate consumers for their recycling behavior. More research is needed with respect to the role of motivational skills, among other factors, to describe and forecast the behavior of selected recycling. The recycling rate in Malaysia is defined as low which is around 5 % compared to other Asian nations like Singapore (11 %), Thailand (14 %), Japan (40 %), China (13 %), and Germany (52.8 %) (MHLG 2011). Malaysia has great potential for recycling, which has targeted 22 % in 2020, but not with the current improvement made today. Recycling in Malaysia has many essential problems and obstacles which make their way to be successful in the plastic waste campaign lengthy. Hence, this country needs to be determined before a successful recycling program can be in place (Moh and Manaf 2014).

The increasing rate of plastic industries in Malaysia is 15 % in the last 11 years. For this reason, plastic dominated the second highest in the composition of waste after organic waste (Asian Development Bank, ADB 2003). In this context, the plastic bag levy can be an appropriate policy to change consumer behavior, but an awareness campaign is also needed at the same time. An awareness campaign can explore the environmental message about the impact of the use of plastic through electronic media across Malaysia by MDTCC. This should be assessed to judge the ability of the drive to deliver the required message which will promote consumers'

awareness, perception, and attitude or at least, their willingness to participate in the environmental program.

As mentioned above, the no plastic bag movement is currently done only in major shopping malls in Malaysia but is not even in the normal markets. The outcomes of the survey will deliver applicable data for improving the execution of the strategy of the plastic bag campaign. This study gives a richer apprehension of the relationship between motivation and behavior of plastic recycling. In summation, a number of independent factors such as selected demography, attitudes, and knowledge of recycling are included in the research for an integrated access to recycling behavior. To this end, the study of plastic waste is essential, particularly given the fact that, recently, no research on the analytic thinking of motivation of the consumer acceptance of plastic bag was taken away in the context of Malaysia. Therefore, there is an urgent need to study awareness, knowledge, and attitudes of households and motivational factors affecting their willingness to participate in plastic recycling programs.

Methodology

In our study, we chose to apply a face-to-face survey with well-trained interviewers as they deliver more complete, widespread, and significant information (CRS 2010). The reaction rate was over 94 %.

Type of survey

Sampling techniques

The number of families in Kuala Lumpur is 2.8 million. In order to select a sample randomly from the population, the following formula is taken in our investigation (CRS 2010):

$$ss' = \frac{z^2(p(1-p)}{d^2} \quad \ldots\ldots\ldots\ldots\ldots \quad (1)$$

where z is the z value (e.g., 1.96 for 95 % confidence level), p is the percentage of respondents who selected a choice, expressed as a decimal (0.5 used for the sample size needed), and d is the confidence interval or margin of error expressed as a decimal. The above equation is proper for infinite sampling, but since the number of households is known in our study, the correction for a finite number of households is as follows.

$$ss = \frac{ss'}{1 + \frac{ss'-1}{F}} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

where F is the number of families in Kuala Lumpur. Established on the sample size formulas, we selected $z = 1.96$, $p = 0.5$, and $d = 5$ % and calculated the sample size which was 383. Due to special resources, such as money and workforce, we selected 350 as our sample size. A total of 370 questionnaires were passed to families through face-to-face interviews. Out of 370, 350 respondents filled out the questionnaire correctly. In September 2015, final data collection was performed in Kuala Lumpur. In this study, we choose this location as the study area because of the profligacy of the Malaysian economy in terms of gross domestic product (GDP) (Department of statistics Malaysia, DOSM 2012). It leads to the speedy growth of the state due to the transportation and industrial centers of Malaysia (DOSM 2012). Kuala Lumpur (latitude 3° 8′ N, longitude 101° 44′ E) is located in the Federal Territory of Kuala Lumpur, West Peninsula Malaysia. The total population of Kuala Lumpur in 2005 is estimated to be 1.6 million people (Kuala Lumpur City Hall 2008). It was calculated that it constituted 41 % ethnic Malays, 39 % Chinese, 10 % Indians, and 7 % of the foreign population. The Federal Territory of Kuala Lumpur consists of 11 districts, as pictured in Fig. 1. In this survey, households were taken at random from five urban areas in Kuala Lumpur. Selayang, Cheras, Ampang, Taman Jaya, and Kuala Lumpur were selected.

