

EXPLORATION OF IMAGE STIMULATION IN RAISING ENERGY AWARENESS AND FOSTERING ENERGY CONSERVATION BEHAVIOUR

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Abstract

Energy is an important pillar in supporting the growth of a nation, notably for developing countries such as Malaysia. The consumption of energy (per meter square) in large public buildings accounts for about 70-300 kwh, in which the consumption rate is 10-20 times higher than residential buildings. One of the reasons for such high energy consumption pattern is due to lack of energy awareness and pro-environmental behaviour among government office building users. Such non-structural problems can be solved through research agenda by focusing on fostering energy conservation behaviour among government building users. Choong (2009) proposed the use of Conceptual Model of Energy Awareness Development Process (CMEADP) in raising energy awareness and to improve energy-use behaviour. According to the model, the first step to create awareness is through presenting appropriate stimulus. By considering the importance of stimulation in raising energy awareness and fostering energy conservation behaviour, this paper explores and suggests the usage of visual communication on how to use image to stimulate energy conservation behaviour among government office building users.

Keywords: *energy conservation, awareness, behaviour, image stimulation*

1.0 INTRODUCTION

It is no doubt that energy resources have always been one of the important agendas for a country. Arabatzis and Myronidis (2011) suggest that energy resources can be regarded as a strategic pillar in supporting the development of the economic system as well as the well-being of social welfare of the country. Energy has been transformed and converted into various forms to support human life and civilization (Mohamed and Lee, 2006). It has been demanded and converted into various forms such as heat in order to support human affairs such as economic activities, transportation and domestic usage for heating and cooling.

The growth of energy demand, thus, results in the change of energy consumption that is positively correlated with economy and population (Mekhilefet *et al.*, 2011). Oh *et al.* (2010) highlight that growth for every 1% in

gross domestic product (GDP) will result in a range of 1.2% - 1.5% increase for energy demand. There is a 27% increase in energy consumption for developing countries in the Asia Pacific region between 1990 to 2000, in which is higher than the overall increase rate which is 11% for the world's energy consumption (Bhattacharya, 2003).

Like other developing countries, Malaysia is also facing an increase of energy demand. According to the National Energy Balance (2009), the final energy demand recorded in year 2009 (40,845 ktoe) is almost double up for the final energy demand as denoted in year 1999 (27,228 ktoe). Moreover, there is an average annual growth rate of 6.30% for energy demand as reported in the Ninth Malaysian Plan from year 2006-2010 compared to 5.60% as recorded on the Eighth Malaysian Plan from year 2001-

2005. In terms of electricity consumption, 53.42 billion kWh of electricity consumption in year 2000 had been dramatically increased to 93.8 billion kWh in year 2011. Figure 1.1 shows the electricity consumption trend in Malaysia from the year 2000 to year 2011.

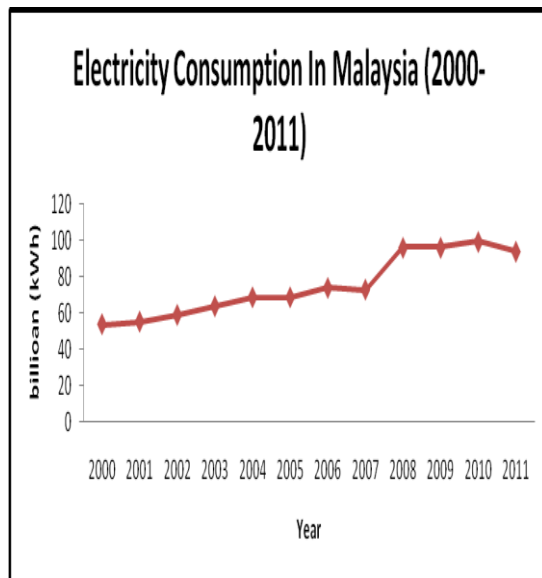


Figure 1.1: Electricity consumption in Malaysia from year 2000 to 2011
Sources: CIA the World Factbook

