A MORAL EXTENSION OF THE THEORY OF PLANNED BEHAVIOR TO PREDICT CONSUMERS' PURCHASE INTENTION FOR ENERGY-EFFICIENT HOUSEHOLD APPLIANCES

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LIST OF ABBREVIATIONS

AFF	Perception of Affordability
ASEAN	Association of Southeast Asian Nations
ATT	Attitude towards Energy-efficient Household Appliances
AVE	Average Variance Extracted
CELC	China Energy Label Center
CFA	Confirmatory Factor Analysis
CO2	Carbon dioxide
CR	Composite Reliability
DEN	National Energy Council of Indonesia
DV	Dependent Variable
EC	Environmental Concern
EE	Energy Efficiency
EGSD	Ministry of Energy and Gas Supply Department
EK	Environmental Knowledge
EPA	US Environmental Protection Agency
EPU	Economic Planning Unit
EU	European Union
IEE	Intelligent Energy for Europe
IEA	International Energy Agency
GDP	Gross Domestic Product
GSB	Graduate School of Business
H	Hypothesis
IV	Independent Variable
KeTTHA	Ministry of Energy, Green Technology and Water
MN	Moral Norm
n	Number of Respondent
OECD	Organization for Economic Co-operation and Development
PBC	Perceived Behavioral Control
PI	Purchase Intention
PLS	Partial Least Square
PLS-SEM	Partial Least Square-Structural Equation Modeling
Q^2	Q Square
R^2	R Square
RO	Research Objective
RQ	Research Question
SAVE	Sustainability Achieved via Energy Efficiency
SE	Standard Error

SEM	Structural Equation Modeling
SIRIM	Standards and Industrial Research Institute of Malaysia
SN	Subjective Norm
SPSS	Statistical Package for the Social Sciences
TPB	Theory of Planned Behavior
TRA	Theory of Reasoned Action
USM	Universiti Sains Malaysia
β	Beta
α	Cronbach's Alpha

ABSTRAK (MALAY)

Penggunaan elektrik di seluruh dunia telah meningkat dengan mendadak sejak beberapa dekad yang lalu dan permintaan tenaga utama global pada tajun 2035 dijangka meningkat sebanyak kira-kira satu pertiga daripada keadaan sekarang. Walau bagaimanapun, pelaburan semasa menunjukkan tanda-tanda amaran kekurangan pembekalan elektrik. Banyak negara semakin sedar akan kepentingan penggunaan sumber tenaga lebih bijak dan telah memeluk kecekapan tenaga sebagai langkah untuk meredakan masalah kekurangan tenaga ini. Pada hakikatnya, ramai orang masih tidak menggantikan perkakasan rumah tangga mereka kepada jenis yang cekap tenaga. Oleh itu, kajian ini bertujuan untuk merapatkan jurang dengan menggunakan lanjutan norma moral dalam *theory of planned behavior* (TPB) untuk mengkaji faktor-faktor penentu niat beli pengguna untuk perkakas rumah cekap tenaga. Satu tinjauan yang menggunakan soal selidik yang ditadbir sendiri telah dilakukan pada 210 pengguna di Pulau Pinang, Malaysia dan *Partial Least Square* (PLS) telah digunakan untuk menganalisis data. Dapatan kajian menunjukkan bahawa sikap para pengguna yang lebih positif terhadap perkakas rumah cekap tenaga dan kawalan tingkahlaku jelas mempengaruhi niat beli pengguna untuk produk-produk tersebut. Kajian ini membuktikan lanjutan norma moral dalam *theory of planned behavior* (TPB) memang menjadi peramal yang penting bagi niat pembelian pengguna. Bertentangan dengan beberapa kajian lepas, variabel seperti kebimbangan alam sekitar, pengetahuan alam sekitar dan norma subjektif didapati tidak mempunyai kaitan yang ketara dengan niat beli pengguna. Dari segi kesan moderasi, persepsi kemampuan tidak menunjukkan apa-apa kesan moderasi terhadap semua perhubungan antara semua faktor sikap dengan niat beli and perhubungan antara norma subjektif dengan niat beli.