Research instrument and data collection

The survey questionnaire has three sections. The first section includes info on the socioeconomic status of respondents which are shown in Table 1. These variables were taken from a study of households in Malaysia (DOSM 2012). The second section focuses on the willingness to participate of

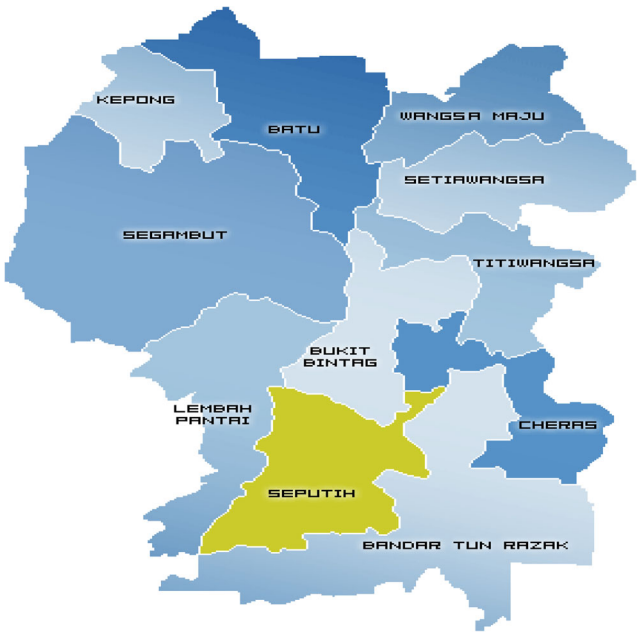

Fig. 1 Map of the Federal Territory of Kuala Lumpur

Table 1 Socioeconomic information of the households

Variables	Frequency	Percentage
Gender		
Male	181	51.67
Female	169	48.33
Age		
18–30 years	112	32.1
31–45 years	162	46.5
46–60 years	76	21.4
Education		
Lower secondary school	84	23.8
Higher secondary school	88	25.1
Diploma	76	21.6
University degree	73	20.8
Postgraduate	29	8.7
Income		
RM 2000 and less than	36	10.2
RM 2001–RM 4000	94	26.8
RM 4001–RM 6000	154	44
RM 6001 and above	44	12.3
	22	6.7

Source: field survey 2015

Table 2 One-way analysis of variance

Variables	Mean	*df*	*F*	Sig
Gender				
Male	3.38	1	0.481	0.487
Female	3.33	349		
Age				
18–30 years	3.25	2	12.11	.000
31–45 years	3.43	347		
46–60 years	3.75			
Education				
Lower secondary school	3.01	3	5.64	0.001
Higher secondary school	3.27	347		
Diploma	3.40			
University degree	3.54			
Income				
RM 2000 and less than	3.13	3	21.32	0.000
RM 2001–RM 4000	3.41	167		
RM 4001–RM 6000	3.69			
RM 6001 and above	3.71			

Source: field survey 2015

respondents in the no plastic bag campaign. It is measured by yes or no. Section C consists of questions about knowledge, motivation, and awareness of and attitude toward plastic waste. These variables of section C are measured along a five-point Likert scale, where 1 represents a strong disagreement, while 5 represents a strong agreement.

Descriptive statistical analysis

Table 1 presents the socioeconomic data of households. Table 2 shows that men made up 51.67 % while females made up 48.33 % of the population. The majority of the respondents (46.5 %) were between 31 and 45 years of age. Most respondents are middle-aged. More than half of the respondents were Melayu (63 %). It is shown that 25.1 % had higher secondary education, whereas 23.8, 21.6, 20.8, and 8.7 % had a diploma, had lower secondary education, had university education, and had postgraduate education, respectively. The survey found that just 10.2 % of respondents had incomes of RM 2000 or less. The highest percentage of respondents (26.8 %) said that their income was between RM2000 and RM4000 per month. Whereas 44 and 12.3 % of the respondents noted that they had income between RM 4001 and RM 6000 and between RM 8000 and RM 6001, respectively. Only 3.7 % of respondents had income more than RM 8000 per month. One-way analysis of variance was employed to explore the difference in the demographic characteristics in terms of frequency in recycling among consumers. The analysis brings out that respondents who are older, have a higher level of training, and have higher incomes recycle more than their counterparts, as shown in Table 2.

