An Exploration of the Factors Concerned with Reducing the Use of Plastic Carrier Bags in Bangkok, Thailand

Roland Hohmann, Chutawat Wattana, Phichittra Sracheam, Supichaya Siriapornsakul
MBA, Graduate School of Business
Assumption University of Thailand

Vorapot Ruckthum, PhD
Lecturer, Graduate School of Business
Assumption University of Thailand

Ray Clapp, PhD
Visiting Professor, University of Hertfordshire, UK
Research Fellow, Occupational Research Centre, UK

Abstract

This research is an exploratory study to examine the attitude of people in Bangkok, Thailand, towards the reduction in use of plastic shopping bags. The research objective is to provide recommendations for policymakers as well as stakeholders in the public and private sector as to how plastic bag use may be effectively reduced. Key findings are that the four factors of the independent variable 'Use of plastic bags in Bangkok' and four of the demographic variables Gender, Nationality, Age, and Occupation are all significantly related to the dependent variable 'Intention to reduce the use of plastic bags'. Additionally, the study shows that regulatory measures like a plastic bag charge may initially reduce the use of plastic bags; however, the effect may only be short-term due to the minimal cost of the bag compared to the cost of items purchased. A number of alternatives are considered such as the substitution of engineered recycled paper containers and bags. However, the main long-term solution is seen as the promotion of a concern for the environment via waste control and recycling as a personal issue (particularly among children) leading to cultural adjustment rather than promotion of any particular project.

Keywords: plastic bags, recycling, pollution, levy, retail sector, regulatory measures

Introduction

An unprecedented change has taken place in Thailand: its population has risen by 20% since 1990 as a result of an economic boom that has swept across Southeast Asia since the 1980's. GNI per capita has risen by 190% between 2006 and 2014 with Bangkok at the centre of an increase in disposable income and a fast paced modernization. Waste production, increased CO_2 emissions and other forms of environmental pollution have followed as a dark shadow of consumerism (World Bank,

2015). Solid waste generation has continued to rise and currently stands at 15 million tons, furthermore, only a very small fraction of about 20% of this waste is recycled. It is estimated that there is a potential for 40-60% of the overall solid waste that could be recycled (Ittiravivongs, 2012). Central Bangkok, with nearly 10 million people, is the densest populated area of the country which poses special challenges for the waste disposal and creates the need for successful strategies to reduce its waste generation.

In many countries, attempts have been made to reduce waste and as part of these campaigns the reduction of plastic carrier bag use has become highly popular. Studies have proven that the use of plastic bags is easy to avoid due to the availability of various substitutes. Also, it is well known that not only conventional plastic bags but in fact most plastic products have a very long lifetime and are ecologically, particularly hazardous. The durability, a reason for its popularity, but the hazard of slow bio-degradability, is a major problem for waste management. Plastic material used for the production of bags takes up to 1000 years to degrade, within this timespan; plastic particles are continually discarded and are harmful to the environment (e.g. Thanh, et al., 2010). Even recycling the bags is a difficult and expensive process as they tend to clog the process machinery (Burchill, 2012). Where plastics are not recycled, littering is a particular problem: the slow degradation generates cumulative litter that becomes visible to the ordinary person. Especially in river estuaries and in the sea plastics accumulate and cause an economic threat to areas popular with tourists. Beaches far away from populated areas are not safe from plastic bags being washed up, and the image of the area deteriorates (Sornil, 2012). At the same time plastic bags are an enormous threat for the ecosystems in the oceans. They cause damage to coral reefs and results in deaths of sea mammals, turtles and fish that mistake them for food, suffocate or die from ingestion (e.g. Tasaki, 2011; Andrady, 2015). Ultimately, the toxins from the plastic end up in the human food chain causing widespread harm to human populations, as studies by Krehbiel (2012) and Andrady (2015) have shown.

Over the last decades' environmental movements have triggered research into the use and effects of plastic bags which has inspired campaigns, education and initiatives from various perspectives. In some countries like Ireland, Finland and the UK the governments have acted to minimize the use (Poortinga et al., 2012; Convery et al., 2007). In other countries individual retailers have committed themselves to the reduction of the use of plastic bags in their shops. Campaigns range from bag-free days, to systems of points that reward customers who decline the offer of a plastic bag, and also, in some shops a small charge for the use of a plastic bag has been imposed (Jones, 2005; Sanghi, 2008; Badu et al., 2012; Zen et al., 2013; Westermann, 2013; Ohnuma et al., 2014; Yeow et al., 2014; Ohotnikova, 2014).