ABSTRACT

The electricity consumption throughout the world has been in the rapid rise over the past decades and the global primary energy demand is expected to rise by around one-third from now to 2035. However, the current investment trend it is indeed showing warning signs of power supply inadequacy. In view of the imbalance situation, many countries are increasingly aware of the urgency and importance of wiser and better use of energy resources and have embraced energy efficiency as a partial solution to looming energy problems. In reality, many people are still not replacing their household appliances to the energy-efficient ones. Hence, this study aims at closing the gap by applying the moral extension of theory of planned behavior (TPB) to examine the determinants of consumers' purchase intention for energy-efficient household appliances. A survey using self-administered questionnaires has been done on 210 consumers in Penang, Malaysia and Partial Least Square (PLS) were used to analyse the data. The finding shows that consumers' more favorable attitudes towards energy-efficient household appliances and perceived behavioral control significantly influence consumers' purchase intention for such products. The study proved the extension of moral norm in the theory of planned behavior to be significant predictor for consumers' purchase intention. Contrary to some past studies, variables like environmental concern, environmental knowledge and subjective norm were not found to have significant relationship with purchase intention. In terms of moderation effect, perception of affordability did not exhibit any moderation effect on all the attitudinal factors – intention and subjective norm – intention relationships. The study implies that marketers and government should focus on consumers' attitude, perceived behavioral control and moral norm in order to promote the

adoption of energy-efficient appliances to consumers. Other than factual knowledge or system knowledge, it may be also necessary to impart action related knowledge and effectiveness knowledge through education system and promotional campaigns.

CHAPTER 1

INTRODUCTION

1.1 Introduction

A concern for environmental conservation has recurred in diverse forms, in different parts of the world, throughout history. The idea of 'the environment', as an explicit concept, has changed over time as the detailed issues have developed (Griseri & Seppala, 2010). In recent days, environmentalism has changed to deal with new issues such as global warming, overpopulation and genetic engineering. Global warming is one of the main environmental issues widely discussed about in international dialogues and conferences. One of the key initiatives to reduce global warming is through the reduction of energy usage.

According to Ek & Soderholm (2010), environmental policy-makers increasingly emphasize individual consumers' responsibility for environmental side effects of their acts, and many environmental requirements are expressed in terms of household-related activities. These include, for instance, recycling, purchasing of green-labeled products and activities that decrease household electricity use. Improving energy efficiency via faster diffusion of energy-efficient appliances is perceived as a key option to achieve energy efficiency and climate policy targets, and likewise, higher energy efficiency typically translates into lower fossil fuel use and lower carbon emissions (Mills & Schleich 2013). Particularly for this context, energy-efficient appliances can and are playing its role in reducing the energy consumption at homes.

1.2   Background of Energy Consumption

Energy is an important element in nation-building as it act as the foundation that supports the socio-economic development of a country. Over the past decades, there has been a rapid rise in electricity consumption, with the strongest growth in service sector and residential sector which the main cause is the increase ownership and usage of electrical appliances (Taylor et. al., 2010; Gaspar & Antunes, 2011).

Global primary energy demand is expected to rise by around one-third from now to 2035, with the contribution mainly by China, India, ASEAN countries and the Middle East (International Energy Agency, 2014) and it has been projected that more than $40 trillion in the investment of energy supply over the period from 2014 to 2035, together with $8 trillion to improve end-use energy efficiency is required to keep up with booming electricity demand (International Energy Agency, 2014). However, the reality is, in view of the current investment trend it is indeed showing warning signs of power supply inadequacy. Taking India as an example, the current electricity supply is far from meeting its demand despite doubling its capacity of power generation since 2000 (International Energy Agency, 2014).

Worldwide households account for about 31% of total energy consumption with Saudi Arabia at 50%, UK 31%, USA 25% and Finland 16% respectively (Saidur et. al., 2007). Faced with increasing populations, increasing per capita electricity consumption, rising fuel costs, and aging facilities, a number of countries have embraced energy efficiency as a partial solution to looming energy problems (Reynolds et al., 2011). Governments around the globe are increasingly aware of the urgency and importance wiser and better use of energy resources.

In Malaysia, the electricity consumption has increased by almost two-folds from 53.42 billion kWh in year 2000 to 93.8 billion kWh in year 2012 (Index Mundi, 2013). Furthermore, within the same period of time, household electricity consumption has also increased in the similar magnitude from 975 ktoe (11.33 billion kWh) to 1974 ktoe (22.95 billion kWh) (Malaysia Energy Information Hub, 2013).

1.3   Global Energy-saving Effort and Purchase of Energy-efficient Appliances

In the study regarding energy efficiency and appliance purchase in Europe, Gaspar & Antunes (2011) pointed out that in order to decrease household energy consumption, both an increase in energy use efficiency (through the adoption of higher efficiency class appliance models) and the promotion of more ecological consumer behaviours (through better use of electrical appliances) should be promoted. In quite similar note, Urban & Scasny (2012) argued that residential consumers can reduce negative environmental effects in relation to their energy consumption especially by improving the energy efficiency of their household appliances through investments in curtailments or by decreasing the use of energy-consuming appliances.

1970s' energy crisis in the United States (US) signaled the importance of energy efficiency and conservation. The US government has since mandated increased efficiency, and also demanded that information necessary for consumers to make more energy-efficient choices be provided. In 1992, ENERGY STAR label (a voluntary program where the designation is awarded to appliances that meet specified energy saving criteria more stringent than minimum federal requirements) has been introduced

by the US Department of Energy and US Environmental Protection Agency (Ward et. al., 2011).

