

## LOW-HANGING FRUITS: IMPACT OF SOCIO-ECONOMIC AND BEHAVIOURAL CHARACTERISTICS ON CONSUMERS' WILLINGNESS TO PAY

Norzalina Zainudin<sup>1</sup>, Chamhuri Siwar<sup>2</sup>, Er Ah Choy<sup>3</sup> and Norshamliza Chamhuri<sup>4</sup>

### Abstract

Energy efficiency is generally recognized as the “low-hanging fruit in a country’s pursuit of energy security and low carbon economy. The promotion of energy efficient products at home is considered as a cost effective way in reducing energy consumption for indoor building. This research aims to examine consumer willingness to pay (WTP) in respect to energy label air-conditioner products. For this purposes, study discussed two main hypotheses which relate to socio-economic and behavioural characteristics. Result from the ordered logit model shows that income, household’s size, perceived of product advantages and perceived behaviour control negative have a significant impact on consumers’ willingness to pay. The findings of the study will contribute to the knowledge on how individual values for the environmental product innovation by making pragmatic policy recommendations that formulate strategies for addressing bottlenecks in accessing energy services by consumers. Understanding the consumers’ willingness to pay will provide invaluable insights into consumer oriented market segment with new avenues for marketers’ thought into green marketing strategy. These findings also would assist Malaysian green innovation product firms to successfully market in Malaysia.

Keywords: socio-economics, behavioural characteristics, energy efficiency, willingness to pay.

### INTRODUCTION

The promotion of energy efficiency as a policy has often been identified as the most cost effective tool to manage the demand for energy. Developing and maintaining wide-scale energy saving policies are considered to be the most reliable, technically acceptable, economically affordable, and environmentally sensible way to overcome the negative consequences of energy production and consumption. United Nations (2011) stated that the effort of energy efficiency as the “low-hanging fruit” which enhanced energy productivity in the future. Energy efficiency could be very attractive investment as the capital investment is recovered in a reasonable time period, lower energy costs, and enhance the energy productivity. Thus this effort very much helping nations and business to be better prepared against any sharp hikes in fossil fuel prices.

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<sup>1</sup> Department of Economics and Management, Faculty of Management and Muamalah, Selangor International Islamic University College, Selangor, Malaysia. \*Corresponding author: Tel: +603-8911 7182, Fax: +603-8925 4472, Email: norzalina@kuis.edu.my

<sup>2</sup> Institute for Environment and Development, Universiti Kebangsaan Malaysia.

<sup>3</sup> School of Social, Development and Environmental Studies, Faculty of Social Sciences and Humanities, Universiti Kebangsaan Malaysia

<sup>4</sup> School of Economics Studies, Faculty of Economics and Management, Universiti Kebangsaan Malaysia

According to Aman et al. (2012) consumption and environment are closely related. Human activities and any changes in consumption patterns have a strong impact to the health of the global environment. Household purchases decisions are particularly important in maintaining the quality of environment. Goods and services bought by consumers and the way they use them have a direct impact on air and water pollution, waste generation, habitat alteration and climate change. Study shows that in this century, the earth's environment has undergone severe destructive changes such as global warming, deforestation, pollution and acid rain (Omar et al., 2015). ERA Consumer Malaysia (2002) stated one of the crucial areas that reflects the changing consumption pattern is the demand for energy. Household electricity consumption has continued to grow with the increasing per capita income, resulting in the ownership of household appliances like air-conditioners, refrigerators, dishwashers, microwave ovens, washing machines and radio and television sets. Data shows that the electricity consumption by Malaysian was increasing from 5.6 percent to 6.0 percent from 2005 to 2010. A study on household energy consumption in a big city of Johor Bahru, Malaysia found high user of electrical appliances at home. Almost all of respondents own at least one of the items namely television (100 percent), refrigerator (99 percent), washing machine (96 percent), rice cooker (95 percent) and ceiling fan (93 percent) (Kubota et al. 2011).