Table 3 shows the descriptive statistics of awareness and knowledge of, as well as attitude and behavior toward, recycling. The results show a low rate of participation as scores indicate that the willingness to participate is lower than the average (mean 0.44, median 0). The survey results also show that for the no plastic bag campaign, 35 % of the 350 respondents support the campaign while 42 % do not, 9 % had changed their shopping day, and 12 % changed their place of purchase. Scores of questions about the participants' knowledge about specific recycling problems indicate that respondents are not well informed as the results are below average (mean 2.61, median 3). It has been shown that respondents are aware of these problems

Table 3 Descriptive statistics on willingness to participate, awareness, attitude, knowledge, and motivation

	Min	Max	Median	Average	Standard deviation
Willingness to participate	0	1	0	0.44	0.49
Awareness	2	5	4.12	4.52	0.53
Attitude	2	5	4.33	4.35	0.55
Knowledge	2	5	2.02	2.61	0.51
Motivation	2	5	2.21	3.72	0.52

(mean 4.52, median 4.12). Scores of attitudes are high (mean 4.35, median 4.33), suggesting that respondents have a positive attitude toward recycling. Regarding motivation, the results suggest that respondents are less motivated for recycling (mean 3.72, median 2.21).

The effect of awareness, knowledge, attitude, and motivational factors on willingness to participate

In this survey, it was found that 35 % of households are willing to participate in the no plastic bag movement. When the respondents who are not willing to participate are called for the reason of their non-participation, it is discovered that the campaign includes trade practice drawbacks and that a ban on plastic bags is the initiative of the super/hypermarket to get extra money.

A logistic regression model is performed to explain the factors that could involve the willingness to participate (WTP) of households in the campaign in Kuala Lumpur. In this instance, households are selected to participate in Kuala Lumpur with two choices. If they are willing to take part in the campaign, we use 1. If they are not willing to participate, we use 0. When the dependent variable is a dichotomous variable such as 0 and 1, we can choose between logistic regression and probit regression (Wang et al. 2011). Therefore, in this study, logistic regression model is selected. The independent variables are selected from the various literature reviews which are listed in Table 4. The probability model WTP, P (Yi = 1), is represented as

$$\begin{aligned} & Log_e\left[\frac{\{P(Y=1)|X_1,\ldots\ \ldots X_p\}}{1-P(Y=1|X_1,\ldots\ \ldots\ .X_p}\right] = Log_e\left[\frac{\pi}{1-\pi}\right] \\ &= \alpha+\beta_1X_1+\cdots\ \ldots\ \ldots+\beta_pX_p \\ &= \alpha+\sum_{j=1}^{p}\beta_jX_j\ldots\ldots\ldots\ldots\ldots \end{aligned} \tag{3}$$

π is a conditional probability of the form P($Y = 1| X_1$, ..., Xp). This means that the probability is dependent on the arrangements of values of the independent variables. The log odd, as mentioned here, is also known as the logit transformation π and analytical approach. It is sometimes written as follows:

$$\begin{aligned} & \langle P(Y=1|X_1,\ldots\ \ldots X_p\rangle \\ &= \frac{e^{\alpha+\sum_{j=1}^{p}\beta_jX_j}}{1+e^{\alpha+\sum_{j=1}^{p}\beta_jX_j}}\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \end{aligned} \tag{4}$$

This can also be transformed into

$$\begin{aligned} & \langle P(Y=1|X_1,\ldots\ \ldots X_p\rangle \\ &= \frac{1}{1+e^{-\alpha-\sum_{j=1}^{p}\beta_jX_j}}\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \end{aligned} \tag{5}$$

