UTILITY CONSUMPTION PATTERN AMONG MALAYSIAN ELECTRICITY USERS

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ABSTRACT

This Study investigates utility consumption pattern among Malaysian electricity users. There are three elements will be investigated which are i) Attitude [Awareness] ii) Environmental concern [self-efficacy/ self-determination, behavior of reference person, psychology factor, economic benefit/socio economic and rule and regulation] iii) Energy consumption [electricity consumption]. The research was conducted in Universiti Teknologi Malaysia (UTM), Skudai branch, Johor Bharu, and the respondents in this study were staffs and students at Faculty of Engineering (FKE). A total of 218 questionnaires collected out of 387 questionnaires distributed, indicating 56.33% of return. The method applied in the study includes T-test, simple regression and hierarchical regression (test mediation effects). There are four main results in this study. First, the T-test shows there is significant different energy attitude and awareness among staffs and students. Second, Regression analysis shows, staffs only rank economic benefit as their environmental concern toward energy consumption whereas student rank self-efficacy as their higher environmental concern followed by economic benefit and rule and regulation. Third, regression analysis shows environmental concern does have relationship with energy consumption. Last but not least, the mediation effect shows awareness and energy consumption is mediated by environmental concern.

ABSTRAK

Kajian ini mengkaji corak penggunaan utiliti elektrik di kalangan pengguna Malaysia. Terdapat tiga elemen akan dikaji yang i) Sikap [Kesedaran] ii) kesedaran alam sekitar [*self-efficacy* / penentuan diri, tingkah laku orang rujukan, faktor psikologi, manfaat ekonomi / sosio ekonomi, undang-undang dan peraturan] iii) Penggunaan tenaga [penggunaan elektrik]. Kajian ini dijalankan di Universiti Teknologi Malaysia (UTM), cawangan Skudai, Johor Bharu, dan responden dalam kajian ini ialah kakitangan dan pelajar di Fakulti Kejuruteraan (FKE). Sebanyak 218 soal selidik yang dikumpul daripada 387 soal selidik yang diedarkan, menunjukkan 56.33% pulangan. Kaedah yang digunakan dalam kajian ini termasuk T-test, regresi mudah dan regresi hierarki (kesan pengantaraan). Terdapat empat hasil utama dalam kajian ini. Pertama, T-test menunjukkan terdapat sikap tenaga yang berbeza dan kesedaran di kalangan kakitangan dan pelajar. Kedua, menunjukkan analisis regresi, kakitangan hanya mengambil kira manfaat ekonomi sebagai kebimbangan alam sekitar mereka ke arah penggunaan tenaga manakala pangkat pelajar keberkesanan diri sebagai isu alam sekitar yang lebih tinggi diikuti oleh faedah ekonomi dan undang-undang dan peraturan. Ketiga, analisis regresi menunjukkan kebimbangan alam sekitar mempunyai hubungan dengan penggunaan tenaga. Akhir sekali, kesan pengantaraan menunjukkan kesedaran dan penggunaan tenaga dihubungkan oleh kebimbangan alam

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Electricity began to used for public in the 1870s, but only gradually did it extend its reach into homes, first into the homes of the wealthy, then into middle-class home, and finally, in many urban areas by the end of the 1930s, into almost all homes (Nebeker, 2009). In the 1920s and 1930s many homes with electricity used it almost exclusively for lighting and electricity lighting was probably the strongest pillar of the electrical industry (Nebeker, 2009). Electricity gives a wide variety of well-known electrical effects, such as lightning, static electricity, electromagnetic induction and the flow of electric current in electrical equipment to light up our homes, power our computer, and other electronic devices. Electrical energy consumption is a form of energy consumption that uses electrical energy as input; this type of energy consumption contributes a large percentage of energy use by consumers.