European consumers which are generally quite homogeneous and has been increasingly putting attention on environmental concerns and energy efficiency, following by the urge of European Commission chief Jose Manuel Barroso in 2006 to start a 'post-industrial revolution' in which Europe is committed to reduce greenhouse gases by 20% by 2020 (Logica, 2007). There is a project funded by Intelligent Energy for Europe (IEE) which began in September 2008 with an ultimate goal to reduce energy consumption from the use of household appliances and equipment, through the promotion of purchase and use of energy-efficient appliances (Gaspar & Antunes, 2011).

Since 2005 energy efficiency is a key focus of China's national energy policy and steps were taken by central government and local governments to raise minimum energy efficiency standards for electrical appliances, and to enforce energy efficiency labelling of appliances, along with programmes to raise awareness of the importance of saving energy at home (Ma et. al., 2013).

Improving energy efficiency is a key policy goal of all International Energy Agency (IEA) member countries which include Australia, Belgium, Canada, Denmark, France, Germany, Italy, Japan, Republic of Korea, Norway, Sweden, Switzerland, Turkey United Kingdom and United States of America (Taylor et. al., 2010).

Indonesia, being the biggest nation and the top energy-consuming country in ASEAN, has comprehensive energy efficiency and conservation programs in place mandated by Law and regulation. In 2007 Energy Law has been gazetted in Indonesia

which calls for establishment of the National Energy Council (DEN) in national energy policy making (APEC, 2012).

Country	Label	Remarks
USA		Having this logo means certified energy efficient. Source: U.S Environmental Protection Agency (EPA) (2013) www.energystar.gov
Thailand		The higher the number rating, the higher the energy efficiency. Source: Sangsawang (2010)
China		The lower the number rating, the higher the energy efficiency. Source: China Energy Label Center (CELC) (2013) http://www.energylabel.gov.cn
UK		Classification from A+++ (most energy efficient to D (least energy efficient) Source: UK National Measurement Office and Department of Energy & Climate Change (2014), https://www.gov.uk/the-energy-labelling-of-products

Table 1.1 Some Energy Efficient Labels Around the World

1.4   Malaysia Energy-saving Effort and Purchase of Energy-efficient Appliances

The oil crisis in the 1970s has seen Malaysia touted renewable energy and energy efficiency (EE) as Malaysia's fifth fuel, however, the discovery of great amount of oil and natural gas in the 1980s masked EE issues in no time (Choong, 2011). Some regulations on EE were drafted in the 1990s by the Electricity and Gas Supply Department (EGSD) and the Ministry of Energy (now the Ministry of Energy, Green Technology and Water, i.e., KeTTHA) then but were not implemented due to "legal issues" (Choong, 2011).

In year 2006 a project funded by Danish International Development was done to evaluate Energy Commission's operation and recommendations has been provided for improvement in policies and implementation (AWER, 2012). Recommendations on Energy efficiency including labelling requirements has been one of the key focus and soon the National Energy Efficiency Master Plan was developed however many implementation aspects of energy efficiency at both businesses and domestic consumers have been overlooked (AWER, 2012). Since 2006, Energy Commission with cooperation from SIRIM has established the energy label for refrigerator (Energy Commission, 2010).

Energy Efficient Labelling Programme for Household Appliances in Malaysia is now enacted for freezers, air-conditioners, domestic fans and televisions where a household appliance is labelled with an Energy Commission label, with 1-Star to 5-Star; 1-Star label being the least energy efficient and 5-Star Label being the most energy-efficient (www.greentechmalaysia.my, accessed on December 24, 2013; Malaysia Electricity Supply Act 1990: Electricity (Amendment) Regulations 2013 (2013)). Given that the

energy saving is calculated based on the average 3-Star rated appliances (www.st.gov.my , therefore 4-Star and 5-Star labelled appliances are considered as energy-efficient appliances in this context. For example Panasonic Econavi series air conditioners & refrigerators, Hitachi's R-479AM refrigerator & RAC-S10CC air conditioner, LG's GR-B492CLCA & GR-M402CLNA refrigerators, Toshiba's ColorCurve series refrigerators were certified by SIRIM and Energy Commission as Energy Efficient 5-Star. (www.panasonic.com/my, www.lg.com.my, http://hitachiconsumer.com.my , www.toshiba.com.my, accessed on December 24, 2013).