All initiatives have in common an aim to change consumer behaviour whether through education or creating incentives to reduce the amount of plastic bags used. The reasons why plastic shopping bags have been so popular amongst consumers and retailers has been investigated by Zen (2013) who found characteristics such as: small size, high

durability and waterproofness are convenient for shoppers. When given away for free at the point of sale, there is little incentive to bring a reusable shopping bag from home, furthermore, retailers have used the bags as advertising space creating distinctive new designs for their bags. In Japan where packing and wrapping is a part of etiquette, this cultural factor creates an additional barrier to reduce plastic shopping bags (Ohnuma, Ohtomo, 2014).

There have been a number of proposals regarding the question how consumer behaviour can be effectively changed towards avoidance and a reduction in use of plastic shopping bags. Ohnuma and Ohtomo propose a framework that is based on the Theory of planned behaviour by Icek Ajzen (Ohnuma, Ohtomo, 2014), while Tasaki et al, (2011); and Elgaaied, (2012) have focused on barrier and benefit identification including the generation of 'guilt' in consumers when using shopping bags. Successful piloting, broad community discourse and norm building were seen as equally important in their studies (Tasaki et al, 2011; Elgaaied, 2012).

An interesting study was conducted in Bangkok about recycling behaviour by Ittiravivongs (2012). This study, one of the first to be conducted about recycling in Thailand, uses the Theory of Interpersonal Behaviour by Triandis, (1977) to show a relationship between the actual recycling behaviour and intention to recycle as well as the habit of recycling, all of which are moderated by conditional factors. Ittiravivongs (2012) shows that people in Bangkok are most likely to recycle when they have a habit of recycling while the intention to recycle is a less strong predictor of recycling behaviour.

Research Objective

The research objective of the present study is two-fold. First, to explore people's attitude and usage of plastic bags in Bangkok with the goal to explain the relationship and contributing factors towards a high usage of plastic shopping bags in Thailand's capital. Second, it aims to develop recommendations for policymakers and stakeholders about how to influence consumer behaviour towards a reduction in plastic bag consumption. Recipients of these recommendations may be politicians as well as decision makers in the retail and hospitality industry.

Four questions guided the research design, instrument development and data analysis:

1. How can we reduce the plastic bag usage in Bangkok?
2. How can we encourage change in consumption behaviour?
3. What kind of measure can the governmental or private sector take?
4. Which demographic groups can be identified that are crucial to support change or can help advocating for change?

The study and its results will be particularly significant as it aims at better understanding the attitudes and behaviours towards the use of plastic shopping bags in Bangkok, Thailand. By studying which demographic factors and variables contribute to the use of plastic bags in Bangkok, as well as which factors may moderate the use of plastic bags. The research will locate the relevant demographic groups for targeting in campaigns for the reduction of plastic bags as well as raise the awareness of this major environmental issue.

Additionally, the results will have the potential to inspire further research into the matter as well as policies to reduce plastic bag waste and thereby contribute to the improvement of health and environment of the population in Bangkok, Thailand.

Conceptual framework

A number of facets that were related to plastic bag consumption in Bangkok were extracted from the literature (e.g. Sanghi 2008, Miller 2011, Kasper 2012, Yeow et al 2014); further aspects that were thought to be relevant to this study were contributed by the research team. The final list of all facets was reviewed for relevance against the research objectives and is shown in Table 1. From items consistent with the facets a single measure was constructed and using exploratory factor analysis to provide an assessment of the factors that affect the use of plastic bags in Bangkok. Also, to provide a more convenient sampling process (and a broad sample population) the dependent variable chosen to represent the use of plastic bags was the psychological variable 'intention to reduce the use of plastic bags'.

Table 1

Demographic Variables and Facets of the Scale Use of Plastic Bags in Bangkok

| Facets	Demographic Variables
Awareness	Gender
Perception	Nationality
Attitude towards reuse	Age
Convenience	Number in Household
Attractiveness	Shopping Frequency
Consumer perspective	Income
Environmental concern	Education
Bag material	Occupation
Lifestyle	
Public activities & campaign	
Alternative available	
Social Pressure	
Situation	
Price	
Functionality	
Economic Incentive	
Government Regulations	
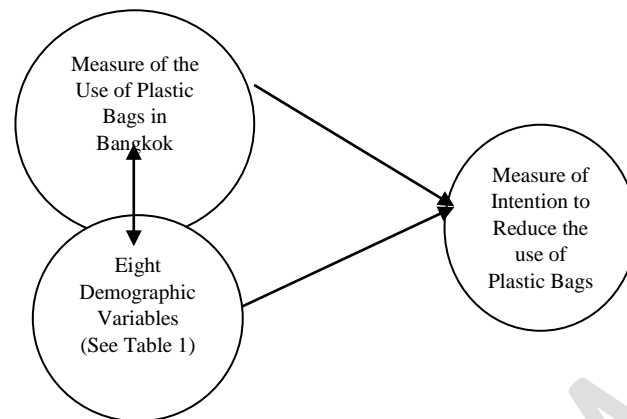
Figure 1 Conceptual Model