Tenaga Nasional Berhad (TNB), which is a major energy provider in Malaysia, is now emphasizing its focus on hydro and gas, and reducing its dependence on oil. The increasing demand for electricity requires continuous reinforcement of the transmission

systems. The power generation sector of Malaysia is composed of two sub-sectors: thermal generation and hydro generation. In Malaysia, electricity is supplied by three main utility companies; Tenaga Nasional Berhad (TNB), Sabah Electricity Supply Berhad (SESB) and Sarawak Electricity Supply Corporation (SESCO). According to Al-Mofleh, Taib, Mujeebu, Salah (2011), the electrical energy demand in Malaysia has increased tremendously in the past 33 years and its energy conservation policy has improved along these lines (Performance and Statistical Information 2008).

In consumer behaviour context, an attitude is a learned predisposition to behave in a consistently favourable or unfavourable way with respect to a given object. This means that attitudes that are relevant to purchase behaviour are formed as a result or direct experience with the product, information acquired from others, or exposure to the mass media (Schiffman and Kanuk, 2008). On the other hand, Moore (2001) defines attitude as the way an individual views or behaves towards an object, often in an evaluative way and it can be said that attitudes are evaluations of people, objects and ideas. According to Peter and Olson (2010), The American Marketing Association defines consumer behaviour as the dynamic interaction of affect and cognition, behaviour, and the environment by which human beings conduct the exchange aspects of their lives.

Behaviours refer to the actions and mannerisms made by organisms, systems or artificial entities in conjunction with their environment and according to Colling (1999), behaviours are meaningful because they arise in the pursuit of a goal or as an expression of a need. Behavioural influence occurs when strong environmental forces propel consumers to make purchase without necessarily developing strong feelings or belief about the product. In this instance, the consumer does not necessarily go through a national decision making process or rely on feeling to purchase a product or service. Instead, the action results from direct influence on behaviour of environmental force, such as sales, promotion, device, cultural norms, physical environment, or eco pressures (Moren, 1995). According to Wang (2011), attitude refers to the degree of people's awareness of performing electricity-saving behaviour, which largely depends on the

evaluation of preference to electricity saving and the information the individual holds towards such behaviour. In the industrial sector, consumers may not pay attention on how much energy or electricity they have used because they do not have the obligation to pay for the electricity they have consumed. These situations occur because they do not have awareness of the consequence if they consume more energy or electricity.

According to Chan and Lam (2002), the concern about environmental degradation has increased and consumers have recognized the importance of protecting our environment and are increasingly aware of the seriousness of environmental problems. There are many environmental factors to consider, which should influence the way energy is used because the overall national consumption can be lowered if organizations adopt a responsible attitude towards environmental concern to encourage behaviour toward energy saving. Tatzel (2003) said all behaviours, in which humans engage in, are directly or indirectly linked to consumption and a number of research studies conducted by psychologists have repeatedly shown that consumption is an integral part of people's lives (Boyd, 2010), and therefore, people are repeatedly exposed to different aspects of consumption.

1.2 Background of Study

This study investigated the utility consumption pattern among Malaysian electricity users. According to Cavallora (2008), electricity power is the core of energy markets and a product with unique characteristics that sets it apart from other types of commodities. Electricity cannot be accumulated and must be consumed as it is provided to ensure a balance between demands and supply at all times.

This study focused on the electricity consumption pattern among Malaysians in institutions. Electricity consumption in Malaysia has been rapidly increasing due to the development in the industrial, agricultural, commercial and housing sectors. Others reasons for the rise in electricity consumption include the increased population growth and the improved lifestyle (Yan and Choon, 2005). People tend to use more electricity because they are in the globalized world where all activities depend on machines and the use of electricity to function.

In the last few decades, the world has talked about global warming as the temperature rises and the earth heats up (www.thinkquest.org). It happens when the greenhouse gases (carbon dioxide, water vapour, nitrous oxide, and methane) trap heat and light from the sun in the earth's atmosphere, which then increases the temperature. One thing that causes global warming is electrical pollution. Electricity causes pollution in many ways, some worse than others. Some examples of using energy and polluting the air are; turning on a light, using an air conditioner and listening to the stereo.

