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Article

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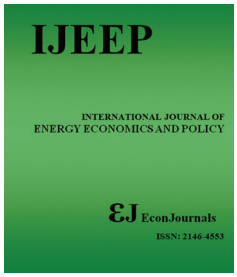

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Energy Efficiency Labelling: Investigating Students' Preferences and Awareness on the Energy-efficient Electrical Appliances in Hostel

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ABSTRACT

The significant role of energy efficiency labelling should not be ignored as it provides various information that serve as a guideline when people make purchasing decision. It indicates projection energy consumption of an electrical equipment according to energy efficiency rating system. This study applied choice experiment (CE) method in which the conditional logit (CL) model was valued to determine students' willingness to pay (WTP) based on their preferences of the energy label attributes of table fans. A questionnaire survey was distributed to 151 on-campus students in Terengganu, Malaysia. The attributes were speed of fan, energy consumption and energy star and price of fan. The study found that the students mostly preferred energy consumption attribute with WTP estimation of RM123.538 (USD29.66) at level two and RM42.88 (USD10.30) at level three. These findings illustrate how people place value on monetary and non-monetary attributes based on their preferences. A label with energy-efficient standard makes it easier for utility companies and government energy-conservation organizations to offer consumers incentives to purchase energy-efficient products. The usefulness of energy efficiency label is very reliant in terms of how it portrays information to the people and promote energy conservation.

Keywords: Choice Experiment, Energy Label, Energy Efficiency, Energy Conservation, Table Fan, Willingness to Pay
JEL Classifications: D1, Q0, Q4, Q5

1. INTRODUCTION

In the context of economic growth, the Global Energy Statistical Yearbook (2020) reported the global electricity consumption has increased by 0.7% in 2019 compared to an average of 3% per year between the year 2000 and 2018. China was ranked first, accounting for 28% of the global electricity consumption which grew by 4.5% in 2019 compared to 10% annual increment due to the slowdown in electricity demand from industry. Developed countries showed a high electricity consumption pattern led by the United States (3866 TWh), followed by India (1230 TWh), Rusia (922 TWh) and Japan (918 TWh). Presently, Malaysia, a developing country, consumes energy at 155 TWh. Several studies have shown a positive relationship between electricity consumption and economic growth. Zhang et al. (2017) explained that electricity provides sustainable power for economic and social development. Rapid economic development means higher electricity consumption which boosts the industrial economy. In order to develop the economy and at the same time reduce energy consumption, it is necessary to reveal the relationship between electricity consumption and economic growth. Some studies used dynamic error correction model to analyse electricity consumption in China and found that GDP was the most important factor related to China's electricity consumption (Zaman et al., 2015; Shiu et al., 2004). Therefore, there is a certain consistency between electricity consumption and economic growth domestically.

Hence, the implementation of energy efficiency (EE) labelling offers a clear and simple signal of energy-efficient products at the point of purchase for consumers to save money on their household