Hypotheses

Based on previous research and the study's focus, nine alternative hypotheses were developed. The null hypothesis stated that plastic bag reduction behaviour is predicted by none of our factors nor any demographic variable that we tested in our model. The nine alternative hypotheses were as follows:

H1: The factors resulting from the analysis of the items associated with the measure 'use of plastic bags in Bangkok' comprising the facets listed in Table 1 are all significantly ($p<0.05$) related to the dependent variable 'intention to reduce the use of plastic bags'.

H2: The demographic factor "Gender" has a significant relationship with both the dependent variable 'intention to reduce the use of plastic bags' and the independent variable 'use of plastic bags in Bangkok'.

H3: The demographic factor "Nationality" has a significant relationship with both the dependent variable and the independent variable.

H4: The demographic factor "Age" has a significant relationship with both the dependent variable and the independent variable.

.H5: The demographic factor "Household members" has a significant relationship with both the dependent variable and the independent variable.

H6: The demographic factor "Shopping frequency" has a significant relationship with both the dependent variable and the independent variable.

H7: The demographic factor "Income" has a significant relationship with both the dependent variable and the independent variable.

H8: The demographic factor "Education" has a significant relationship with both the dependent variable and the independent variable.

H9: The demographic factor "Occupation" has a significant relationship with both the dependent variable and the independent variable.

Experimental Design

Development of Measure 'use of plastic bags in Bangkok

In discussion questionnaire items that represented the facets concerned with plastic bag consumption (see Figure 1) were collected in Thai and then translated into English and back translated into Thai to check for the accuracy of both meaning and understanding of the terms used in both languages. The first draft of the questionnaire also included an English and Thai cover letter asking for support by stating the reason for the study as well as promising confidentiality of the respondents.

In a next step, a pilot study with a total of 80 respondents was conducted to check for the questionnaire's reliability and collect comments and obstacles from respondents. The results of the pilot study were compiled and unclear or double questions were eliminated while others were edited. The questions were re-grouped and re-arranged to enhance the logical structure and give respondents a progressive experience when scoring the questionnaire. All content was once again proofread in both Thai and English language and translations were checked for accuracy.

The result was a questionnaire containing 38 attitude questions related to the 'use of plastic bags' (also used as a title for the scale) representing the 17 facets in Table 1 and a five item scale for the dependent variable 'intention to reduce the use of plastic bags'. All of the items scored on a 5-rank Likert scale ranging from 'Strongly Disagree' = 1 to 'Strongly Agree' = 5 with the numbers 2 – 4 being labelled 'Disagree', 'Neutral' and 'Agree' respectively. Additionally, 8 questions with nominal and ordinal answer options designed to capture the demographic profile of the respondents (i.e. Gender, Nationality, Age, and Number of people living in the household, Frequency of grocery shopping, Income, Educational background and Occupation).

Sampling and Data Collection

With a target sample size of greater than 300 cases, the 22 students who formed the study and data collection group gathered completed questionnaires from at least 30 respondents over the course of 5 days. The sample was randomized by each student gathering respondents from different districts of Bangkok. A total 681 questionnaires were completed from 22 of the 50 Bangkok districts.

Data Analysis and Results

Item and Factor Analysis of Scale 'Use of plastic bags in Bangkok

To determine that all of the items in the 'Use of plastic bags in Bangkok' scale are related to the same domain, an item analysis was conducted that examined the item-rest correlations (see appendix 2). The results show that eight of the items have low item-rest correlations (less than 0.25) and were deleted from the final scale

The final version of the scale consisted of 31 items with a Cronbach Alpha of 0.91 (see Appendix 3). These results indicate that all of the items relate to the same domain and that the respondents understood the 31 items of the final questionnaire in the same way.