Earth Hour is a campaign to reduce electricity consumption and its purpose is to save the earth for a sustainable future (www.earthhour.org). Due to global warming, governments nowadays encourage people to turn their lifestyle to be more environmental friendly by introducing "Green power". "Green power" is electricity generated from abundant energy sources that are replenished at a sustainable rate by natural processes. In addition to being sustainable, green power contributes to cleaner air and water.

This research also focused on consumer behaviour towards green energy consumption because a lot of researches have turned their focus towards sustainability, such as Fuji (2006), Diamantopoulos, Schlegelmilch, Sinkovics, and Bohlen (2003), Chuah, Azlina, Robiah and Omar (2006), Aixiang (2011), Kang, Cho and Kim (2012) and the world is going green nowadays. Through this research, the researcher hopes that the consumers will know how important for human beings to reduce their electricity

consumption. When consumers use too much electricity, they somehow contribute to electrical pollution and it will hurt the Earth (Martinsson, Lundqvist and Sundstorm, 2011). The researcher wanted to investigate consumers' attitude towards electricity consumption and the factors that encouraged them to reduce their electricity consumption.

1.3 Problem Statement

This study of the utility consumption pattern among Malaysian electricity users was carried out because "electricity" reminds us of any equipment that we plug into an electrical socket in order to make it work, such as lights, refrigerators, microwaves, and computers. Consumers tend to use electricity unnecessarily and this may lead to environmental pollution and clearly, waste of energy. Electricity users are more concerned about electricity use when they have the obligation to pay the electricity bills. When they are at the work place, they are less concerned about the electricity use and some would switch on the electricity in the morning without switching it off in the evening before they leave the office because they are not obliged to pay the electricity bills. According to Jaraminiem (2012), people tend to behave in a more energy-wasting manner at work than they do at home, because most often they have no financial incentive to save energy at their workplace. Therefore, it is quite a challenge to find ways to encourage people to save energy at their workplace.

This study investigated consumer behaviour towards energy saving by identifying their electricity consumption pattern. The researcher aimed to investigate the factor of variable that determined consumers' attitude towards electricity consumption. Most previous researches investigated household electricity consumption pattern (e.g: Sutterlin B., 2011, Karjalainen S., 2011, Thogersen J., 2010, Wang Z., Zhang B., Yin J.,

Zhang Y., 2011) and there are no researches that studied consumer energy saving or electricity consumption pattern in institutions and at workplaces.

1.4 Importance of the Study

This study was carried out because the researcher aspired to foster awareness among consumers on the importance of saving energy and reducing their electricity consumption at workplaces. People may not always be aware of the environmental consequences (or energy use) of their behaviour and therefore, unknowingly perform actions that increase or decrease their energy use. Thus the consumers need to save energy because as mentioned above, it leads to global warming.

This study is very important in increasing and improving individual consumers' knowledge about their electricity consumption and especially about how their electricity consumption is related to their individual and collective behaviour (Thogerson and Gronhoj, 2010). It is important to educate people about the actual environmental impact of their behaviour (Gatersleben, Steg and Vlek, 2002) and to educate them to be more responsible in order to ensure our environment is always within green space.

The public does not have any idea about their consumption and they need more information, especially concerning the proportional consumption of appliances to make the right choice about their use of energy (Karjalainen, 2011). This study enables the government to deliver information on its government policy (Ma et al, 2011) and energy saving knowledge in order to effectively and efficiently reach and cover different groups of consumers (students and staffs). This is because; according to Wang (2011), policy and social norms attach great importance to reduce daily unnecessary electricity use.