Following the new electricity tariff which has gone up 15% averagely on Malaysian consumer effected 1st Jan 2014, consumers are likely be more careful in choosing the type of electrical appliances, and may opt for energy-efficient variants compared to the previous years. As reported on The Star newspaper, consumers were feeling the pain and were starting to reduce the burden of their already rising cost of living through prudent use of electricity as an average household would be expected to face a potential hike of RM62.73 on their total electricity bill (Yeoh et al., 2013). As quoted in the news write up, a housewife identified as Roanna Wong said, though the cost of energy is increasing, consumer has adapt to the situation by learning new energy-saving techniques, such as limiting the use of air-conditioner which requires only a little discipline and sacrifice (Yeoh et al., 2013). As interviewed by The Star reporter, a mother of two named Betty Tan said, green technology such as energy-saving bulbs and appliances should be considered by consumers in the wake of rising energy cost (Yeoh et al., 2013).
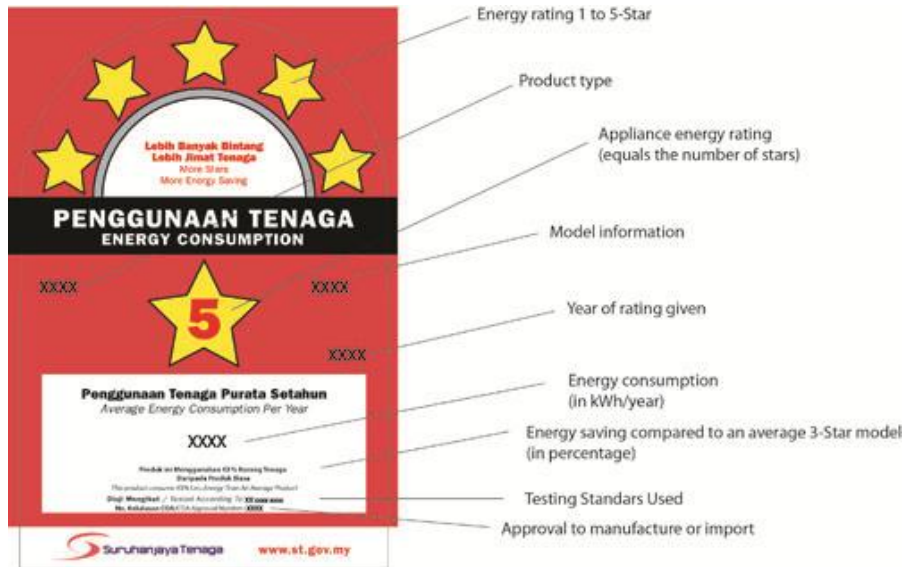
Figure 1.1 Energy Efficient Label (by Energy Commission, Malaysia www.st.gov.my

retrieved on 26 December, 2013)
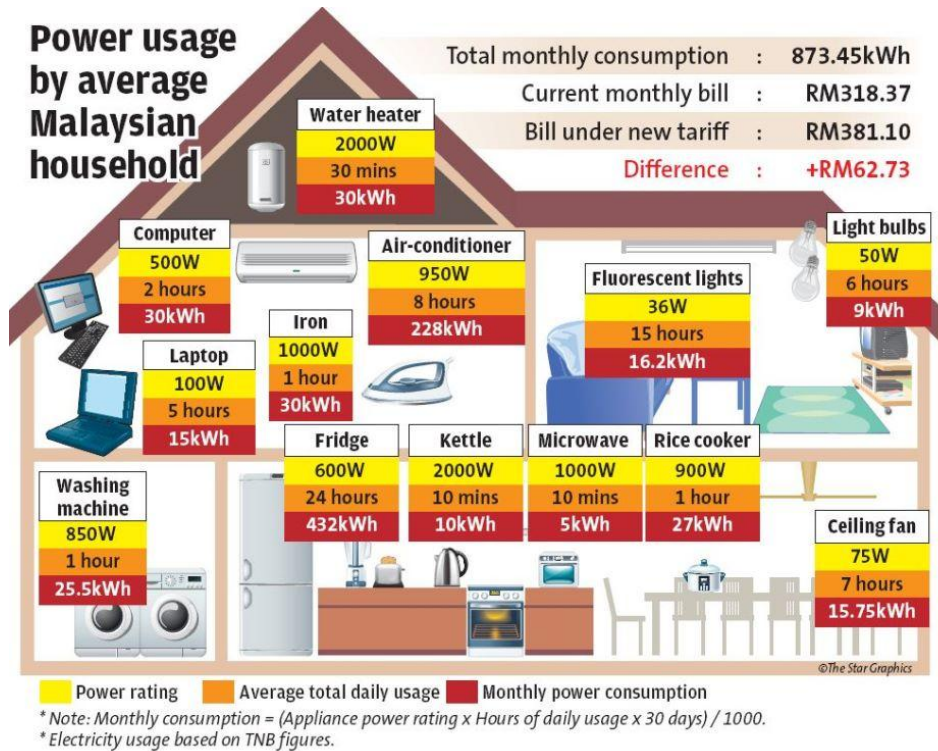
Figure 1.2 Power Usage by Average Malaysian Household (Yeoh et al., The Star