To consolidate the items of the scale 'Use of plastic bags in Bangkok', exploratory factor analysis was used to determine the minimum number of factor that would adequately represent the scale. After considering aspects concerning: Eigen values, the variance explained, the number of item in each of the factors and the 'simplicity' of the rotated structure the four factor solution was considered the better representation (see Appendix 4)

The four factors were labelled:
Factor 1   Recognition of personal and social benefits of the re-use of plastic bags
                (Number of Items=11, Alpha=0.87, Mean =47.71, Std Dev=6.91, n=675)
Factor 2   Awareness of the over-use of plastic bags
                (Number of Items=9, Alpha=0.83, Mean =37.48, Std Dev=5.29)
Factor 3   Personal action to minimize the use of plastic bags
                (Number of Items=5, Alpha=0.75, Mean =17.01, Std Dev=3.93)
Factor 4   Promote the use of alternatives
                (Number of Items=6, Alpha=0.77, Mean =24.42, Std Dev=3.73)

Analysis of the Scale for the Dependent Variable

The analysis of the five items of the scale 'Intention to reduce the use of plastic bags in Bangkok' that represents the dependent variable showed the following characteristics Alpha = 0.76, Mean = 19.32 and a Standard Deviation of 3.51. Furthermore the relationship of the independent variable 'Use of plastic bags in Bangkok' with the dependent variable is $r = 0.78$, $p \leq .0001$.

Analysis of the Demographic Variables

The manifest demographic variables were analyzed and provided a profile of the average respondent as a female Thai national, aged 25-35 years old, living in a household of four members who goes shopping two or more times per month. Their modal income was 35,000 THB per month and modal educational level was holding a Bachelor degree.

The Analysis for Hypothesis H1

To test for the validity of Hypothesis H1 a regression analysis of the four factors with the dependent variable 'intention to reduce the use of plastic bags' (see Appendix 6) showed that all of the factors were significant predictors of the dependent variable.

The most significant predictor is Factor 2 where R squared equals 0.47 indicating that awareness of the over use of plastic bags is the dominant aspect in reducing use.

The second but less contributing, however, significant factor is factor 3 which is concerned with the action an individual may take to reduce the use of plastic bags. For factor 3, R squared equals 0.10 giving a total variance accounted for as 57%.

The next less contributing significant factor is factor 1 which concerns the recognition of personal and social benefits from the re-use of plastic bags. Here, R squared equals 0.03 giving a total variance accounted for as 60%.

The fourth and last is factor 4 which is concerned with the promotion of the use of alternatives. Here, R squared is only 0.003 (i.e. only 0.3% of the variance) and while it remains significant adds little to the overall variance accounted for.

The factors 2, 3 and 1 are all significant at f=<0.001 while factor 4 is only just significant at f=0.03 confirming the choice of a four factor solution model.

These results confirm hypothesis H1 where all of the factors are significantly related to the dependent variable 'intention to reduce the use of plastic bags'.

The Analysis of the Demographic Variables for Hypotheses H2-H8

To determine the relationships between any of the demographic variables and both the dependent variable 'intention to reduce the use of plastic bags' and the scale 'Use of plastic bags in Bangkok' including the associated four factors (see Fig 1) a correlation analysis was used (see Appendix 7).

The analyses yield the following results:

For H2 the demographic variable Gender is significantly negatively related (p<0.002) to both the dependent and independent variables and all of the associated factors.

For H3 the demographic variable Nationality is significantly positively related (p<0.005) only to Factor3 (Personal action to minimize the use of plastic bags) of the independent variable.

For H4 the demographic variable Age is significantly positively related (p<0.004) only to Factor3 (Personal action to minimize the use of plastic bags) of the independent variable.

For H5, H6, H7 and H8 and the respective demographic variables Household Members, Shopping Frequency, Income and Education are all unrelated to both the dependent and independent variables.

For H9, the demographic variable Occupation, is negatively related to Factor2 (Awareness of the over-use of plastic bags) (p<0.056) and significantly negatively related to Factor4 (Promote the use of alternatives) (p<0.008) of the independent variable.

In summary, the null hypotheses was accepted for H5, H6, H7 and H8 where demographic variables Household Members, Shopping Frequency, Income and Education are all unrelated to both the dependent and independent variables. The only demographic variable that is significantly related to both the independent and dependent variable is 'Gender' where the null hypothesis is rejected. Furthermore, Gender is seen more as a direct predictor of the dependant variable (r=-0.12, p=0.002) rather than a multiplicative moderator of the independent variable.

Discussion

The study shows that the independent variable 'Use of plastic bags in Bangkok' can be partitioned into four factors all of which are significant predictors of the dependent variable 'Intention to reduce the use of plastic bags'.