1.5 Research Limitation

There are a few limitations in this study. Research limitations are potential weakness in the study and are out of researcher's control (Simon, 2011). This research only focused the Fakulti Kejuruteraan Electrik (FKE) [Faculty of Electrical Engineering] and therefore, the researcher could only identify energy consumption behaviour among respondents who used the FKE buildings. The respondents of this research were the staffs and students who used those buildings. This scenario drives this research to a small sample. Next, the researcher found out that it was very difficult to get cooperation from the staffs to answer the questionnaire as the return rate was very low and some of them answered only half of the questionnaire. It had become an obstacle for the researcher to analyze the data and the accuracy of the findings may be questioned. However, the researcher had successfully elicited 54 responses from 190 staffs and it is enough for the researcher to analyze the data.

1.6 Objectives of the Study

The objectives of this study are:

RO1: To identify the different attitudes in energy saving behaviour and awareness among staffs and students.

RO2: To identify the ranking of environmental concern (Micro or Macro) among staffs and students.

RO3: To investigate the relationship between energy saving and environmental concern.

RO4: To examine the mediating effect of environmental concern on the relationship between awareness and energy consumption

1.7 Research Questions

RQ1: What is the difference in the attitudes of energy saving behaviour between staffs and students?

RQ2: What is the ranking of environmental concern (Micro or Macro) among staffs and students?

RQ3: What is the relationship between energy saving and environmental concern?

RQ4: What is the mediation effect of environmental concern on energy consumption?

1.8 Scope of the Study

This study focused on Malaysian electricity users in institutions and at workplaces to evaluate their utility consumption pattern. This study took place at the FKE, P02, P05, P07 and P16 at UTM, Skudai. The researcher chose FKE because the staffs and students were within similar field as far as this study is concerned and they were exposed to electricity knowledge and education. This research used questionnaires to collect data.

1.9 Research Design

Figure 1.1 illustrates the six steps in the research design. Problem definition focuses on the utility consumption pattern among Malaysian electricity users. This study will evaluate Malaysian utility consumption pattern. The literature review unpacks the previous studies and their contexts. This quantitative study involves staffs and students of the FKE in Universiti Teknologi Malaysia (UTM) and the evaluation is based on the suggested framework. Data from the quantitative study are analyzed using SPSS software. Finally, this study discusses the results and summarizes the main findings.