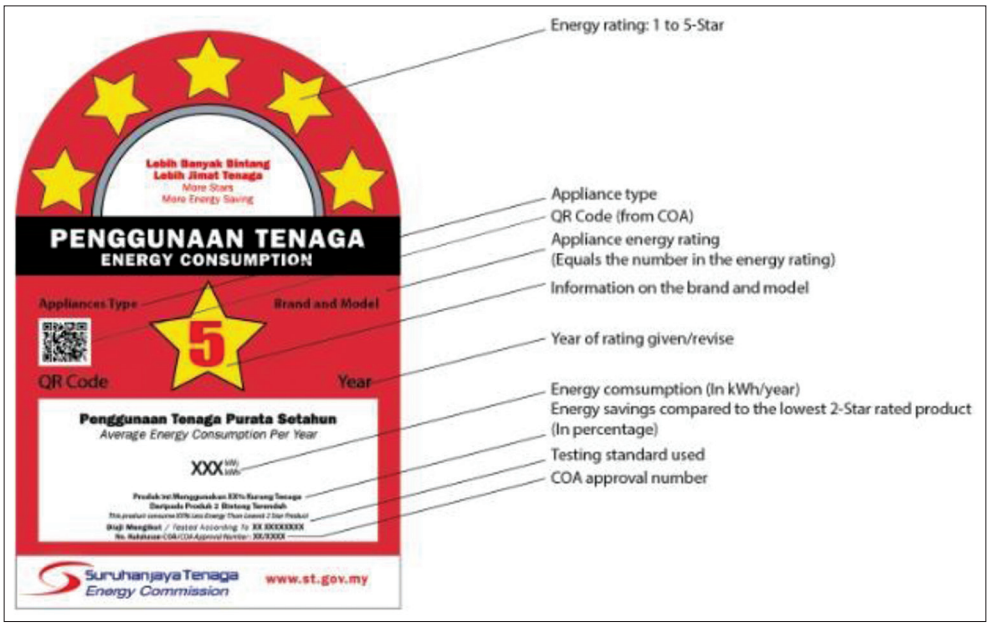
energy bills whilst reducing greenhouse gas emissions. The introduction of EE labelling on certain appliances and equipment is a good method to educate consumers on how to understand the cost of running a model and how energy efficient it is compared to similar models. Many countries take good actions by implementing EE labelling as it is an effective mechanism to deliver energy-saving products, reduce greenhouse gas emission, and obtain significant financial gain to consumers and society (Energy Charter Secretariat, 2009). The EE labelling can influence consumer choice in energy-efficient household appliances with different types of information. The running costs of some electrical appliances can far exceed the sale price, thus energy efficiency is an important factor when considering overall long-term value. EE labels for appliances have gained importance for promoting the sales of energy-efficient electrical appliances and buildings, with positive implications in the process of effective consumer decision-making, to give competitive advantage for the suppliers of energy-efficient goods, and to achieve societal goals such as mitigating climate change. The EE labels in Malaysia has been used as one of methods to promote energy-efficient equipment since 2009 and came into force in 2013. This label is self-printed by the manufacturer with guidelines provided by the Energy Commission (Energy Commission, 2020). Figure 1 illustrates the latest EE label that shows new label features such as QR code, year of rating given or revised and certificate of approval (COA) number.

Energy consumption in university buildings is determined by many factors such as building age, building type, equipment installed, occupancy, operating hours and weather conditions (Khuram et al., 2017). According to the Higher Education Statistics Agency (2019), electricity and gas consumption are the two major carbon-emitting sources of the higher education sector in England, with shares of 63% and 33% respectively. In response to a similar situation, the Malaysian government has promoted energy-efficient concept to many buildings in the country including public universities via the introduction of energy management program (Saleh et al., 2015). This is consistent with energy-saving initiatives at educational centres promoted by the ministry of higher education (MOHE) and the ministry of education (MOE) (Wai et al., 2011). Through a proper and systematic education program at tertiary level, it helps Malaysia to save money, reduce carbon footprint, and exhibit environmental leadership. Less-efficient energy consumption at the university leads to less financial and environmental sustainability. The EE label on electrical appliances at the student hostel may encourage energy-saving behaviour among students. It is important for the students to understand how their chosen appliances affect their electricity consumption pattern. Besides, the EE label promotes sustainable lifestyle among students.

This leads to the question on whether "Do the students understand the importance of EE label when purchasing electrical appliances – table fan in hostels?" This study therefore determines the importance of the EE label with other product attributes speed of fan, energy rating star, energy consumption and price in students' purchasing decision. The EE label transforms the attribute "energy consumption" into a search attribute by third-party certification, leading to individuals' purchasing decisions. Firms' activities which provide consumers with information about product characteristics are termed as "signalling" while consumers' activities that search for the product characteristics are called "screening" (Göbel, 2002). After realizing that a problem exists in attaining information about different product characteristics, the question arising is "What are the product characteristics that people prefer?"

This study also explores student preference and determines first, how much are they willing to pay for electrical appliances based on its attributes on EE label via marginal WTP. The purchasing decision to buy a table fan, for example, is determined by several

Figure 1: The latest EE label in Malaysia



Source: Energy Commission Malaysia (2020)

factors, namely the most common brand used in campus, its pervasiveness, and the apparently high relevance of EE label to students in order to make purchase. The government and university can use the information to determine which attributes in the EE label that are mostly preferred by the students in order to improve energy efficiency, cost saving and management in campus. This is imperative to attain Goal 7 of the Sustainable Development Goals (SDGs): Ensure access to affordable, reliable, sustainable and modern energy.