The most significant of the factors is factor 2 which concerns awareness of the over-use of plastic bags and reflects into priority campaign actions that provide much more informative literature illustrating the damage discarded plastic materials cause to the environment and potentially those who inhabit the planet. The second most significant factor is factor3 which concerns actions that an individual can take to reduce the use of plastic bags. In this factor the focus is on reuse of plastic material such as boxes for take-away food and multiuse bags (which may contain some plastic material). In the case of the takeaway boxes the easier solution is for the retailer to offer a recycle facility where used boxes can be deposited for recycling. In the case of the re-useable bag the

convenience of compact cotton bags and trendy design seems to be less important (relegated to factor 4) probably because most people make use of a car to do their main shopping where durability and strength rather than type are more important. The third most significant factor is factor 1 which is concerned with the recognition of the personal and social benefits of the re-use of plastic bags. Here, the focus is about social and personal rewards from being seen as a person who is interested and supportive of efforts to maximize the re-use of plastic materials, particularly single use products. The rewards are largely psychological and involve a sense of satisfaction from intrinsically motivated action. This seems a better explanation than 'habit' (defined as learnt actions that are triggered automatically in response to contextual cues that have been associated with their performance) particularity as both 'Shopping Frequency' and 'Education' have no significant relationship with either of the dependent or independent variables. The fourth and least significant factor, factor 4, accounts for less than 1% of the variance and is concerned with convenient alternatives, particularly the cotton bag. While remaining significant it would appear that the main use of plastic bags centers on the carrying of bulk shopping (using a car) rather than the occasional random shop where the cotton bag may be more convenient to carry and use.

The demographic variable 'Gender' has a significant negative effect towards the reduction of plastic bags indicating that the target of '3R' (Reduce, Reuse, Recycling) campaigns should have a feminine bias to be most effective. The variables 'Nationality' and 'Age' both have a significant positive effect but only on factor 3 indicating that all of the nationality groups and individuals of increasing age consider personal action an important aspect in minimizing the use of plastic bags. This finding implicates culture as an important aspect and suggests that the actions of governments should be focused on the cultural issue of waste recycling rather than particular projects. The four variables, 'Number of household members', 'Shopping Frequency', 'Income' and 'Education' have no significant relationships with any of the other variables indicating that both the independent and dependent variables are unaffected. The last of the demographic variable 'Occupation' has a negative relationship with both factor 2 (Awareness of overuse) and factor 4 (Promotion of alternatives) of the independent variable indicating that employees have a greater interest in reducing the use of plastic bags than employers.

Conclusions

The study concludes that the four factors of the independent variable 'use of plastic bags in Bangkok' and four of the demographic variables 'Gender', 'Nationality', 'Age', and 'Occupation' are all significantly related to the dependent variable 'Intention to reduce the use of plastic bags'.

The promotion of this 'awareness' is seen as best provided by cultural interventions from the government as well as the private and public sectors. While there is no relationship between both dependent and independent variables and Education this may be due to education being operationalized in this study as educational status rather

than learning. Thus, the promotion of the awareness of the dangers of overuse is well placed in the environmental studies curriculum of school children and would help integration into family behaviour. The focus of such initiatives should be a concern for the environment via waste control and recycling as a personal issue leading to cultural adjustment rather than promotion of any particular project. The results of the study also indicate that if the content of any educational material is more relevant to the female members of society it will be most effective. This bias is particularly relevant as the female members traditionally still tend to be more involved in the family shopping (where the bulk of plastic bag use occurs) and because of the social impact of their influence. From the viewpoint of the retailer (the main supplier of plastic bags) they too can be more responsible by providing a greater focus on recycling and the provision of collection points for unwanted items (plastics, chemicals and electronics). This may be more easily done and impactful by bigger stores as they are the main providers of plastic bags, have more space and finance support available.

There seems to be a particular problem in Bangkok over the use of plastic containers for take-away food. These can be easily replaced by suitably engineered paper containers along with carrier bags made from recycled paper (Muthu et al 2012). Bags made from recycled paper are an overall economic replacement for plastic bags particularly in the area of small occasional purchases.

These moves would relegate plastic to multi-use bags which could be supplied (and subsidized) by the larger retailers who in turn could demonstrate their support by suitable advertising on the side of the bag. These bags have a home in the boot of the family car ready for bulk shopping. Rather than promoting products that are 'fit for purpose' some initiatives have proposed a relatively small charge for the use of single use plastic bags at the point of sale. As the bag cost is usually small compared to the purchased item the desired impact is only short term.

Limitations of Study

While recycling and recycling campaigns are nothing new to Thailand, research on the topic has been very thin spread. Hence, the research original concept was designed to explore a wide scope of questions related to the topic of plastic bag use.

A weakness of the study is that the sample was not randomized as intended. While questionnaires were answered in a wide geographical area covering the majority of Bangkok, the demography of the sample is not representative of the population of Bangkok. Female respondents and Bachelor graduates are over represented in the sample. Also, most interviews were conducted at the fieldworkers' work place, limiting the location of the interviews to be specific which might have also encouraged more socially desirable answers.