The increased demand for energy coupled with energy scarcity in which fossil oil is the primary source is alarming the energy security of any country. At present, natural gas and oil contribute to a total of 56.10% of fuel mix in electricity generation according to the Ninth Malaysia Plan from year 2006-2010. The remaining sources are coal (36.50%), hydro (5.60%) and others (1.80%). If we consider coal which is also a source of fossil fuel, Malaysia is highly dependent on fossil fuel which accounts for a total of 92.60% of fuel mix. In order to meet the increasing trend of Malaysian energy demand and consumption rate, the power industry in Malaysia is faced with the issue of sustainability (Mohamed and Lee, 2006). Sustainability concept applied in Malaysia shall ensure energy security, continuous reliable energy supply and energy resources diversification (Mohamed and Lee, 2006). In short, Malaysia needs to sustain energy in various aspects to solve the

problem of increasing energy demand and the depletion of energy resources.

2.0 THE NEED TO RAISE ENERGY CONSERVATION AWARENESS

Yukata (2003) pointed out that energy conservation is essential to reduce Carbon Dioxide (CO₂) emissions which is strongly related to global warming. Large consumption of energy either in electricity or other sources such as heat and cooling system will lead to degradation of environment. As said by Geller (1995), human behaviour is critical and it is strongly related to the environment. Humans should protect their environment to prevent global warming because they are the main cause of the problem. Hence, there is a need to raise energy conservation awareness.

Furthermore, Yang *et al.* (2008) found out that there is about 70-300 kWh/m² energy used by the office building annually and this figure is about 10-20 times of that energy usage in residential buildings. It is noted that office building is consuming more energy than residential sector. Based on the calculations made by Chirarattananon and Taweekun (2003), and Saidur (2009), it was estimated that Malaysian office buildings account for about 6,090 GWh of electricity usage in 2006 with the total commercial energy usage reported at about 29,000 GWh. As reported in National Energy Balance 2009, the commercial electricity consumption is 31,857 GWh which accounted for 33.10% of total electricity consumption. By applying the same assumption as made by Saidur (2009), we are estimating that office building electricity usage had increased to about 6,690 GWh in year 2009. This shows that there is a drastic increase of 600 GWh electricity consumptions in office buildings alone just in three years.

Moreover, it is reported that 40% - 50% of electricity usage can be saved in office building via combination of effective energy measure (Kofoworola and Gheewala, 2009). This shows that there is a great opportunity

of electricity generation in office buildings and this electricity usage can actually be saved. However, since most of the previous studies have focused on the technical feature of buildings or physical features of building (eg, low energy building of PTM in Malaysia), this proposed study tends to scrutinize the energy saving through non-technical aspect, which is voluntary energy conservation behaviour stimulated by image.

3.0 THE CHALLENGE TO INCREASE AWARENESS AND FOSTER CONSERVATION BEHAVIOUR

Building users' awareness and behaviour plays a crucial role in reducing the usage of energy. According to Camp (2005), raising awareness and improving energy-use behaviour is a large part of the solution for energy wastage. Hence, Kollmuss & Agyeman (2002) studied on several theoretical frameworks that have been developed to explain the gap between environmental knowledge, awareness, and demonstrate pro-environmental behaviour. Even though people have the awareness and intention to save energy, there is still a gap between their intention and action to perform energy conservation behaviour.

Typically, energy-saving tips aimed at home owners often are not applicable to those in apartments or subsidized housing because they do not install their own insulation (McMakin *et al.*, 2002). This condition is similar to the government office building in which it is not the building user who pays the electricity bill. For those who do not pay for the electricity bill, they take it for granted and are not aware that they are wasting energy in the office building. Therefore, there is no action taken to improve energy efficiency. They even felt that it is alright to let the lights or air-conditioning system on when they are not in the particular area because somehow the electricity will be paid by their employer, and not them.