1.1. Energy Efficiency Labelling

The standardization of household appliances became prevalent just after the oil price shock in the 1970s. Both the United States and European countries announced that they were the first countries that implemented EE label and standard for household appliances. Nevertheless, the literature surveys showed that EE labelling has already been implemented in household appliances in more than 50 countries globally before the introduction of voluntary and mandatory environmental or energy certification schemes in the early 1990s (Abas and Mahlia, 2018; Wong and Kruger, 2017; Waide et al., 1997). In the early of 1962, Poland introduced the first mandatory EE label and standard for a range of industrial appliances, while the French government alleged mandatory energy efficiency standards for refrigerator in 1966 and 1978 for freezers. Other than that, Russia declared mandatory energy efficiency standard in 1976. However, much of this early legislation was poorly implemented and had little impact on the appliances' energy consumption and was cancelled in the late 1970s and early 1980. At present, EE labelling is common around the world and offers considerable promises in reducing the financial cost and environmental damage associated with energy use (Gerarden et al., 2017; Bennett and James, 2017; Brown, 2015; Stephen and James, 2003).

In 2000, 15 countries adopted mandatory EE label and standard. Among the Southeast Asian nations, Philippines and Thailand were leading the way towards the development of national standard for energy conservation. Other countries such as Australia, Brazil, Canada, China, Japan, India, Korea, Mexico and Taiwan, have applied either energy standards or energy labelling or both. Standardization procedure and EE labelling can create awareness among consumers on how to use energy efficiently (Ahmed et al., 2011; Mahlia and Saidur, 2010). For example, the US ENERGY STAR label indicates that the labelled appliance is more energy efficient than an unlabelled appliance used to assist consumers' decision-making by providing information. Moreover, the European energy label enables consumers to compare the energy efficiency of appliances (Cardoso et al., 2012; Galarraga et al., 2011; Heinzle and Wüstenhagen 2012; Mills and Schleich 2010; Murray and Mills, 2011; Sammer and Wüstenhagen, 2006; Ward et al., 2011). Similarly, eco-label certifies that the environmental friendliness of products can be used to assist consumers' green purchasing habits by providing information about environmental attributes of products, for instance EU eco-label, the Nordic swan environmental label, and the carbon footprint label (Brouhle and Khanna 2012; Cohen and Vandenbergh 2012; Hansla, 2011; Srinivasan and Blomquist, 2009).

However, there have been no studies about EE labelling in Malaysia through economic valuation and consumer preference perspectives. For instance, Tan et al. (2017) showed that attitude, perceived behavioural control and moral norm were positively significant with purchase intention for energy-efficient household appliances, proving the extension of moral norms in the classical theory of planned behaviour to be a significant predictor for consumers' purchase intention. Policy implications like creating awareness for energy star labelling, enhancing minimum energy performance standard (MEPS) and the role of education in nurturing younger generations are addressed. Next, Kwong et al. (2018) reviews the energy management opportunities (EMOs) of miscellaneous electric loads (MELs) in both commercial and residential buildings in Malaysia by taking the legislative and regulatory requirements of such appliances into consideration. Several issues related to MELs are also highlighted, such as the distribution and marketing of uncertified electrical items, absence of mandatory energy efficiency testing and labelling requirements on certain appliances, extension of regulatory coverage to the presently non-regulated equipment and the awareness among the locals about purchasing certified electrical products. This paper identifies the energy-saving potential for electrical appliances and office equipment in Malaysian buildings by analysing the technical characteristics of the devices and the current law enforcement difficulties that hinder the potential of better energy efficiency. The regulatory, enforcement, energy use and other aspects of MELs are discussed. For instance, the Malaysian government has introduced regulations to ensure that the Energy Commission approves all regulated electric devices before they can be manufactured, imported, displayed, sold and advertised in the country. The results of the case study showed that at least 50% of the MELs energy consumption in household could be reduced if the existing non-rated devices are replaced with 5-star label. Furthermore, an additional of 5-7% energy-saving can be obtained if the most energy-efficient appliances are used.

Sammer and Wüstenhagen (2006) studied the influence of eco-label on consumer behaviour for household appliances in Switzerland through EU energy label on washing machines. This paper provides empirical data on the influence of eco-label on consumer behaviour for household appliances, reporting the results of a survey involving 151 choice-based conjoint interviews conducted in Switzerland during Spring 2004. Discrete choice analysis was applied to reveal the relative importance of various product attributes for consumers. The EU energy label was used for the product category chosen in the survey and the relative importance of this eco-label was compared with other product features such as brand name. The most important result from the analysis was the significant WTP for A-labelled energy efficient products. In comparison to the average price of products in the sample, this represents about 30% premium. This WTP for a labelled product is encouraging for marketers who want to differentiate themselves based on energy-efficient product attributes.