We also have to conclude that the questionnaire design might have led to a bias due to the nature of self-reported and self-evaluated data. For further studies, we recommend alternative survey methods like observations or diary reports to obtain eventually more accurate data on where plastic bag usage occurs.

Closing Remarks

Countries and communities have been implementing policies to reduce if not ban plastic bags over the last decades. As it became evident in the last paragraph the path to a policy that aims at reducing plastic bags is highly political. Decisions can be made for popular reasons but are usually short term. Multiple studies have questioned the popular approaches to reduce plastic bags by showing that some decisions can be misguided and actions against plastic bags do not tackle the core of the problem, which is the increasing amount of waste in general. As studies have shown, the use of reusable materials can yield far higher CO_2 footprints than single use plastic bags (Kimmel, 2014). In such scenario, a large scale systematic global networking waste management effort in all types might be needed as the problem is fairly large, and scattered all over the globe; another noticeable problem can be readily observed that some countries are doing more while others do less or none at all on this issue. Therefore, the issue is also about commitment from all sides which maybe only be caused by suitable behavioural and social changes. A caution may be that it is not clear how the amount of plastic bags used contribute to our solid waste generation, as it is suggested that the use may be overrated in public (Gesellschaft fuer Verpackungsmarktforschung, 2014). Hence, we need to understand the steps to reduce plastic bags as steps towards a confrontation of modern waste generation overall.

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Appendices

Appendix 1. Questionnaire (please contact principle author for complete details)

Item-Total Correlations

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Awa1	144.2659	278.779	.441	.383	.897
Awa2	143.8988	277.368	.552	.513	.896
Awa3	144.0967	274.142	.553	.454	.895
Per1	144.0483	274.884	.581	.498	.895
Per2	144.3036	274.563	.506	.465	.896
Per3	144.2372	277.715	.422	.308	.897
Att1	144.1737	278.062	.431	.392	.897
Att2	144.3459	272.883	.575	.498	.895
Att3	143.9290	274.934	.621	.533	.895
Con1	144.8066	289.179	.053	.443	.903
Con2	144.6601	290.833	.009	.426	.903
Atr1	144.5136	279.285	.351	.298	.898
Atr2	144.4275	277.434	.401	.340	.897
Cons1	144.3852	275.384	.488	.393	.896
Cons2	144.5483	275.358	.465	.333	.896
Env1	144.3399	273.223	.580	.655	.895
Env2	144.2976	274.391	.571	.570	.895
BM1	145.4260	292.478	-.040	.299	.905
Life1	144.1375	278.945	.423	.302	.897
PAC1	144.5891	276.315	.498	.389	.896
PAC2	144.1541	275.725	.530	.466	.896
Alt1	144.5725	285.095	.153	.273	.902
Alt2	144.0665	277.366	.533	.422	.896
Alt3	144.2855	284.428	.213	.339	.900
SP1	143.9728	276.810	.523	.504	.896
SP2	144.2598	274.102	.595	.557	.895
Sit1	145.7281	282.664	.207	.389	.901
Sit2	144.5287	288.095	.106	.280	.901
Sit3	145.5000	277.908	.311	.420	.899
PR1	144.8278	275.144	.451	.451	.897
Fun1	144.3746	273.067	.541	.435	.895
Fun2	144.2432	274.320	.580	.484	.895
Fun3	144.2054	274.484	.580	.497	.895
EI1	144.2190	274.332	.577	.456	.895
EI2	145.0650	274.245	.403	.425	.898
GoR1	144.7976	272.370	.489	.529	.896
GoR2	144.8338	274.317	.430	.475	.897
GoR3	144.1813	273.616	.586	.465	.895

Note: The 7 items marked in Yellow all have low item total correlation

Appendix 3 (Final Scale 31 items)