The non-response probability is

$$\begin{aligned} & P(Y=0|X_1,\ldots\ldots X_P) = 1-P\left(Y=1|X_1,\ldots..X_p\right) \\ &= \frac{1}{1+e^{\alpha+\sum_{j=1}^{p}\beta jXj}}\ldots\ldots \end{aligned} \tag{6}$$

Using the independent variables of the regression model, the LR equation for the log odds for WTP is estimated to be

$$\text{Log}\left[\frac{Pi}{1-Pi}\right] = b_0+b_i\times X_i\ldots\ldots\ldots\ldots\ldots\ldots \tag{7}$$

The coefficient, b_i, indicates the change to log odds of WTP of households on the no plastic bag campaign in Kuala Lumpur.

The estimates for the logistic regression model are presented in Table 5. The sign of all coefficients is consistent with our previous studies. The results of the logistic regression model show that the coefficients of attitude and knowledge are positive and important. It demonstrated that the respondents who are more informed and more convinced of this knowledge have a more positive attitude toward recycling than their counterparts do. Nguyen et al. (2015) reported that personal attitude had the greatest influence on the intention of waste separation. A positive attitude toward participation will reduce pollution and domestic waste (Zhang et al. 2015). A positive and significant relationship is also found between WTP and the social and environmental motivation to recycle.

The study results are consistent with previous research on the motivation to preserve the environment (Delistavrou et al. 2005) which can significantly influence recycling behavior. The financial motivation is not one of the variables that can predict WTP. This conclusion becomes very important, considering that economic incentives are very difficult to utilize because they require to be ongoing (De Young 1985, 1986).

The level of importance among motivational factors

Motivation is a hypothetical concept used to explain behavior. Motivation can also be defined as the direction of the conduct of one or what makes a person repeat a behavior and vice versa. One reason is that it encourages a person to act in a certain way or at least develop a preference for a specific behavior. Previous research has indicated that recycling can be boosted by economic incentives (Delistavrou et al. 2005),

Table 4 Variables used in the regression and their description

Variables	Items	Mean
Awareness of plastic waste	Plastic wastes from urban areas can cause water pollution.	4.40
	I am aware that plastic waste is a serious problem.	3.94
	I am aware that plastic waste affects human life.	3.96
	I am aware that plastic waste might affect the natural environment in Malaysia.	4.22
	I am aware about environmental restoration, pollution prevention, and water conservation.	4.41
	I am aware about the trend of utilization of plastic bags	4.29
Knowledge of plastic waste	I know about the campaign of "No Plastic Bags Day" in Malaysia.	3.64
	I know that plastic bag problem can create animal death, human health problems, blockage of drain system, and deterioration of the natural beauty of the environment.	2.43
	I know that the possible reasons for the increase in utilization of plastic bags are cheapness (low cost), durability, availability, whenever and wherever required, and lack of awareness of the community.	2.38
	Industries and supermarkets are contributing greatly to littering of plastic bags.	2.35
	Inadequate landfilling has aggravated the problem of plastic bags.	2.29
Attitudes toward the no plastic bag campaign	Consumers should react to the "No Plastic Bag Day" by preparing their own recyclable bag to the hypermarket.	4.31
	Consumers purchasing in the hypermarket without providing plastic bag is inconvenient.	4.42
	Consumers can change the date and place of shopping.	4.45
	Consumers do not support the "No Plastic bag campaign."	4.44
	Using reusable bags helps reduce the amount of plastic bags that end up in the landfill.	4.27
	I am willing to pay a certain amount to reduce the impact of plastic waste.	4.35
Environmental motivation	Contribute to the energy conservation	2.12
	Contribute to resource conservation	2.02
	Help in minimizing litter	2.23
	Help in minimizing landfill use	2.09
Social motivation	My friends started to recycle	2.23
	My family started to recycle	2.13
Financial motivation	Get reduction coupons for merchandise	2.21
	Raise money for charity	2.01

but incentives must be uninterrupted (Delistavrou et al. 2005). Environmental security, reducing air pollution, preservation of water resources, energy saving, and the wait in the closure of community landfills are important reasons that might prompt many consumers (Howenstine 1993; Gamba and Oskamp 1994; Delistavrou 1999). Social influence can also motivate people to recycle. Influence of friends, neighbors, and family members is a predictor of behavior recycling (Schultz et al. 1995). Eight factors in this study are taken from the literature (Delistavrou et al. 2005; Delistavrou 1999; De Young 1986; Hopper and Nielsen 1991; Oskamp et al. 1991; Oskamp Gamba 1994) that may motivate respondents to recycle.