Jeong and Kim (2015) conducted a CE to investigate the effects of environmental and EE label on household choice of appliances in South Korea. Labelling program which is currently operated by the South Korean government was also considered in the

empirical study. It was found that households showed a positive preference for labelled appliances and for the intention to pay more for EE-labelled appliances. Consequently, in terms of the promotion for green appliances, South Korean government could expand the list of items mandatorily by including it in its labelling program. For manufacturers, it is worth noting that consumers properly identify the information regarding energy efficiency and environmental friendliness with reasonable monetary value. Thus, it is wise if appliance manufacturers to focus on improving energy efficiency grades and acquiring environmental labels. Banfi et al. (2008) also employed CE and focused on the benefits of energy-saving attributes valued by Swiss consumers. Two groups of respondents consisting of 163 apartment tenants and 142 house owners were asked to choose between their housing status quo and every several hypothetical situations with different attributes and prices. The estimation method is based on fixed effects of logit model. The results suggested that the consumers significantly value the benefits of energy-saving attributes. These benefits include individual energy-saving and environmental benefits, as well as comfort benefits namely thermal comfort, air quality and noise protection. The results showed a significant willingness to pay (WTP) for energy-efficiency attributes of rental apartments and of purchased houses. The WTP is generally higher than the costs of implementing these attributes. Therefore, it is economically reasonable for owners and housing promoters to invest in energy-saving measures. Meanwhile, from the policy-making point of view, the government intervention should be considered to accelerate the process of cost-reduction measures in order to improve energy efficiency in buildings.

Overall, previous studies highlighted the need for justifying the purpose of this research within the context of existing literature. These include how developing countries implemented the EE label and standard. For example, among the Southeast Asian countries, Philippines and Thailand are leading the way towards the development of national standard for energy conservation which can serve as a guideline for Malaysia. It can also be used to identify the empirical data on the influence of energy label on consumer behaviour or purchasing decision for household appliances, other than understanding how discrete choice was conducted and varied from one case study to another. Thus, it is worth to analyse the quantitative impacts of EE label on products and draw an optimal approach to improve the performance of labelling program in Malaysia.

2. RESEARCH METHODOLOGY

The survey was conducted among Universiti Malaysia Terengganu (UMT) on-campus residents (n = 151) involving eight blocks. They were asked about their awareness and preferences on EE label in selecting table fan.

2.1. Choice Experiment (CE) Method

Louviere et al. (2000) used choice experiment (CE) to assess non-market value to quantify goods that cannot be traded in the market based on Lancaster's (1976) consumer choice model and stochastic utility theory (Birol et al., 2006; Hanley et al., 1998; Sinha, 2006). This study demonstrates CE to estimate the WTP for electrical appliances amongst students who stay in the hostel. Choice experiment (CE) is also known as choice modelling (CM) which is widely used to estimate the value of various goods or bundles of attributes with an associated price. The practise can be seen in previous studies, Zha et al. (2020), measured consumers' awareness and attitudes regarding two electrical appliances namely washing machines and refrigerators. It was revealed that the energy level program is effective in China. Other than that, researchers examined on how consumers differentiate between appliances label categories on two appliances air conditioners and refrigerators (Manisha et al., 2018). The study found that there were differences in consumer response according to different usage patterns of the appliance. The CM includes a stated preference technique that frequently provides the identification of trade-off that each consumer makes between attributes. For instance, marginal value of changes in each attribute can be generated if individuals are willing to pay for one of the attributes to secure the change. CE also offers useful information for policy makers for efficient management with a well-structured and careful design using this method.

However, empirical data regarding the impact of energy label on buyers' responses are usually limited and there is a lack of studies on how consumers consider specific information displayed on the energy label in their purchasing decision. Thus, CE can portray selected attributes and their levels in order to offer a selection of consumer preferences between the EE label and its intangible features like energy saving and energy star.