Press, published on December 4, 2013)

1.5   Problem Statement

Driven by strong demand from commercial and domestic sectors in line with its Gross Domestic Product (GDP) growth, the growth of electricity demand in Malaysia as forecasted by Economic Planning Unit (EPU) has shown an increase of 3.52% in 2012 compared to 3.48% in 2011 (Tan et al., 2013). Statistics from *Suruhanjaya Tenaga* (Energy Commission) showed that Malaysian household consumed about 20.2% from total electricity usage in year 2011, an increase of nearly 2% from 18.3% in 2007. The steady growth of electricity consumption in Malaysia has actually raised the concern of Malaysian government as increasing of such energy consumption is directly linked to CO_2 emission. In Malaysia, energy efficiency drives at national level first start in the Seventh Malaysia Plan (1996 to 2000) which gave birth to Malaysia Energy Centre (PTM). Next, in the Ninth Malaysia Plan (2006 to 2010) and Tenth Malaysian Plan (2011 to 2015), energy efficiency is once again clearly been addressed. Malaysian government has noticed the importance of reducing household electricity usage through the adoption of energy efficient appliances. SAVE or *Sustainability Achieved via Energy Efficiency*, is a program spearheaded by the Ministry of Energy, Green Technology and Water to improve energy efficiency in Malaysia. From July 2011 to end 2012, a total of 100,000 rebate vouchers for 5-Star rated refrigerators, and 65,000 vouchers for 5-Star rated air conditioners have been allocated to household consumers across Malaysia. The effort is in line with the utilization objective of Malaysian Energy Policy, which is to promote the efficient utilization of energy and discourage wasteful and non-productive patterns of energy consumption. This first of its kind of incentive in Malaysia may not be significant

enough to bring down the energy usage but it marked the important milestone in Malaysian local context in promoting the adoption of energy efficient appliances.

In reality, many people are still not replacing their household appliances to the energy-efficient ones. Factors affecting the adoption of energy efficient household appliances may still not be clearly understood by policy makers and also the producers and suppliers of such household appliances. Another big step ahead is when there is mass adoption of such retrofit at homes. To achieve this, it is of great importance for the marketers and policy makers to understand the effect of some key factors influencing the purchase intention for energy efficient appliances.

Energy efficiency is recognised as an essential strategy in energy saving and climate change mitigation policies and hence quite a substantial number studies has been done on energy conservation and energy efficiency over the past few years in many countries including Malaysia, Ireland, Germany, Portugal, Greece, Poland, Spain, Italy, China, South Korea; Australia, Canada, Czech Republic, France, Netherlands, Norway, Sweden, Japan, Thailand, Vietnam, Saint Lucia, USA, UK, Denmark and many more (Saidur et al., 2007; Gan et al., 2013; Ooi, 2014; Gaspar & Antunes, 2011; Wang et al., 2011a; Wang et al., 2011b; Ma et al., 2013; Mi et al., 2011; Zhang et al., 2013; Ha & Janda, 2012; Hori et al., 2013; Martisson & Sundstrom, 2011; Mills & Schleich, 2010; Reynolds et al., 2012; Ward et al., 2011; Hicks & Theis, 2013; Sapci & Considine, 2014; Urban & Scasny, 2012; Yohanis, 2012; Panzone, 2013; Caird et al., 2008; Daim et al., 2013; Hassen, 2013). Among those studies, there were only a handful of research done particularly on determinants of the purchase intention for energy-efficient appliances.

Mills & Schleich (2013) has conducted survey on more than 20,000 households to determine influence of labelling knowledge and household characteristics on the adoption of Energy-Efficient Household Appliances in Germany. As the analysis of factors may suffer from knowledge-based selection bias, it was suggested by Mills & Szchleich (2013) that future research may be conducted to account for the differences in environmental attitudes, social norms and psychological factors on the purchase decision of energy-efficient appliances.

In order to close the contextual gap and literature gap, this study attempts to incorporate the moral extension of Theory of Planned Behavior (Ajzen, 1991) to understand the intention of the consumers towards purchasing of energy-efficient household appliances in the context of Penang consumers. First, this study examines the relationship between attitudinal dimensions which include attitude towards energy-efficient appliances, environmental concern, and environmental knowledge, subjective norm, perceived behavioral control and moral norm and the purchase intention for energy-efficient appliances. Then the moderating effect of perception of affordability on the above relationship is investigated.

1.6   Research Objectives

The objective of this study is to investigate the purchase intention of the consumers in Penang who are willing to purchase energy-efficient appliances. The research objectives (RO) of the study are as follows:

RO 1: To examine whether attitudes towards energy-efficient appliances, environmental concern and environmental knowledge, subjective norm, perceived behavioral control and moral norm influence consumers' intention to purchase energy-efficient appliances.