Table 5 The maximum likelihood estimates for the logistic regression model

Variables	β	Std. Error	*Z* statistics	Probability
Attitude	0.34	0.10	5.03	0.00
Knowledge	0.06	0.07	0.64	0.02
Awareness	0.17	0.16	2.17	0.54
Environmental motivation	0.46	0.11	4.18	0.02
Social motivation	0.47	0.08	5.87	0.01
Financial motivation	0.12	0.23	0.52	0.23

Mc Fadden R^2 = 0.367, LR statistics (6 *df*) = 14.12

To examine the comparative degree of importance among the factors motivating respondents to recycle, this study uses the method of the modified average and coefficient of fluctuation of the models which were used by Begum et al. 2009. According to Begum et al. 2009, the average important score (AIS) of factor *i* is

$$AIS_i = \sum_{j=1}^{4} X_j N_{ij}/N \quad (8)$$

where AIS_i is the average important score of the factor *i* and x_j is the important score which can adopt scores of 1–5. Score 1

indicates strongly disagree, scores 2 indicate disagree, score 3 indicates neutral, score 4 indicates agree, and score 5 indicates strongly agree. Moreover, N_{ij} is the number of respondents who give the factor i the score X_j and N is the total number of respondents. In order to do the ranking of the importance among all the factors, we need to calculate factor index value (FIV) by joining the modified average and coefficient of variation. To calculate the coefficient of variation, we divide the AIS by δ_i. So, the equation is as follows:

$$\mathrm{FIV}_i = \mathrm{AIS}_i + \mathrm{AIS}_i/\delta_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (9)$$

where FIV_i is the factor index value of factor i *which* represents the coefficients of variation. AIS_i is the average important score of factor i and δ_i is the standard deviation of the important score for factor i. The standard deviation δ_i shows how much each factor is deviated from their average value. Moreover, we used a simple t test in order to notice the difference between the sample average and the population average of motivational factors. The Statistical Package for Social Sciences (SPSS) is utilized for data analysis.

The study results are summarized in Table 6. Table 6 reports the results on the respondents' responses on the importance among the motivational factors. The response is very much important. For a contributing factor to the contribution of energy, 46 % of respondents suggested that energy conservation is the most significant factor motivating them; on the other hand, 40.7 % of respondents considered this element as an important incentive. Furthermore, only 2 % of the respondents believed that this factor is less important and nobody indicated that this element is not significant at all.

It can be concluded that environmental and social factors are introduced as important motivational factors because not even one respondent mentions that these factors are less important or not important at all. On the other hand, there are few respondents who believed that the economic factor is not important at all to motivate them. Table 7 summarizes the results of the estimated modified average and the FIV model. Table 7 reports that the highest value of AIS is 3.02 for the factor of helping minimize landfill use. This indicates that the minimization of the landfill use is the most significant factor which motivates the participants to identify problems of plastic waste. So, environmental motivation affects the respondents in participating in the no plastic waste bag campaign. Nevertheless, the lowest value of AIS is 2.02 for the factor of raising money for charity, which thus is the least important factor according to respondents' opinion. Therefore, financial motivation cannot encourage the respondents to participate in the no plastic bag campaign. The AIS values for the rest motivating factors are from 2.98 to 2.65. This results indicate that the level of importance is not the most important (score 5) nor important (score 4) among the motivating factors. Although our estimated AIS is capable of displaying the classification of all components, the weakness of AIS is that it cannot reflect the degree of variation between specific answers (Begum et al. 2009). Therefore, Begum et al. 2009 suggested that when two factors have similar or very near mean values, the factor with less difference should be considered as higher rank. In order to increase the strength of ranking attributes by the average values, we used the FIV. Furthermore, we fail to accept the null hypothesis that the sample mean of the motivating factors is far from the value of the population since the calculated t value is larger than the critical t value with degree of freedom of 349.