As mentioned earlier, Geller (1995) stated that humans play an important role in energy conservation behaviour. However, behaviour is multifaceted and complex (McMakin *et al.*, 2002) and clarifying conservation behaviour is very challenging. Different people have different characteristics and also different behaviour. For government office users, they portray different characteristic and behaviour in conserving energy. "Some of them might have the positive attitude but still not perform the action for attitudes do not determine behaviour directly, rather they influence behavioural intentions which in turn shape our actions" (Ajzen & Fishbein, 1980, p. 239). Thus, it is very challenging to foster energy conservation behaviour and increase energy awareness.

4.0 A NOVEL CMEADP MODEL IN STIMULATING ENERGY AWARENESS

In order to overcome the challenges, Choong (2009) proposed the use of Conceptual Model of Energy Awareness Development Process (CMEADP). This model is aimed at increasing energy conservation awareness and thus, improves energy use behaviour among building users. Basically, this suggested model highlight two important segments, namely, Receiver Dominated Segment and Transferor Dominated Segment. The Receiver Dominated Segment indicates the awareness achievement and achievement process of energy awareness, which is self-monitored by the receiver. Meanwhile, the latter segment is referring to the awareness development process conducted by transferor, which is developed, monitored and controlled by the transferor. Each of this segment possess their own stage process, in which some of the stage process are interconnected with respective stage process from another segment (as shown in Figure 1.2).

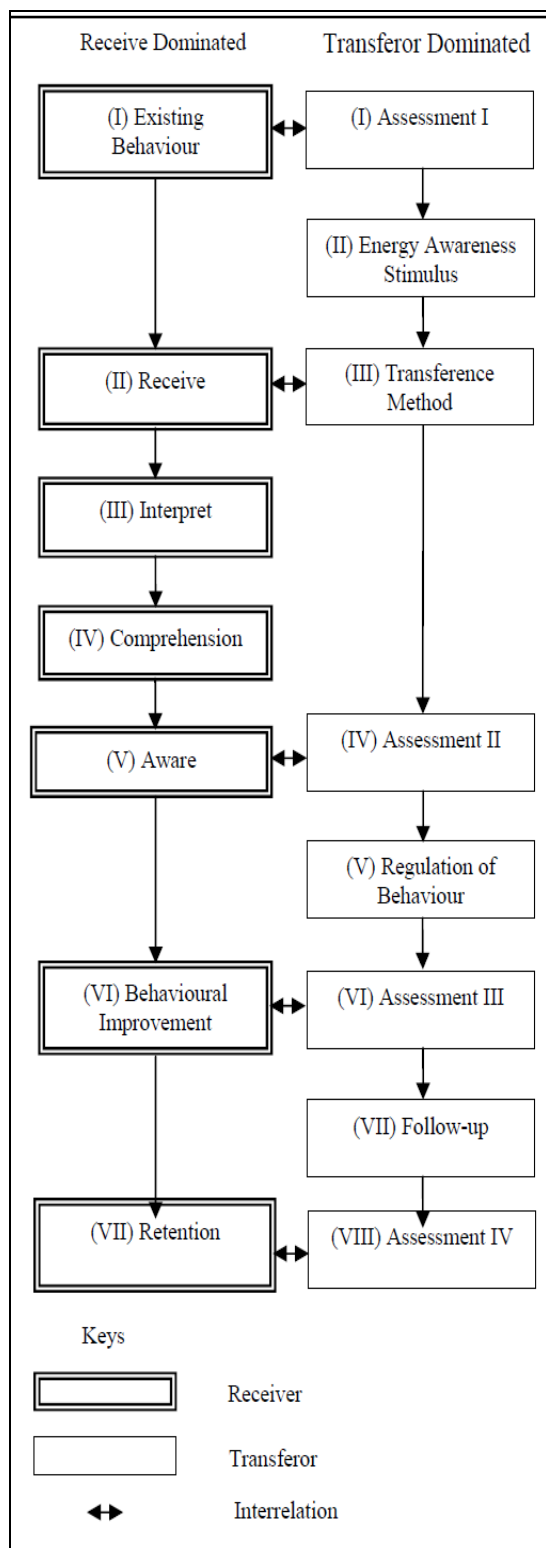


Figure 1.2: The Conceptual Model of Energy Awareness Development Process. Source: Choong (2009).