RO 2: To explore the moderation effect of perception of affordability on the relationships between attitudinal factors which include attitudes towards energy-efficient appliances, environmental concern, and environmental knowledge and purchase intention and the relationship between subjective norm and purchase intention for energy-efficient appliances.

1.7   Research Questions

The research questions (RQ) of this study are:

RQ 1: Does attitude towards energy-efficient appliances, environmental concern, environmental knowledge, subjective norm, perceived behavioral control and moral norm influence consumers' intention to purchase energy-efficient appliances?

RQ 2: Does perception of affordability moderates the relationships between attitudinal factors such as attitudes towards energy-efficient appliances, environmental concern, and environmental knowledge and purchase intention and the relationship between subjective norm and purchase intention for energy-efficient appliances?

1.8   Definition of Key Terms

The following definition of key terms help to set common ground of conceptual understanding about this study.

1.8.1   Household Appliances

Household appliances include wet and cold appliances (washing machine, dishwasher and dryers, refrigerators and freezers), space-conditioning appliances (air-conditioners and fans), consumer electronics (such as Television and Hi-Fi systems) water heaters, cooking appliances, and miscellaneous small appliances (such as irons, toaster, hair dryers, vacuum cleaners, and power tool) (Bertoldi. et al., 2001).

1.8.2   Energy-efficient household appliances

Energy-efficient household appliances are household electrical appliances which are reducing the amount of energy required to obtain a unit of consumption (e.g. the same amount of light less electricity) while performing their specific tasks (Panzone, 2013). Given that the energy saving is calculated based on the average 3-Star rated appliances (www.st.gov.my) , therefore 4-Star and 5-Star labelled appliances are considered as energy-efficient appliances in Malaysian context, which include freezer, air-conditioner, domestic fan and television.

1.8.3 Attitude towards Energy-efficient Appliances

Attitude towards energy-efficient appliances is a person's overall evaluation of energy-efficient appliances the corresponding favorable or unfavorable judgment about energy-efficient appliances, which will lead to intentions to purchase or not to purchase the product (Ha & Janda, 2012).

1.8.4 Environmental Concern

Environmental concern is how concerned a person with various environmental problems such as air pollution and climate change (Urban & Scasny, 2012).

1.8.5 Environmental Knowledge

Environmental knowledge is individual's factual knowledge about environment (Kaiser et. al., 1999).

1.8.6 Subjective Norm

Subjective norms are the perceived social pressure from significant others, which influence one's decision-making (Chen & Tung, 2014).

1.8.7   Perceived Behavioral Control

Perceived behavioral control is a perception of how much control a person has over the behaviour, and how confident a person feels of being able to perform that behavior (Alam et al., 2014).

1.8.8   Moral Norm

Moral Norm refers to the perceived moral obligation or responsibility to perform or not to perform certain behavior (Kaiser, 2006; Ajzen, 1991).

1.8.9   Perception of Affordability

Perceptions of economic realities that he or she can afford to buy the product (Notani, 1997).

1.8.10 Purchase Intention

Purchase intention is whether or not an individual is motivated or eager to buy a certain product (Ha & Janda, 2012).

1.9   Significance of the Study

This study is aimed to utilize the moral extension of Theory of Planned Behavior to find out the key drivers influencing consumers' purchase intention for energy-efficient household appliances which include attitudes towards energy-efficient appliances, environmental concern, environmental knowledge, subjective norm, perceived behavioral control and moral norm. It is also aimed at studying the moderating effect of perceived affordability on the relationship of those drivers and the purchase intention. The study marks some important contributions to the industry, consumer, government and theory.

1.9.1 Industry

Attracting new customers cost the industry or marketers as much as five times the effort more than retaining existing customers (Kotler et al., 2012). And yet much of the marketing resources is still focusing on attracting new customers, as this will help to improve market share and increase revenues. Therefore the study and understanding of purchase intention is very important for industry and marketers to develop proper marketing strategies and marketing plans which yield better results.

1.9.2 Consumer

The aim of energy-efficient appliances is to reduce the amount of energy use and hence it gives socio-economic impact to consumers directly and indirectly. Once the marketer can create and better marketing programmes and influence more consumers on purchasing those curtailments, more energy will be saved which translates into the saving

of electricity bill directly. Consumers and the community in large shall enjoy a better living environment when the adverse environmental impact is lowered resulting from less energy usage.

1.9.3 Government

From the government or policy makers' point of view, understanding of the key factors influencing the purchase intention for energy-efficient household appliances is very crucial. The government or policy makers' can then make better policies in the sense that come with significant impact. This can help the government in shaping the more efficient government workforce and society.