Table 7 reports the value of FIV and the ranks of the relative factors of important values (RFIVs). The highest FIV is 7.46 for motivating factor "help minimize the use of landfills," which is from environmental factors. The lowest FIV is 2.20 which represents the motivational factor of "raise money for charity" which is from financial motivation. These findings also support that environmental factors are more important than the financial factors or social motivation for motivating

Table 6 The levels of importance among motivational factors

Factors	Items	Not important		Less important		Neutral		Important		Most important	
		Yes	%	Yes	%	Yes	%	Yes	%	Yes	%
Environmental motivation	Contribute to the energy conservation	–	–	7	2	40	11.3	143	40.7	161	46
	Contribute to resource conservation	–	–	5	1.3	31	8.7	129	36.7	187	53.3
	Help in minimizing litter	–	–	25	7	31	8.7	13	3.6	191	54.7
	Help in minimizing landfill use	–	–	25	7	31	8.7	129	36.7	189	54
Social motivation	My friends started to recycle	–	–	7	2	49	14	136	38.7	158	45.3
	My family started to recycle	–	–	7	2	68	19.3	168	48	107	30.7
Financial motivation	Get reduction coupons for merchandise	11	3	14	4	12	3.3	129	36.7	185	53
	Raise money for charity	11	3	13	3.7	28	8	117	33.3	203	58

Table 7 The calculations of the parameter values of the motivational factors for RFIV

Factors	Items	Average important score, AIS	Std deviation, δ	t value	Factor index value, FIV	Rank of factor index value, RFIV
Environmental motivation	Contribute to the energy conservation	2.76	0.75	7.2	6.44	5
	Contribute to resource conservation	2.82	0.70	7.6	6.84	4
	Help in minimizing litter	2.98	0.68	7.9	7.36	2
	Help in minimizing landfill use	3.02	0.68	7.9	7.46	1
Social motivation	My friends started to recycle	2.56	0.72	6.7	7.35	3
	My family started to recycle	2.65	0.76	6.5	5.29	7
Financial motivation	Get reduction coupons for merchandise	2.12	0.73	6.4	5.56	6
	Raise money for charity	2.02	0.78	6.6	2.20	8

the respondents in the no plastic bag campaign. In conclusion, it is evident that the results of AIS and FIV are almost the same. Hence, it is important to analyze the relative importance of the factors established by both measures which can address the problem of plastic waste.

Conclusions and policy implication

Until today, recycling has not become the ecumenical means of life in Malaysia (Omran et al. 2009). It was observed that only limited people are practicing recycling regularly (Moh and Manaf 2014). Although this country is trying to recycle 22 % of total solid waste by 2020, currently, people are recycling at the rate of 5% (Agamuthu and Fauziah 2011). This rate is lower compared with other developed nations who have recycling rates of 30–35 % (Mahmud and Osman 2010). The plastic bag campaign in Malaysia is a good initiative because it is hoped that it will increase the possible recyclable shopping bag practice among the consumers.

This study evaluated the effect of socioeconomic variables on the behavior of households for recycling plastics. This study found that the older, higher educated, and high-income group are more willing to participate in no plastic bag campaign than their counterparts. Although respondents are found to be less knowledgeable about recycling, we suppose that the more respondents know about recycling and the more they feel convenience in their knowledge, the more they are willing to participate. Moreover, it is also clear that the most positive attitudes toward recycling of respondents hold the highest recycling rate. As for the scope of this study, this study found that motivation is a significant determinant, but not for recycling plastic behavior of households. In this study, 35 % of households are willing to participate in the no plastic bag campaign. When households who are not willing to participate are called for the reason why they work away to participate, it is discovered that the campaign includes trade practice drawbacks and that a prohibition on plastic bags is the initiative of the market to get additional money.

The results also provided experimental evidence on the level and classification of the importance of motivating factors for plastic recycling. The results of the study revealed that environmental factors are more important factors than financial factors in motivating the respondents for their participation in the no plastic bag campaign. The study findings suggested a number of policies that could hold implications for the country to encourage the households to participate in the no plastic bag campaign.