Study also said that the changing role of women in society is another factor that influences the rising demand for electrical appliances. In the urban area, many women play a dual role as traditional housekeepers and wage earners to supplement the family income in order to cope with the rising cost of living. With limited time in hand, busy working women often rely on electrical gadgets to do some of their household chores like cooking, washing and cleaning. Micro studies among rural and low-cost housing shows the similar trend (ERA consumer Malaysia, 2002). This may leads to an increasing level of carbon dioxide (CO<sub>2</sub>) emission which significantly contributes to the problem of global warming and climate change. Consequently, the uncomfortable environment will encourage household to reduce heat at home with the use of air conditioning (Jusoh, 2015).

Due to important of appliances in our daily lifestyle (for cooling, heating, entertainment, cooking or cleaning) and the environmental quality concerns, policy makers worldwide are attaching more important to the adoption of such energy efficient products. Previous studies have shown that the use of energy efficient appliances can be economically viable way to reduce energy cost and CO<sub>2</sub> emission (Chatterjee & Suresh, 2012; Ha & Swinder 2012). The use of energy efficient products could enhance the prevention of some of the environmental impact associated with the consumption of conventional electrical products. Indeed the benefits of consuming energy efficient products can be more economically to the user in term of reducing monthly electricity bill. Hence, the use of energy efficient products has the potential to play an important part in reducing overall energy demand and CO<sub>2</sub> emission and to contribute towards more sustainable system of energy production and consumption. Since energy efficient products are relatively new for Malaysia business, there are only few studies about the product

and marketing in Malaysia. Thus, it is imperative to understand consumers' willingness to pay (WTP) towards energy label air-conditioner in Malaysia, where the trend is still new. In this context, consumers' response has been identified as a key challenge that firms are facing when developing and marketing green innovation products like energy efficient appliances.

Therefore this study attempts to uncover the factors that cultivate the behaviour of consumer towards purchasing energy efficient home appliances which focus on the product of air conditioner. Numerous research have been conducted to understand sustainable purchasing behaviour but none focuses on energy efficient products. This study uses air conditioner because this product considered as one of the largest contributor of CO<sub>2</sub> emission while consuming a lot of electricity (Md. Jusoh 2015). Thus, this paper will discuss general characteristics of the consumers, the consumers' willingness to pay for air conditioners, determining factors which affect the amount of their willingness to pay and suggestions and policy implications in the perspective of conserving energy in Malaysia. Specifically, the main objective of the study can be divided to two, which are (a) to estimates consumers' willingness to pay for energy efficient air conditioners and (b) to analyse how socio-economic characteristics and behavioural characteristics of consumers relate to the willingness to pay on air-conditioner with energy efficiency label in Malaysia.

This paper is organized in five sections. The first section is designed to give specifically introduction to the importance of the study. Then followed by the discussion on previous studies that are related to the green consumption and behaviour. Data collection method, sample and study measurement are covered in part three of study methodology. The result discussed in section four and research limitation and suggestion for future study is summarized in the last section.

## **LITERATURE REVIEW**

There has been widespread research in the area of energy efficiency and environmental concern (Liu, 2012; Li, 2011; Ward, 2010; Galarraga et al., 2010). The main interest of this study are the efforts to evaluate consumer reaction to environmental goods which is specifically said as consumer willingness to pay for that particular products.

Empirical literature on consumer surveys reveal that consumers' socio-economic characteristics such as age, gender, level of education, income level, household size as well as the level of consumers' awareness and perceptions and product price tend to influence consumers' willingness to pay (WTP) for energy efficient products (Chatterjee & Suresh, 2012; Mills & Schleich, 2010; Galarraga et al., 2010). Mills and Schleich (2009) showed that younger consumers, regardless of gender, paid higher premiums for energy efficient products. Empirical results on the effect of education and income on consumers' willingness to pay for energy efficient products appear to be mixed. Study in US consumers by Hirst and Goelz (1982) found that the higher levels of education are associated with greater energy saving activities. In contrast, the analysis Stead (2005) based on a survey in EU 15 member states on lighting and appliances in general do not imply statistically

significant impact of education levels.

As for the impact of income, some of studies related with new innovation products found negatively related with income (Kolondinsky & Thomas 2003; Kenneth 2007). The higher the income the lower consumers' willingness to pay. However results from most studies imply that higher income is positively related with energy saving activities (Dillman et al. (1983); Long (1993); Walsh (1989); Mills & Schleich (2010)). Therefore, study assume as the higher income households are less likely to face income constraints for investments in energy efficiency. Study hypotheses are as follow:

### **Study hypothesis 1:**

Socio-economic characteristics have a significant relationship to consumers' willingness to pay.