2.2. Choice Experiment Design

The CE analysis is based on random utility model when consumer, *c*, obtains utility from choosing a combination of attributes. The model specifically shows that the utility which a consumer *c*, correlates with alternative *i*, stated as:

$$U_i^c = V_i^c + \varepsilon_i^c \quad (1)$$

The probability can be represented in parametric function of general form a as follows:

$$Prob_i^c = f(x_i^c, x_j^c; i \neq j, \beta) \quad (2)$$

$Prob_i^c$ = Probability of respondent choosing alternative *i*.

= Parameter of observable characteristics of alternative *i* for consumer *c*.

= Parameter of observable characteristics of alternative *j* for consumer *c*.

The probability that consumer c chooses the alternative *i* over alternative *j* with the presence of the random term can be written as below:

$$Prob_i^c = Prob\left\{(V_i^c > U_j^c)\right\}; i \neq j \quad (3)$$

$$= Prob\left\{(V_i^c + \varepsilon_i^c) > (V_j^c + \varepsilon_j^c)\right\}; i \neq j \quad (4)$$

$$= Prob\left\{(V_i^c - V_j^c) > (\varepsilon_i^c - \varepsilon_j^c)\right\}; i \neq j \quad (5)$$

Equation (4) expresses that the probability of consumer c referring to choose alternative i rather than alternative j in the choice set. Equation (5) indicates that the probability of observed quantity $(V_i^c - V_j^c)$ is greater than the probability of random error term $(\varepsilon_i^c - \varepsilon_j^c)$ since it is a cumulative distribution. The term ε_i^c has an extreme value distribution based on conditional logit (CL) model and the density function as below:

$$f(\varepsilon_i^c) = \exp\{-\varepsilon_i^c - \exp\{-\varepsilon_i^c\}\} \quad (6)$$

Hence, in this analysis, the probability of consumer *c* choosing alternative *i* over alternative *j* in the choice set *C* is shown as follows:

$$Prob_i^c = \frac{\exp(\mu V_i^c)}{\sum_j^J \exp(\mu V_j^c)} \quad (7)$$

This study assumes that V_i^c demonstrates a linear parameter and generalizes specification of utility function written as follows:

$$V_i^c = \beta_1 x_i^c + \beta_2 x_i^c + \beta_3 x_i^c + \ldots + \beta_s x_{si}^c \quad (8)$$

Where β the vector of parameters to be assessed and *x* signifies all explanatory variables in the model.

$$Prob_i^c = \frac{\exp(\beta' V_i^c)}{\sum_j^J \exp(\beta' V_j^c)} \quad (9)$$

Where:

$Prob_i^c$ = Probability of consumer *c* choose alternative *i*

x_i^c *and* x_j^c = Vectors expressing the attribute *i* and *j*

β=Vector of coefficient

Hence, the log-likelihood function applies to maximize across the parameters in order to estimate β. The function can be expressed in the log likelihood function as follows:

$$\log L(\beta) = \sum_{C=1}^{N} \sum_{j=1}^{J} \log prob_i^c \quad (10)$$

Therefore, this study applies log-likelihood function to maximize across *c*, selects alternative *i* and 0 otherwise. Then, *N* is considered as consumers who are included in this sample size. According to the Equation (10), the β coefficients signify the taste of parameters which are attributes that directly affect utility. It can be used to estimate the marginal rate of substitution (MRS) or at which consumers are willing to trade-off between the attributes. The substitution rate can be estimated by dividing the β coefficient with another β coefficient (price attribute) and multiply it by -1. Therefore, the equation is as follows:

$$\rho_k^c = \frac{\frac{\delta V}{\delta x_{c,s}}}{\frac{\delta v}{\delta P_{c,s}}} = \frac{-1\beta_{c,s}}{\beta_{c,s=p}} == \frac{\beta_{attribute}}{\beta_{price}} x - 1 = -\frac{\beta_{attribute}}{\beta_{price}} \quad (11)$$

This study includes price attribute since it demonstrates the people's WTP to improve their current level. Equation (11) depicts the changes in implicit price of the attributes relative to the current situation.

2.3. Data Collection

This study employed a face-to-face survey on 151 on-campus students residing at the UMT, Malaysia who use table fans in their rooms. This study applied purposive sampling and was conducted for 2 months from October 2019 until December 2019. Enumerators were appointed to assist the survey especially if the respondents did not fully understand the questions. They would ask the respondents to complete any unfinished questions immediately. The author did not include exclude missing data particularly if the respondents declined to provide the requested information on their socio-demographic background or because of time constraints. Data scanning for missing values was performed at an early stage prior to the analysis of the data.