With both the industry and the government's better understanding of the factors to focus on when promoting energy-efficient appliances, we can then collectively targeting the right moves and the right time in coping with the environmental issues, especially the in the context of global warming and scarce energy resources. Eventually, when more and more people have adopted energy-efficient appliances in their household, the less energy will be consumed and less harm done on the earth which leads to sustainable and better living. On the other hand, the direct benefit to consumers is that they are able to enjoy savings from less energy consumption.

1.9.4 Theory

Since the framework of the study is based on the well-established Theory of Planned Behavior (TPB), the research will be able to confirm the applicability moral norm extension of the TPB on the subject matter in Malaysian context. It will help to provide some insights for other researchers on suitability of the moral extension of TPB in this topic in local Malaysian context and therefore may help to contribute to future refinement or establishment of theory. This study aimed at confirming the moderating effect of perception of affordability on purchase intention as similar study has only been done once on exploratory manner.

1.10   Organization of Remaining Chapters

The report of this study has been organized in five different chapters. Chapter One gives an overview of this study by providing introduction and background of work. Chapter Two presents the summary and critical reviews on past literatures, mainly in relation to factors affecting the consumers purchase intention. Chapter Three shows the research design, method of data collection and data analysis. Chapter Four presents the analysis results of findings using SPSS and Smart PLS softwares, with focus given on statistical analysis, descriptive statistic, validation analysis, reliability analysis and structural equation modeling (SEM) analysis. And lastly, Chapter Five presents discussion on the overall findings and implications of research, limitation of the study as well as suggestion for future research and ended by conclusions.

CHAPTER 2

LITERATURE REVIEW

2.1   Introduction

This study focus on six independent variables, namely, attitude towards energy-efficient appliances, environmental concern, environmental knowledge, subjective norm, perceived behavioral control and moral norm, one moderating variable which is perception of affordability and one dependent variable namely purchase intention for energy-efficient household appliances. Hypotheses are developed to test the effect that one variable has over another variable. This study has a total of ten hypotheses and all of the hypotheses test results will be shown in Chapter 4 and discussed in Chapter 5.

2.2   Overview of Energy Conservation and Energy-efficient Measures

While energy efficiency refers to the application of specific technologies that achieves the maximum services obtainable and at the same time reduce the overall energy usage (e.g., heating, cooling, lighting, mobility), energy conservation is the attainment of energy savings by merely changing consumer behaviour (Lopes et al., 2012). However, based on Gaspar & Antunes (2011), both increasing energy efficiency and energy conservation behaviour should be promoted and integrated by intervening on the purchase of energy-efficient appliances, giving the linkage between energy efficiency and consumer behaviour.

Most previous studies set out to explore the possibility to improve efficiency of energy use in Western world (Wang et al., 2011b). The adoption of energy-efficient measures and energy saving behavior in households are typically based on quite diverse concepts in psychology, sociology, anthropology, demographic and economics (Mills & Schleich, 2013; Lopes et al., 2012; Wang et al., 2011b; Caird, 2008). Existing research on consumer adoption of both energy efficiency and renewable, at least that conducted on behalf of the UK government, has tended to focus on addressing the financial, regulatory and informational drivers and barriers to household adoption (Caird, 2008).

As the one of the largest energy producer and consumer in the world, China has attached great importance to energy conservation and thus the research on such areas has been extensive (Wang et al., 2011a; Wang et al., 2011b; Ma et al., 2013; Mi et al., 2011; Zhang et al., 2013). A success subsidy programme which seen the rise of market share of energy-efficient air conditioners from 5% to 80% in a mere 2 years from 2009 to 2011, has given birth to a new subsidy programme in China covering air conditioners, washing machines, refrigerators and water heaters in 2012 (Ma et al., 2013). Other than labelling and subsidy, steps were also taken to raise minimum energy efficiency standards for electrical appliances, as well as to raise awareness among citizens of the importance of saving energy at home (Ma et al., 2013).

Appliance energy consumption labelling scheme or energy-efficiency labelling scheme both mandatory and voluntarily, has been identified as a key effort to increase the adoption of energy-efficient appliances in many countries in the world such as EU, China, etc. (Bertoldi & Atanasiu, 2009; Ma et al., 2013).

In Malaysia, study about energy saving or energy efficiency was scattered and always been isolated cases. A longitudinal research has been conducted on energy and exergy efficiency for residential sector by taking into account the energy and exergy flows from year 1997 to 2004 (Saidur et al., 2007). Study has also been conducted in Universiti Teknikal Melaka to examine the feasibility replacing fluorescent lighting with LED lighting (Gan et al., 2013).

2.3   Purchase Intention

The purchase of energy-efficient appliances is very important for policy makers since, unlike other behaviours that are performed on a regular basis, major appliances such as freezers and washing machines are not changed frequently (Gaspar & Antunes, 2011). Studies show that many people has the intention to pay more for energy-efficient appliances, but only some has converted it into actual purchase (Gaspar & Antunes, 2011).