Sub-hypothesis:

- H1a Gender (female) will be positively related to consumer willingness to pay.
- H1b Ethnicity (Malay) is positively related to consumers' willingness to pay.
- H1c Marital status (married) will be positively related to consumers' willingness to pay.
- H1d Level of education (degree and above) will be positively related to consumers' willingness to pay.
- H1e Household income (income more than RM3000 per month) will be positively related to consumers' willingness to pay.
- H1f Household size (more than seven people) will be negatively related to consumers' willingness to pay.

With respect to the issue of determinants of consumers' willingness to pay for eco-labelled products, economists and psychologists have developed a number of behavioural factors such as awareness, knowledge, attitude, personal norm, believe about products, responsibility and social norm. Previous studies on these factors can be found in (Chiou, 1998; Mills & Schleich, 2009; Steg & De Groot, 2010; Chen, 2010; Larsson & Khan, 2011; Aman et al., 2012; Nabsiah & Ismail, n.d.). Thus, the second objective of this study is to estimate how these behavioural factors affect consumer willingness to pay. Then study proposed hypothesis two as:

### **Study's hypothesis 2:**

Consumers' behavioural characteristics have a significant relationship with their willingness to pay on energy labelled air-conditioner.

Attitude has been cited as an important construct for understanding consumer behaviour. Prior studies (Bagozzi, 1992; Iravani et al., 2012) has been noted as an

evaluative appraisal. If an individual makes a favourable evaluation judgement, then attitude will lead to consumers' intention to perform the behaviour. The role of attitude has been discussed in many behaviour theories such as Theory of Reasoned Action (TRA) (Ajzen & Fishben, 1975), Technology Acceptance Model (TAM) (Davis 1989) and Theory of Planned Behaviour (TPB) (Ajzen, 1991). Thus, study proposes sub-hypothesis from hypothesis 2 as:

H2a Attitude is positively related to consumers' willingness to pay.

Consumers' perception on product quality or belief whether purchasing green product is good for the environment or individual was found positively related to consumers' willingness to pay. If consumers value that the products or services are good, then they are more willing to pay for the goods or services. According to Rogers (2003), consumers' evaluation of product characteristics is likely to yield low or high WTP for new innovation products. An innovation's relative advantage reflects to the degree in which an innovation is perceived as being better than the idea it supersedes. Recent empirical studies around green innovations tend to confirm this, showing that consumers associate various advantages of energy efficient products and energy saving measures including energy cost savings (Chatterjee & Suresh, 2012), environmental friendliness (Ha & Swinder, 2012) and independence from conventional sources of fuel (Mills & Schleich, 2010). Thus, study intent to analyse how consumers' perception on the advantages of energy efficient air-conditioner relates with their willingness to pay as hypothesis H2c below.

H2c Perceived product advantages will be positively related to consumers' willingness to pay.

Previous studies (Larsson & Khan, 2011; Honabarger, 2011) has shown the important of social relation factors such as families and friends in influencing individual behaviour. As described by Ajzen (1991), social influences or subjective norm is a function of belief about expectations of important referents others and individual motivation of complying with these referents. This study will test on how important people in the individual's life feel that person should be more willing to pay higher or not for energy efficient air-conditioner. Thus hypothesis stated as follow:

H2b Subjective norm is positively related to consumers' willingness to pay.

Individual perception of aids or barriers to perform a specific behaviour is also important to individual in performing environmental action. Perceived behaviour control as stated in TPB explained on how this factor is important in influencing a person's behavioural intention particularly when the behaviour is not wholly volitional control (Chiou, 1998). Rogers (2003) said, complexity may influence consumers' adoption for a new products. Complexity may refers to the degree to

which an innovation is perceived as being difficult to use or understand. Most energy efficient products considered as a high involvement products and require significant cognitive efforts. Thus, complexity associated with an innovation can ultimately result in lower WTP. Therefore, this study focus on analysing individual negative perception on their willingness to pay.

H2d Perceived behavioural control negative will be negatively related to consumers' willingness to pay.