Next, a pre-survey was conducted to establish the attributes that affect the students' choice when purchasing table fan in the hostel. Table 1 lists down four related attributes non-monetary attributes i.e., speed of fan, energy consumption and energy star and monetary attribute i.e., price of table fan. The status quo was italicised based on a common brand of table fan that was used by on-campus students. A pre-survey was conducted in order to set the right selection of the status quo. The price of table fan refers to various prices and qualities while the speed of table fan demonstrates the fan speed and its relationship with electricity bills. Meanwhile, energy consumption showed its connection

Table 1: Attributes and its levels based on students' preferences in using table fans

Attribute	Levels	Descriptions
Price of table fan (in Ringgit Malaysia, RM)	RM50	Selection of table fan at cheaper price without any concerned-on energy efficiency label
	RM80	Selection of table fans at a price that can provide long-term durability
	RM100	Selection of table fans at affordable price, long-term durability and high quality
Speed of fan	High	High speed causes an increase in electricity bills
	Moderate	Moderate speed causes electricity bills demonstrated not too high or too low
	Slow	Slow speed causes a reduction in electricity bills
Energy consumption (kilowatt-hour, kWh)	149 kWh	Saving 149 kWh per year of energy consumption, 4% less with the lowest star rating
	152 kWh	Saving 152 kWh per year of energy consumption, 8% less energy
	155 kWh	Saving 155 kWh per year of energy consumption, 17% less energy
Level of 'Energy Star'	Lowest	Energy rating at 2 stars, least efficient
	Average	Energy rating at 3 stars, average
	Highest	Energy rating at 5 stars, most efficient

Status quo in italics. Exchange rate in August 2020 US$1=RM4.18

with the percentage of energy saved. Level of energy star shows from the "least efficient" (two stars) until the "most efficient" (five stars). Selection of attributes and its levels were based on the discussions of experts and previous literature. The attributes must be carefully identified by referring to previous research, coupled with experience and knowledge of the specific research problem (Mohd et al., 2008). On the other hand, markets for goods with attributes can easily provide information, whereas attributable goods should be informative and effect buyers' purchasing decisions. A sample of choice card of options is shown in Figure 2.

A total of three choices were offered to the students in each of the five choice cards and 15 observations (3 choices × 5 choice cards) were produced from the responses of each respondent. The orthogonal design was generated using SPSS software with suggestion of 3 × 3 × 3 × 3 = 81 combinations based on four attributes with three levels in each attribute. A "no choice option" was also available to the students (Li et al., 2016) because there is a tendency that consumers postpone their purchase over buying the wrong products or services to avoid choice conflict between alternatives and nearly equal utilities (Vermeulen et al., 2008).

3. RESULTS

Table 2 shows the socio-demographic profiles and descriptive statistics of respondents (n = 151) who reside in the eight blocks of a hostel mostly for 2 years. The descriptive analysis aims to describe the characteristics and trends of the data collected. Out of the total number of respondents, 114 respondents (76%) were female while 37 (24%) were male. Most male respondents prefer to live off campus (Muhammad et al., 2012) as it offers new experiences, freedom, self-reliant, more convenient and without any curfews. On the other hand, most 1st-year students (58.3%) prefer to live on campus because at this stage, they are still fragile and need time to adjust themselves with college life (Tidimalo Kobue et al., 2017). Hence, the convenient on-campus accommodation makes it possible for students to better focus on their academic activities. Other than that, 55% of them are 18-21 years old taking either diploma or bachelor's degree. Most hostel rooms (68.2%) in UMT provide a four-sharing bedroom containing two bunk beds.