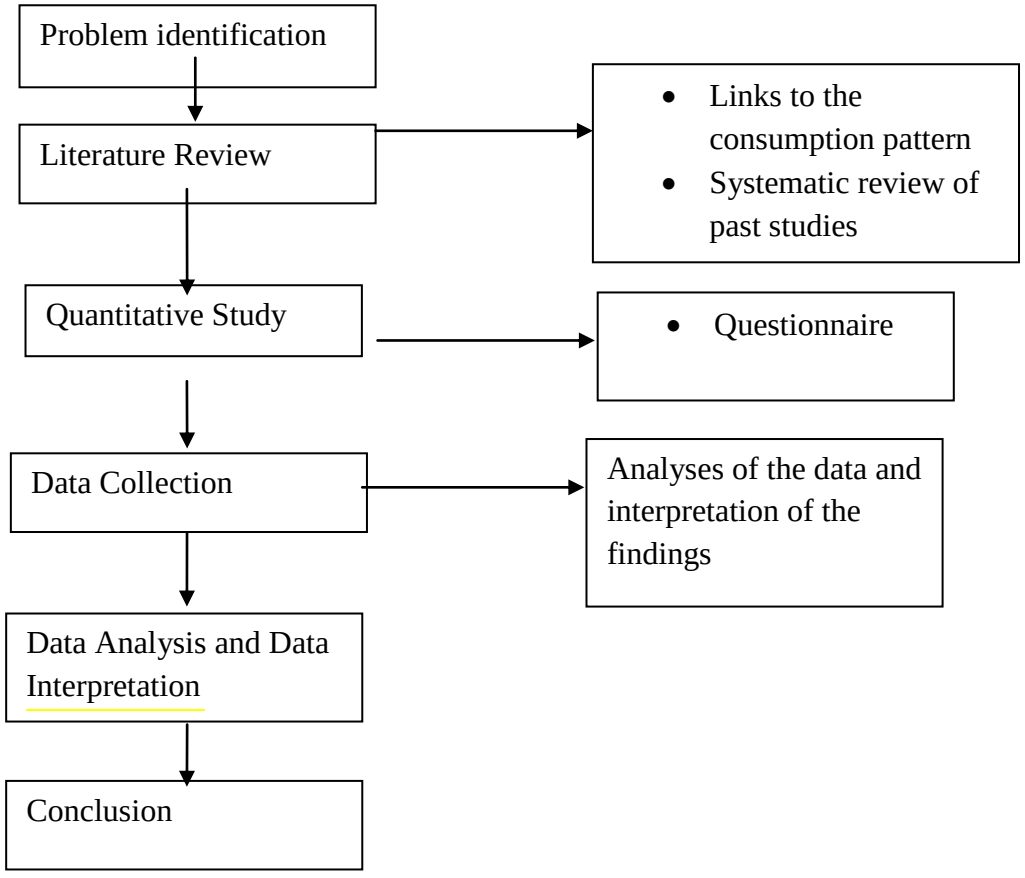

Figure 1.1 Research Design

1.10 Definition of Terms

The terms in this research paper are conceptually and operationally defined for better understanding of the readers.

Green Power:

Electric energy produced by renewable, more environmentally friendly sources, leading to less negative air, water and natural resources impacts (www.greenpoweremc.com). In the research, the researcher uses green power for electricity consumption among the respondents as they use high or low electricity.

Awareness:

According to Wang (2011), attitude refers to the degree of people awareness of performing electricity-saving behaviour, which largely depends on the evaluation of preference to electricity saving and the information the individual holds towards such behaviour. In this research, the researcher uses a scale of awareness to measure the awareness among its respondents to their electricity consumption, if they have any awareness while utilising electricity.

Self-efficacy/ self-determination:

People trying to reduce their electricity use can be potentially important triggers for one's own willingness to do so the same (Thogersen and Gronhoj, 2010). In this research, the researcher uses self-efficacy as one of the environmental concern variable and to determine if the respondents' environmental concern attitude is driven by themselves or others.

Behaviour of reference person:

We are easily influenced by the people in the same situation with us. Welsch and Kuhling (2009) found that the most influential behaviour reference persons are our friends, neighbours and relatives. The researcher would like to determine how behaviour of reference person influences the respondents' attitude to their electricity consumption.

Psychosocial factor:

Psychosocial is belief in human-environmental relation, the consequences and the individual's responsibility to take appropriate actions (Stern et al, 2000). In psychosocial factor, the research would identify if the respondents save their electricity consumption by nature or in other words, it is their habit.

Economic benefit/ Socio economic*:*

''Benefits'' refer to useful resources gained or behaviour consequences beneficial for them, which serve as motivating factor that drives human behaviour. The more benefits one gain through social exchange, the more likely that one will engage in such social exchange relationships (Zhang et al, 2013). The researcher looks into the economic benefits as people save or reduce their electricity consumption because they care about the consequences to others, such as the environmental and the organization.

Rules and regulation/ Phase out:

Wang (2011) illustrated that policy is of great importance to reduce daily unnecessary electricity use, thus to strengthen people's consciousness of energy scarcity while environmental degradation plays a limited role in consumer electricity saving. The researcher uses this variable to investigate energy consumption among the respondents and if they commit to energy saving due to the rules and regulations.

1.11 Conclusion

This chapter presents the background of this study that consists of the importance of utility consumption pattern. The problem statement focuses on what are the problems that appeals to this study. The importance of the study discusses why this research is important and why it must be carried out. The objectives of this study identify the purpose of the study and it is followed with the research questions. The scope of this study focuses on the lecturers, staffs and students at the FKE and the research design is illustrated. Chapter 2 will discuss the literature review.

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