- The benefits of plastic recycling should be promoted effectively by the government to the public. People have to be constantly informed by the government and retailers that recycling is the only way to minimize waste and landfills, while at the same time contributing to the conservation of energy and resources. In this case, the retailers need to be trained by experts.
- Although monetary rewards are still needed to encourage recycling, most households recycle based on environmental motivation (Halvorsen 2012). However, the role of monetary rewards to encourage households to recycle plastic waste should not be exaggerated by local authorities and the influence of other reasons for recycling should not be underestimated when it comes to the implementation of policies and recycling programs. It is recognized that plastic bags hamper our world a lot, and we are still paying for it for a long time. People should promise to reduce their current plastic bag use and take their own bags to the shopping malls. Whereas the government is working to help us with that, we should also have to accept some individual responsibilities toward saving the earth ourselves.
- However, it is revealed that the local authorities need to introduce monetary incentives to increase consumer participation in the recycling program. In practice, consumers have to be persuaded by appropriate communication campaigns by others around them who are involved in recycling.
- The WTP in the no plastic bag movement is not satisfactory in this survey. In contrast, few reports

mentioned that Malaysian citizens want the country to ban plastic bags in Malaysia like Singapore and other nations in Asia and Europe (plastic bags; Malaysia 2011; OECD 2004). But Zen and Ahamad (2013) found different findings in their study. They mentioned in their study that the campaign tries to dilute down the usage of plastic bags, but consumers were registrant to support the cause. The government should deliver clear guidelines and mechanism for consumers, markets, and the plastic industry. In this way, we can increase consumers' trust and create sustainable consumption. Convery and Redmond 2007 revealed that the income from the plastic bag campaign is considered as environmental funds which can be used to internalize the environmental damage caused by plastic. The procedure of tax enforcement initiatives on the plastic bag and public participation can be amended by adopting clear guidelines and the mechanism of legislative approach (Zen et al. 2013). In this instance, they advised that the implementation of the Solid Waste and Public Cleansing Management Act 2007 (Act 672) needs to fatten up for the anti-litter regulations mostly associated with the taking out of the plastic bag levy instead of promoting more exercises.

Although people have knowledge about the environment and realize that the environment has to be taken care of, there is a deficiency in education, where most of them cannot translate their knowledge into behavior (Mahmud and Osman 2010). Some are not able to connect the benefits of recycling and the consequences of not recycling to the environment in a sophisticated manner (Prestin and Pearce 2010). This explains why recycling has not become a general way of life in Malaysia (Omran et al. 2009), although there is a 100 % awareness of the importance of recycling based on a survey by the Ministry of Housing and Local Government (MHLG 2011). A more effective way to cultivate the community about the no plastic bag campaign is needed as the lack of knowledge is a major barrier to recycling (McDonald and Oates 2003). In an attempt to change their behavior, the barriers to recycling, especially their own views, have to be uttered.

It can be concluded that we endure to use plastic bag alternatives—simply, we have recollected that the alternative plastic should be less or not harmful to the environment. There are many alternatives to plastic bags. The currently favored alternatives can be separated into four major groups, such as jute, paper, biodegradable, and recyclable bags. Jute bags are different types. In addition, they are biodegradable and compostable. For this reason, they do not impose any negative effect on the environment and human health. Biodegradable bags are many kinds of natural starch which are made of plastic, degradable plastic, mixed synthetic plastic, and synthetic natural plastic. On the contrary, paper bags are made of different shapes with a format. Although they have different grades, thicknesses, and colors, they can cause environmental problems. For example, paper bags produce half the sum of emissions of greenhouse gases in the process (USEPA 2012). Another disadvantage of paper bags is that they take 70 % more energy to manufacture than bags made of plastic. At last, reusable bags can be made from both renewable and non-renewable sources, including different types. Among these alternatives, jute bags may be the best option to plastic bags because they are environmentally friendly and readily biodegradable. Bangladesh can supply half of jute for making shopping bags to everyone.

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