3.1. Perceptions on Energy-saving Attitude in Hostel

Table 3 shows that the respondents strongly agreed (75.5%) that all parties should be accountable in using electricity efficiently to support energy-saving in the hostel. They also strongly agreed (57.6%) that the reduced electricity consumption can be influenced by selecting the right electrical equipment. This finding is similar to that of Shujie et al. (2019) who stated about 70.42% of respondents believed that energy-saving is essential to protect the environment by using suitable equipment. About 62.3% of the respondents mentioned that they turned off the light when sleeping; a finding

Table 2: Socio-demographic characteristics of the students, n=151

Variables	Frequency	Percentage
Gender		
Male	37	24
Female	114	76
Blocks		
Block 1	19	12.6
Block 2	20	13.20
Block Annasai'	16	10.6
Block Ibnu Abbas	16	10.6
Block Ibnu Majah	23	15.2
Block Ibnu Jarir	20	13.2
Block At-Tarmidzi	16	10.6
Block At-Tabrani	21	13.9
Year of study		
1st year	88	58.3
2nd year	18	11.9
3rd year	44	29.1
4th year	1	0.7
Age (years old)		
18-21	83	55.0
22-24	65	43.0
25-27	3	2.0
No. of room occupancy		
2 people	24	15.9
3 people	24	15.9
4 people	103	68.2

Figure 2: Example of choice card presented to the students

Attributes	Option 1	Option 2	Option 3
Price of fan		  	No choice option
Speed of fan	Moderate	High	
Energy consumption (kilowatt-hour, kWh)	149 kWh	152 kWh	
Energy star			
Choose **ONE** option		√	

that is similar to that of Cotton (2016). In this case, energy-saving behaviour stimulates students' positive actions. Furthermore, 68.9% of the respondents strongly agreed on the implementation of electric-efficient practices to save the earth, hence indicating a high level of environmental awareness among students. Other than that, 55.6% of the respondents mentioned that they turned off computers or laptops when there are not in use.

3.2. CHOICE EXPERIMENT RESULTS

This section presents the CE results for multinomial logit model (MLM). The equation for this model is as follows:

$$U = \beta_1 X_{Speed2} + \beta_2 X_{Speed3} + \beta_s X_{Star2} + \beta_4 X_{Star3} + \beta_5 X_{ECons2} + \beta_6 X_{ECons3} + \beta_7 X_{Price} \quad (12)$$

Table 4 demonstrates the attributes of Speed2, Speed3, and ECons2 which were significant at 1% and 5% level. The variables of Speed2 and Speed3 portray a negative relationship with students' preferences in buying table fans to provide air circulation in their rooms. Besides, Star2, Star3, ECons2 and ECons3 generated positive preferences where the students selected characteristics of energy star and energy consumption as elements to purchase table fans. The variables of Speed2 and ECons2 portray a positive preference with a highly significant level at 1%. Through the survey, the students stated that they do not expect to achieve high level of energy star and reduce the energy consumption at the optimum level. Their basic knowledge and awareness are sufficient. They were also in the opinion that more education on choosing energy-saving electrical appliances is necessary (Zha et al., 2020). The negative sign of price with 1% significance level is as expected since preference or utility for a given choice will be lower when the cost of choice increases, thus implying the probability of consumers choosing alternative option is reduced when the prince increases (Jain et al., 2018). Therefore, an increase in the price of table fan reduces students' WTP due to the lower utility cost.

Table 3: Energy-saving attitude

Item	Statement	Frequency	Percentage
1.	All parties are responsible for using electricity efficiently		
	Strongly agree	114	75.5
	Agree	36	23.8
	Not agree	1	0.7
2.	Reduction of electricity consumption is influenced by using electrical equipment that can save energy		
	Strongly Agree	87	57.6
	Agree	61	40.4
	Not agree	3	2.0
3.	Electricity saving occurred if sleep with lights off		
	Strongly agree	94	62.3
	Agree	53	35.1
	Not agree	4	2.6
4.	Implementation of electric-efficient and saving practices can save the environment and the earth		
	Strongly agree	104	68.9
	Agree	44	29.1
	Not agree	3	2.0
5.	Turning off computers or laptops when they are not in use		
	Strongly agree	84	55.6
	Agree	60	39.7
	Not agree	7	4.6

Table 4: Coefficient estimation for MNL model

Variables	Coefficient	Standard error	Z	Prob. z
Speed2	−0.7004***	0.1583	−4.42	0.0000
Speed3	−0.5078**	0.2494	−2.04	0.0418
Star2	0.0839	0.2763	0.30	0.7615
Star3	0.1536	0.3254	0.47	0.6370
ECons2	1.0153***	0.2100	4.83	0.0000
ECons3	0.3524	0.2169	1.63	0.1042
Price	−0.0082***	0.0028	−2.93	0.0034