Norm Activation Theory (NAT) has been highlighted the importance of personal norms as self-expectations that are based on internalized values (Schwartz, 1977). Schwartz said personal norms reflect commitment with internalized values and are experienced as feelings of personal obligation to engage in a certain behaviour. Feelings of personal obligation will be activate when someone is aware of the consequences of one's behaviour for the welfare of others and when individual ascribes at least some responsibilities for these consequences to oneself. Then this study test these two factors as follow:

H2e Responsibility is positively related to consumers' willingness to pay.

H2f Personal norm is positively related to consumers' willingness to pay.

## **METHODOLOGY**

Previous studies have included both stated preference and revealed preference approaches in measuring consumers' willingness to pay (Bhattacharjee & Petrolia, 2008; Tsen et al., 2006). Revealed preference (RP) basically examine consumers' actions in actual marketplace setting. Compare to RP, in stated preference (SP) research is one of the popular methods in evaluating WTP because it allows the researcher to place consumers in an easily controlled hypothetical marketplace and give them a choice amongst several alternatives (Anderson & Hansen, 2004). Thus, this study uses contingent valuation survey of 500 residents in six cities in Malaysia. Subjects were selected from users and non-users of energy label air-conditioner and they were personally contacted and asked to complete a self-administered questionnaire, which took approximately fifteen to twenty minutes for respondents to complete. By the end of July 2014, 418 questionnaires had been returned (83.6 percent) of which 392 were fully completed and these have been used for further analysis.

In contingent valuation surveys, hypothetical markets are set up in which consumers' willingness to pay for products are solicited by asking respondents to value the products contingent on the available market. Where market prices already existing for the product, contingent valuation surveys tend to focus on the premiums that consumers are willing to pay for the product. In this survey, we employed the single bounded approach where individuals are offered only one bid to pay or reject.

To determine the factors that may influence consumers' willingness to pay for energy label air-conditioner we will apply the ordered logit model. This model is

one method applicable for analysing the determinants of choice between four alternative value of willingness to pay, ranging from 1 to 4. The explanatory variables were then regressed on thirteen possible outcomes of willingness to pay.

The general form of the logit model can be formulated as follow:

$$\begin{aligned}
 Y &= 1 \text{ if } Y^* \leq \mu_1 \text{ (not willing to pay)} \\
 Y &= 2 \text{ if } \mu_1 < Y^* \leq \mu_2 \text{ (less than 5 percent of WTP)} \\
 Y &= 3 \text{ if } \mu_2 < Y^* \leq \mu_3 \text{ (more than 6 to 20 percent of WTP)} \\
 Y &= 4 \text{ if } Y^* > \mu_3 \text{ (more than 20 percent of WTP)}
 \end{aligned}$$

## RESULTS AND DISCUSSION

The characteristics of the data gathered from the respondents of various geographical locations indicated that participants were 192 males and 200 females with average in age are from 26 to 54 years with a mean age of 41.3 years. In terms of gender distribution, the proportion of women in our sample (51 per cent) was found to be higher than the corresponding proportion in the nationwide population. This is reflective of the Malaysian context where shopping on behalf of the household is done more by women than by men.

In total 29 percent of participants indicated that their gross income was "less than RM3,000, 25 percent "between RM3,001 and RM4,500", 14 percent "more than RM4,500 and RM6,000" and then 8 percent are more than RM9000 and above. The distribution of highest educational level attained showed 30.9 percent had completed high school, 53 percent had completed a college or university degree, and 8 percent had attained a master or doctoral degree.

**Table 1: Consumers' willingness to pay for energy efficient air-conditioner.**

Willingness to pay (WTP)	Percent
Not willing to pay	37.5
Less than 5 percent of WTP	43.4
More than 6 to 20 percent of WTP	18.4
More than 20 percent of WTP	0.8
Mean	1.824
Medium	2.000

The estimation presented in Table 1 was used to determine the mean and median WTP for air-conditioner. The result clearly shows that WTP is lower, at less than 5 percent (43.4 percent) and more than 37 percent are not willing to pay more for energy efficient air-conditioner. Less than 20 percent of consumers willing to pay between 6 to 20 percent more compared to non-energy efficient air-conditioner. The result of consumers' mean and median WTP clearly shows that the WTP are

lower and less than 5 percent more compared to non-energy efficient products. Therefore, the results suggest consumers' willingness to pay for is significantly lower than actual market price.