Item-Total Correlations

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Awa1	119.6847	255.720	.443	.373	.922
Awa2	119.3183	254.554	.547	.505	.920
Awa3	119.5240	250.644	.571	.455	.920
Per1	119.4730	251.245	.605	.473	.920
Per2	119.7312	251.060	.522	.457	.921
Per3	119.6607	253.503	.461	.287	.921
Att2	119.7733	249.027	.609	.492	.919
Att3	119.3483	251.785	.634	.524	.919
Cons1	119.8123	251.774	.507	.383	.921
Cons2	119.9745	252.154	.475	.311	.921
Env1	119.7658	248.904	.629	.633	.919
Env2	119.7222	250.574	.607	.560	.920
Life1	119.5601	255.582	.434	.293	.922
PAC1	120.0150	252.502	.528	.368	.921
PAC2	119.5781	252.789	.532	.448	.920
Alt2	119.4895	254.458	.531	.415	.921
SP1	119.4009	253.645	.528	.476	.921
SP2	119.6832	249.961	.646	.542	.919
PR1	120.2508	250.925	.493	.431	.921
Fun1	119.8003	250.172	.544	.426	.920
Fun2	119.6667	251.278	.587	.469	.920
Fun3	119.6291	251.232	.596	.488	.920
EI1	119.6456	251.086	.590	.443	.920
EI2	120.4895	251.011	.413	.412	.923
GoR1	120.2192	249.092	.505	.520	.921
GoR2	120.2568	251.409	.432	.468	.922
GoR3	119.6051	250.576	.594	.462	.920
Att1	119.5931	255.718	.409	.370	.922
Atr1	119.9354	256.987	.327	.284	.923
Atr2	119.8498	254.666	.394	.322	.922
Sit3	120.9219	254.256	.328	.374	.924

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.923	.927	31

Appendix 4 Factor Analysis (four factor solution)

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	9.945	32.080	32.080	9.945	32.080	32.080	4.398	14.187	14.187
2	2.185	7.048	39.128	2.185	7.048	39.128	4.356	14.051	28.238
3	1.632	5.263	44.391	1.632	5.263	44.391	3.601	11.617	39.855
4	1.440	4.646	49.037	1.440	4.646	49.037	2.846	9.181	49.037
5	1.205	3.887	52.924						
6	1.058	3.413	56.337						
7	.944	3.045	59.382						
8	.895	2.886	62.267						
9	.867	2.797	65.065						
10	.809	2.610	67.674						
11	.773	2.495	70.169						
12 – 31		.	100.000						

Extraction Method: Principal Component Analysis.

Rotated Component Matrix[a]

	Component			
	1	2	3	4
Att2	.681		.311	
Cons1	.671			
Awa3	.661			
Per2	.660			
Env1	.534	.376	.482	
Fun1	.523		.325	.374
Per1	.502	.369		
SP2	.489	.459	.311	
Att1	.484			
Per3	.473	.300		
Cons2	.335			
Awa2		.654		
Awa1		.654		
PAC2		.637		.320
GoR3		.594		.305
Att3	.415	.562		
Env2	.394	.538	.329	
SP1	.372	.462		.384
GoR2		.453	.449	
Life1		.415		
EI2			.736	
Sit3			.709	
PR1			.694	
GoR1		.429	.570	
PAC1		.358	.416	
Atr2				.663
Atr1				.623
Fun3			.364	.544
Alt2		.396		.530
Fun2			.353	.521
EI1		.351	.374	.389

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 7 iterations.

Factor 1 Recognition of personal and social benefits of the re-use of plastic bags

1	8	Att2	I prefer recyclable material over other plastic bag materials.
1	14	Cons1	I can use plastic bags more than 1 time.
1	3	Awa3	I reuse plastic bags when I have a chance
1	5	Per2	I think people who re-use single use plastic bags are admirable.
1	16	Env1	I am concerned about the pollution caused by plastic bags.
1	31	Fun1	If the plastic bag is durable, I do reuse it over and over again.
1	4	Per1	I think people who bring their own reusable bags for grocery shopping are commendable.
1	26	SP2	I can stand publicly for the importance of reducing plastic bag consumption.
1	7	Att1	Recycling plastic bags can solve environmental issues such as pollution or littering.
1	6	Per3	It is possible to totally reject the use of plastic bags.
1	15	Cons2	I can use other bags instead of plastic bags when I buy dry food.

Factor 2 Awareness of over use of Plastic bags

2	2	Awa2	People in Bangkok use too much plastic bags.
2	1	Awa1	The danger of using plastic bags is imminent.
2	21	PAC2	I feel that public/private sector should have more budget on '3R' (reduce, reuse, recycle) plastic bag campaigns.
2	38	GoR3	I agree for government authorities to raise awareness in the community about the dangers of plastic bags.
2	9	Att3	I think we need to reduce the use of plastic bags in Bangkok.
2	17	Env2	I consider reducing the use of plastic bags because it is harmful to the environment.
2	25	SP1	I can reject single use plastic bag when purchasing a single handy item even when others don't.
2	37	GoR2	I agree if the government introduces a tax for plastic bags.
2	19	Life1	I prefer to eat at home or at a restaurant more than buying packed ready to eat food in the convenience store or at the market

Factor 3 Personal action to minimise the use of plastic bags

3	35	EI2	I bring my own Tupperware/lunch box to a restaurant when I don't want to pay extra for takeaway boxes.
3	29	Sit3	I prepare my own Tupperware/lunch box to the restaurant, if I want to get takeaway food.
3	30	PR1	I rather bring my own cotton bag instead of paying for a single use plastic bags.
3	36	GoR1	I agree to government banning the use of plastic bag in supermarket, 7/11, and family mart
3	20	PAC1	I invite my family and friends to participate in activities about reducing plastic bag consumption.