Intention is defined as a person's location on a subjective probability dimension involving a relation between himself and some actions (Fishbein & Ajzen, 1975). It has been demonstrated in the Theory of Planned Bahavior and the Theory of Reasoned Action that, purchase intention is the antecedent of actual purchase behavior (Ajzen, 1991). Based on these theories, Cheah & Phau (2011) has reiterated that one's behaviour is a result of his intention to perform that particular behavior. This study focuses on purchase intention rather than behavior, because intention has wider implications and will often have a positive impact on an individual's actions (Hung et al., 2011). Purchase

intention means a consumer favors to buy a product or service because he or she needs a particular product or service, or even just by having an attitude towards a particular product (Madahi & Sukati, 2012).

Purchase intention for green product has been conceptualized by Nik Abdul Rashid (2009) as the preference, probability or willingness to purchase the product which has features of having eco-friendly features over the 'normal products'. On the other hand, green purchase intention has been defined by Qader & Zainuddin (2011) as a person's plan to perform an eco-behavior within a specific time. It has been argued that consumer's green purchase intention is dependent on a consumer's altruism and how one could be motivated (Cheah & Phau, 2011).

Soyez et al., (2011) investigated the relevance of individual, product and situational determinants of purchase intention for organic food buying behavior in three industrialized (USA, Canada, and Germany) and two transition societies (Russia and Ukraine). In UK, Bull (2012) surveyed 465 UK residents to determine consumers'' willingness to pay for efficient washing machines. Ha & Janda (2012) conducted research in South Korea to predict consumers' intention to purchase energy-efficient products. In more recent study, Petschnig (2014) examined 1105 individuals to study the determinants of consumers' purchase intentions for alternative fuel vehicles. Similar study has also been done in China whereby Zhang et al., (2013) researched on consumers' intentions to purchase new energy vehicles.

In Malaysian context, there are also a number of researches done on green purchasing intention in recent years. Aman (2012), in the study of green purchasing intention among 384 Sabahan, has stressed the importance to examine consumers' green

purchasing behavior in Malaysia, where the trend is still considered new. Earlier, Ramayah et al., (2010) has studied green product purchase intention on 257 working respondents who were asked their views concerning their value sets, attitudes and purchase intention of cloth diapers. A research has been done by Qader & Zainuddin (2011) to study the purchase intention of green electronics among 170 lecturers in a local university. Recently, another study by Yusof et al., (2013) has examined purchase intention of environment-friendly automobile by investigating the influence of the consumers' environment responsibility feeling, values, knowledge, perceptions of environmental advertisement and environment-friendly automobile. However the extant literature review has yet to find study done in Malaysia on energy-efficient appliances purchase intention. In the recent local setting, a study has been conducted on Malaysian households' usage intention for renewable energy (Alam et al., 2014)

2.4   Attitude towards Energy-efficient Appliances

Ivancevich et al., (2011) defined attitude as a mental state of readiness learned and organized through experience, exerting a specific influence on a person's response to people, objects, and situations with which it is related. This is in line with Ajzen (1985) who mentioned that one with positive attitudes toward an action is more likely to carry out that action. As one of the three three conceptually independent determinants of intention in TPB, attitude toward a behaviour refers to the degree of one's favourable or unfavourable evaluation of the behavior in question (Ajzen, 1991; Klockner, 2013; Ha & Janda, 2012). Greaves et al., (2013) in an echoing note, reiterated that attitude toward the

behavior represents ones' overall evaluation of the behavior based upon their beliefs of whether the behavior will result in desirable outcomes.

For example, a consumer may view that inexpensive air-conditioner as more affordable, which shows that the individual is having positive attitude toward inexpensive air-conditioner. However, the consumer may decide on a more costly energy-efficient air-conditioner while comparing different options. The ultimate intention to purchase the particular product (even though it is more expensive) may be subjective to beliefs about the positive outcome of purchasing the product and one's degree of inspiration to comply with those beliefs (Ha & Janda, 2012). Greaves et al., (2013) who conducted study on random sample of 2000 employees in the target organization in UK using the theory of planned behavior found that attitudes together with the other two TPB components accounts for substantial amount of variance in employee intentions to engage in environmental behaviors, including saving energy by switching off the computers.

Extant research also indicates that consumer attitudes are one of the most relevant predictors of green purchasing decisions and various ecological behavioural intentions (e.g., Ha & Janda 2012; Mosquera et al., 2014; Greaves et al., 2013; Olsen et al., 2010). In local context specifically, Ooi (2014) studied and confirmed that consumer' attitude toward energy-efficient appliances is positively related to its purchase intention.

2.5   Environmental Concern

Environmental concern may be motivating from a policy standpoint when it deals with energy-saving because environmental concern seems to be independent of the appeal and