The result of the logit analysis is presented in Table 2. The model specification is statistical significant and the fit of the model is acceptable as indicated by the goodness of fit measures, which can be interpreted much as the R2 measure in multiple regression analysis (Hair et al 2006). Of the thirteen variables included in the model, income, number of household, perceived product advantages, perceived behavioural control negative all appear as significant beyond the 5 percent level, except perceived product advantages which is significant at 10 percent level.

Looking first at the socio-economic characteristics, it is seen that income has a negative and significant effect on the willingness to pay for energy efficient air-conditioner. It is shown that those individuals with higher incomes are less likely to pay extra for energy efficient air-conditioner. Number of household is also significant but positively relates with consumer willingness to pay.

Gender, ethnicity, marital status, education and location appear to have no influence on consumers' willingness to pay for energy efficient air-conditioner. This result also agree with the study by Liu (2012) for consumer in Taiwan who found no significant impact of gender and the importance of income to the consumers' willingness to pay.

Table 2 also reveals that consumers who perceive and believe better product quality are willing to pay amounts on the air-conditioner with energy efficient label. The results indicates that consumers' that are believe investing in energy efficient air-conditioner will make them more cost saving and associated with environmental friendliness, which also translates into higher WTP.

Perceived behavioural control negative or uncertainty related to the product performance and technology has a negative influence on WTP. Consumers' perceptions complexity of the products found significantly negative with WTP. This result is not surprising, since energy efficient products are still new in Malaysian market and consumers' perception on products performance, technology and efforts are critical in decision making process. This finding shows, when consumers' perceived usage barriers on performing the behaviour, then this will lead to lower WTP on energy efficient air-conditioner. Therefore, this factor found as the most important determinant of resistance on the adoption of energy efficient products in Malaysian market.

**Table 2: Ordered logit model: influence of individual, household and behavioural characteristics on willingness to pay for energy label air-conditioner.**

Variables		Estimate ( $\beta$ )	Std. Error
Socio-economic characteristics	Gender	-0.037	0.201
	Ethnicity	0.497	0.315



	Marital status	0.260	0.234
	Level of education	-0.370	0.227
	Household income	-0.432**	0.222
	Household size	0.516**	0.242
	Location	-0.163	0.221
Behavioural characteristics	Attitude	0.006	0.020
	Subjective norm	0.015	0.014
	Perceived product advantages	0.070*	0.037
	Perceived behaviour control negative	-0.020***	0.008
	Responsibility	-0.004	0.020
	Personal norm	-0.033	0.030
	Constant	845.679	
	Chi-square statistic	58.569***	
	Pseudo R <sup>2</sup> Mc Fadden	0.069	

Note: \*\*, \*\*\* significant  $p < 0.001$  and  $p < 0.05$

## CONCLUSION

Energy efficiency is an important mean and initiative in reducing carbon emissions and global warming and has called government attention to its impacts on human activities. A key challenge facing producers are selling green innovation products at a competitive prices. This leads to concern whether consumers prefer to buy energy efficient products in the market. Estimating the willingness to pay not only provides the evidence for product makers as part of information for decision making, but also offers the useful measures for policy makers to design available instruments for the issue of global warming.

Based on empirical results we bring how the consumers' perceived on product advantages and perceived behavioural control negative as dominant factors in influencing consumers' willingness to pay. Therefore, this information can be used by marketers to improvise their marketing strategies. Green marketing is a continuous process that requires constant inputs from the suppliers, government legislations and policies, and consumers. This is required so that the businesses green marketing strategies can be aligned to the target markets and gain sustainable competitive advantages.

This study also contributes to a growing body of knowledge in the energy policy domain. The results suggest that perception factor either the benefits or negative about products are very important in explaining consumers' willingness to pay. It is important that strategies and policies in relation to energy efficient initiatives to build up consumers' confidence and trust on the benefits of energy efficient products. The finding of the study will contribute to the enhancement of

consumers' beliefs on energy efficient products by making pragmatic policy recommendations that formulate strategies for addressing bottlenecks in accessing energy services by consumers. The findings of this study have implied that urban Malaysia may be more effectively targeted by the marketers using the strategies which encourage these groups to be more eco-friendly users.

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