Log likelihood function: - 600.19910. Significance at 1% (***), 5% (**), 10% (*)

3.3. Marginal WTP Analysis

Marginal willingness to pay (MWTP) or marginal rate of substitution can be estimated using the ratio of non-monetary attribute's coefficient over the monetary attribute coefficient as follows:

$$\text{Marginal WTP} = \frac{\beta \text{non - monetary attribute}}{\beta \text{monetary attribute}} \quad (13)$$

The calculation of marginal WTP was produced through Wald procedure with econometric software NLogit 5.0 as shown in Table 5. It should be noted that the marginal values correlated to the energy labels are estimated in Ringgit Malaysia (RM).

The results of WTP marginal values in Table 5 illustrate that the students did not prefer to look into "speed of fan" attribute when buying table fan because they can control and adjust the speediness according to room ambience. Different speeds carry different electricity consumption; lesser speed means lesser electricity consumption (Azzam et al., 2017; Jena et al., 2019). Meanwhile, students demonstrated their preference on attributes of energy star with positive relationship on the EE label. The students' WTP was RM10.20 for Star2 and they preferred highest level of energy star with the value of RM18.68. On the other hand, consumers who are more sensitive on environmental issues put more effort to purchase energy-efficient products that are less energy-consuming and safe for the environment (Zainudin et al., 2014). Next, the "energy consumption" attribute was highly significant at 5% level and positive in its relationship at both levels. The students' WTP was RM123.53 for energy consumption at level two, showing a saving of 152 kWh/year of energy consumption with 8% less energy. Besides, the marginal WTP of "ECons3" was RM42.88, a saving of 155 kWh/year of energy consumption with 17% less energy. It is worth noting that this shows a great concern about environmental issues among the students (Bhati et al., 2017), hence the CE was able to place marginal WTP value for each attribute in the model.

Table 5: Marginal values of MNL model

Variables	Function	Standard error	z	Prob. z
Speed2	−85.2191**	35.62345	−2.39	0.0167
Speed3	−61.7847**	27.83216	−2.22	0.0264
Star2	10.2063	31.23612	0.33	0.7439
Star3	18.6871	36.19293	0.52	0.6056
ECons2	123.538**	50.08227	2.47	0.0136
ECons3	42.8895**	20.82751	2.06	0.0395

Significance at 1% (***), 5% (**), 10% (*)

4. CONCLUSION

Through changing cultures and dimensions, universities have a vigorous role to promote energy efficiency. Energy-efficient practices in campus will obviously reduce the financial budget, reduce carbon footprint in campus area and promote environmental leadership especially among students, the Gen-Z. The EE label is broadly used as a policy instrument to increase energy efficiency in electrical appliances. In this study, the WTP for EE label attributes which includes the price of table fan, speed of fan, energy consumption and level of energy star were examined using survey data from students resided in UMT hostel. This study highlighted the empirical outcomes on students' responses to the attributes of label on table fans. This study estimated the marginal value of attributes off the labels on the table fan appliance. The students realized the importance of being energy-efficient through their actions in the hostel as shown in Table 3. The students were given 15 choice sets comprising a no-choice option in every choice set as shown in Figure 2. It is understood a no-choice option in every choice set of the CE leads to more accurate estimations (Vermeulen et al., 2008). The implicit value that the students place on energy star (Star) and energy consumption (ECons) variables were found to be positive and significant. Results indicated that the students who preferred energy consumption (ECons) attribute with a statistically significant WTP when purchasing table fans stated marginal value at RM123.54 (ECons2) and RM42.89 (ECons3). Meanwhile, the variable of "speed of fan" (Speed) significance at 5% level with negative relationship in its model.

Changing the university students' attitude to be more environmentally friendly is vital to attain sustainability across campus. This can only be done if the university's decision-makers reaffirm their commitment to become more energy-saving. Besides, in term of technical aspects, the role of energy managers and auditors in campus is significant to guarantee the implementation of those practices. Investments are also significantly required to support the improvement. Meanwhile, promoting energy efficiency is in line with "Goal 7 Affordable and Clean Energy" in the sustainable development goals (SDGs). This goal aims to ensure access to affordable, reliable, sustainable and modern energy for everyone. Thus, intensifying infrastructure and modernising technology to provide cleaner and more efficient energy will assist the growth and protect the environment.

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