In the CMEADP model, the Transferor Dominated Segment is highly appreciated with its role in creating energy awareness. The purpose of this proposed research is to raise energy awareness and foster energy conservation behaviour among government office users. The author intends to further explore the Energy Awareness Stimulus at the Transferor Dominated Segment. As explained by Choong (2009), energy awareness stimulus actually refers to each and every kind of stimulus that can present information and knowledge. These presented information and knowledge can be used to stimulate energy awareness and to encourage energy conservation behaviour, especially in providing sufficient information and knowledge to public in matter pertaining to energy conservation. For instance, newspaper, television, radio and internet are some of the energy awareness stimulus in delivering information and knowledge to the public. In the author's suggested research, image will serve as the energy awareness stimulus in shaping the energy conservation behaviour among government office building users.

5.0 PLAUSIBLE SOLUTIONS

While energy demand is increasing in Malaysia, a crucial program is prerequisite to increase energy conservation awareness and to foster energy conservation behaviour among government office users for a sustainable use of energy in government offices. However, at present, most of the available theories and models attempted to reveal the process of how human interpreted information and behave rather than what should be done to change their behaviour. Let's take the learning theory as an example. This theory focuses on how people learn rather than how to trigger and create the learning needs (Wexley and Latham, 1991 and Barker, 1997). On the other hand, Devito (2000) discussed on the perception theory which explained how people receive and select information through the senses instead of how to grab receiver's attention by preparing interesting materials.

Hence, this paper proposes to use image stimuli, to motivate and encourage energy conservation behaviour among government office users so that they can voluntary change their conservation behaviour. It is believed that the successful use of image and picture display will answer on how to raise awareness and foster energy conservation behaviour among government office users. Moreover, image stimulation suggested in this research is due to its successful result when applying in health education campaign (Shinichi *et al.*, 2011; Chang *et al.*, 2011). For instance, Canada was the first country which displayed the fear picture on each and every box of cigarettes to raise public awareness of the health hazards of smoking and to motivate smokers to quit smoking (Chang *et al.*, 2011). Furthermore, researchers had reported using pictures or graphics in shopping centres (Kerr *et al.*, 2001) and office buildings (Eves *et al.*, 2006 and Kwaket *et al.*, 2007) to promote the usage of staircase.

This study had the intension on using different types of image stimuli to stimulate the energy conservation behaviour among government office users. These different types of image stimuli include fact stimuli, fear stimuli, and fun stimuli (which are display in figure 1.3, 1.4 and 1.5). The effectiveness of these stimuli will then be examined through a longitudinal experimental study. The most effective type of image stimuli will be recognised and be proposed to the building managers for their effort in energy conservation campaign. This is the unique and novel aspect of the proposed research compared to previous studies.



Figure 1.3: Examples of Fact Stimuli
Source: <http://www.bc.edu/green>
<http://www.purdue.edu>



Figure 1.4: Examples of Fear Stimuli
Sources: <http://www.awarenessideas.com>
<http://www.behance.net>



Figure 1.5: Examples of Fun Stimuli
 Source: <http://www.display-campaign.org>
<http://www.awarenessideas.com>

6.0 CONCLUSION

In conclusion, raising energy conservation awareness and fostering conservation behaviour among the nation is crucial to achieve a sustainability energy community as well as to respond to the current climate change issue. Knowledge is an undeniable prerequisite for human behavioural change to be more responsible in energy usage. Besides the traditional approach (eg. Newspaper and television) in delivering information and knowledge to increase awareness among end users regarding energy conservation, we are strongly believed that the utilization of image stimuli is essential to foster human's behaviour. We are expecting that not only information being delivered through the image, in fact, attitude and social values are being stimulated, thus, government office building users will have stronger will to dedicate to energy conservation behaviour.

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