Factor 4 Promote the use of alternatives

4	13	Atr2	I prefer to use a cotton bag that has a trendy design.
4	12	Atr1	I reuse plastic bags that are beautiful and have a good design
4	33	Fun3	It's important for me that a cotton bag can be folded into small piece.
4	23	Alt2	I think that campaigns and activities such as offering discounts for not using plastic bags is a good motivation to use alternatives.
4	32	Fun2	I use a cotton bag if the cotton bag can carry heavy items.
4	34	EI1	I bring my own cotton bag if I get a discount on my shopping.

Appendix 6 Regression of the 4 factors with DV (intention to reduce the use of plastic bags)

Model Summary[e]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.692[a]	.479	.478	2.51763	.479	606.664	1	660	.000	
2	.762[b]	.580	.579	2.26100	.101	159.329	1	659	.000	
3	.780[c]	.608	.606	2.18701	.028	46.344	1	658	.000	
4	.782[d]	.611	.608	2.18070	.003	4.813	1	657	.029	1.947

a. Predictors: (Constant), Factor2

b. Predictors: (Constant), Factor2, Factor3

c. Predictors: (Constant), Factor2, Factor3, Factor1

d. Predictors: (Constant), Factor2, Factor3, Factor1, Factor4

e. Dependent Variable: DV

Appendix 7

		DV	Factor1	Factor2	Factor3	Factor4	pbs31
DV	Pearson Correlation	1	.661	.702	.651	.582	.776
	Sig. (2-tailed)		.000	.000	.000	.000	.000
	N	678	672	673	674	676	663
Factor1	Pearson Correlation	.661	1	.709	.526	.618	.898
	Sig. (2-tailed)	.000		.000	.000	.000	.000
	N	672	675	671	671	673	666
Factor2	Pearson Correlation	.702	.709	1	.559	.653	.870
	Sig. (2-tailed)	.000	.000		.000	.000	.000
	N	673	671	676	672	674	666
Factor3	Pearson Correlation	.651	.526	.559	1	.528	.736
	Sig. (2-tailed)	.000	.000	.000		.000	.000
	N	674	671	672	677	675	665
Factor4	Pearson Correlation	.582	.618	.653	.528	1	.798
	Sig. (2-tailed)	.000	.000	.000	.000		.000
	N	676	673	674	675	679	666
pbs31	Pearson Correlation	.776	.898	.870	.736	.798	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
	N	663	666	666	665	666	666
Gender of Respondents	Pearson Correlation	-.116	-.165	-.158	-.149	-.199	-.208
	Sig. (2-tailed)	.002	.000	.000	.000	.000	.000
	N	678	675	676	677	679	666
Nationalities	Pearson Correlation	.025	-.007	.039	.109	.022	.039
	Sig. (2-tailed)	.516	.864	.317	.005	.576	.311
	N	678	675	676	677	679	666
Age of Respondents	Pearson Correlation	.046	-.025	.026	.110	.016	.033
	Sig. (2-tailed)	.230	.511	.493	.004	.682	.397
	N	678	675	676	677	679	666
Number of household members	Pearson Correlation	-.059	-.043	.014	-.056	.017	-.027
	Sig. (2-tailed)	.127	.270	.711	.145	.653	.482
	N	678	675	676	677	679	666
Frequency of grocery shopping	Pearson Correlation	.017	.057	.021	.026	.026	.052
	Sig. (2-tailed)	.668	.140	.589	.498	.505	.179
	N	678	675	676	677	679	666
Personal Income	Pearson Correlation	.000	-.026	.054	-.016	-.030	-.013
	Sig. (2-tailed)	.999	.504	.169	.683	.448	.750
	N	660	658	658	659	661	649
Educational Background	Pearson Correlation	.040	.062	.033	.028	.005	.036
	Sig. (2-tailed)	.296	.109	.398	.466	.890	.349
	N	676	674	674	675	677	665
Occupation	Pearson Correlation	.010	-.033	-.074	-.016	-.102	-.058
	Sig. (2-tailed)	.798	.389	.056	.682	.008	.135
	N	676	674	674	675	677	665