STUDY ON THE EFFECTIVENESS 3R (REDUCE, REUSE, RECYCLE) OF SOLID WASTE AMONG UMP STUDENTS AND BETWEEN UNIVERSITY TECHNICAL MALAYSIA (UMT AND UMK)

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ABSTRACT

Human activities generate wastes that are often disposed when they become worthless. The most common method of waste disposal is to collect the waste at first then buried at the landfill. The purpose of this study is to investigate the solid waste management system in Universiti Malaysia Pahang, to research the awareness and practice in 3R of solid waste practice among the students in UMP and also other University Technical in Malaysia, and to be able provide recommendations solid waste management system and encourage 3R of solid waste activities initiative among the students towards making UMP a Green Campus. The study focused on the awareness of students regarding 3R of solid waste activities and the awareness for other University regarding 3R of solid waste issue via questionnaires. After analysis, there are certain issues regarding solid waste management in UMP are not properly addressed, and there are factors that also affect the students' involvement in 3R of solid waste activity. From the data analyzed, 60 percent respondent aware in 3R of solid waste activity. Only 40 percent does not aware. For among University Technical in Malaysia, there are aware but still poor to sustain the 3R of solid waste activity. Besides that, the data analyzed shows that there is sufficient evidence to conclude that the proportion of different level of study and faculty are aware in 3R of solid waste activity. Hence, recommendations have been suggested to enhance the solid waste management system and the initiative promote 3R concept. This is one of the initiatives which could contribute towards making UTM a Green Campus.

ABSTRAK

Aktiviti manusia yang sentiasa menghasilkan sisa sampah yang dianggap tidak lagi berguna. Cara yang kerap digunakan untuk melupuskan sisa sampah adalah dengan mengumpulkan sisa dari sumbernya dan kemudian dilupuskan di tapak pelupusan sampah. Matlamat kajian ini adalah untuk mengkaji aktiviti mengitar semula sisa pepejal di dalam Universiti Malaysia Pahang (UMP), serta mengenalpasti tahap kesedaran pelajar-pelajar UMP tentang aktiviti 3R dalam sisa pepejal, dan memberi cadangan-cadangan bagi menggalakkan penyertaan para pelajar dalam aktiviti 3R sisa pepejal supaya menjadikan UMP sebagai satu *Green Campus*. Bagi menjalankan kajian ini, borang soal selidik digunakan bagi para pelajar untuk mendapatkan data tentang tahap kesedaran pelajar tentang aktiviti 3R dalam sisa pepejal dan juga pada kesedaran pihak universiti berkenaan aktiviti 3R dalam sisa pepejal melalui soal selidik yang dijalankan. Daripada data yang dianalisis, di dapati 60 peratus pelajar UMP mempunyai kesedaran terhadap 3R aktiviti, manakala 40 peratus pelajar tiada kesedaran. Di antara Universiti Teknikal di Malaysia di dapati, mereka sedar namun gagal untuk mengekalkan dan mengalakan 3R activiti. Selain itu, berdasarkan data yang telah dianalisis menunjukkan terdapat bukti yang boleh menyimpulkan perkadaran bagi perbezaan tahap pembelajaran dan fakulti menunjukkan pelajar mempunyai kesedaran terhadap 3R dalam sisa pepejal. Cadangan-cadangan telah dibagi untuk menggalakkan inisiatif mengitar semula sisa pepejal di UMP supaya menjadikan UMP sebagai satu *Green Campus*.

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CHAPTER 1

INTRODUCTION

1.1   GENERAL

In the world today, sustainability issue is real popular issue that been discussed all around the world and with very high frequency. Green revolution is arise and with very high pace. What means by "Green"? It is very easy for everyone link it to the meaning of sustainable and environmental friendly. Green technology means the new technology that contributes toward the environment; Green Building means the building that is sustainable and environmental friendly and Green Campus means the higher or tertiary institutions that are sustainable and environmental friendly. Green Campus is a concept; which comprise of various fields. For example: green building in the campus, energy conservation, student-driven programs toward making green campus, steer towards affordable renewable energy, waste management, and waste recycling.

As the awareness towards Green is rising in a really high pace in the society, campus as the higher education institution start implements the Green Campus concept. This is not only for the creation of sustainable campus; but for most is lead by example as education institution is where we cultivates social responsibility and instill the social

awareness among the students. There are several fields that could be focus on toward making a Green Campus. Solid waste is one of the fields and is critical as the human population in campus is increasing.

Rapid economic development, population growth, change in life style, inadequate infrastructure and expertise, and land scarcity make the management of solid waste become one of Malaysia's most critical environmental issues. Production of waste through the consumer products generate high amount of extra packaging such as junk food wrappers, plastics and soft drink cans. In Malaysia, estimated overall solid waste generated per day is 20000 tons (Mahmud, 2009). Based on the country's drastic development, by the year 2020 the quantity of solid waste generated was estimated to have increased to 31,000 tons.

Due to the development of country, our education system also grows tremendously followed by an increasing in the population on campus has a huge growth as well. Solid waste is one of the largest amounts of waste that produced in campus. Examples of solid wastes produced in campus are papers, containers, scrap metal, ground wastes, reusable clothing, books, appliances, toner cartridges, transparencies, diskettes and envelopes. The usual method to manage the solid waste is dumping, but now recycling becoming more and more popular as an approach to manage the solid waste, for those recyclable.

This study focused more on the efficiency of 3R (reuse, reduce, recycle) among students at University Malaysia Pahang (UMP) campus and also focused on awareness of 3R between University Malaysia Pahang (UMP), University Malaysia Kelantan (UMK) and University Malaysia Terengganu (UMT).

1.2 PROBLEM STATEMENT

Solid waste management is one of the most critical issues faced by Malaysia due to the rapid development of the country in population and economic. The same goes to the tertiary education institutions. UMP is a hostel provided campus, the human traffic is big within the campus. Every day there are tons of solid wastes been produced by the residents of UMP. Most of the solid waste created by UMP residents are papers, household waste, glass, plastic and others. We could realize most of the above solid wastes are recyclable. However, the residents of UMP are not aware on sustainable and environmental issue. They are not playing the active role to take initiative to reduce the solid wastes and recycle the waste.

The main reason is due to lack of awareness of sustainable and environmental issue among the students. To be more accurate, the students do not see the relevant and responsibility to play a role in this. Besides, lack of facilities and support from government also contribute to this problem in UMP. There are not enough recycling bins inside the campus. Also, there is no any program to encourage and involve the students in UMP in solid waste recycling. University authority also does not putting enough effort to reduce the solid waste in campus as well.

If we do not look serious into this problem, UMP campus will be contaminated and caused by certain significant environmental impact. The causes of this problem should be investigated, thus the ways to minimize or solve solid waste management problem could be figured out.

1.3   PURPOSE OF STUDY

The purpose of this research is to investigate the efficiency of 3R (reuse, reduce, recycle) among students at University Malaysia Pahang (UMP) campus. By doing so, analysis can be done and recommendations can be made so that the problem of lack of solid waste recycling can be solved. Also, it will focus on awareness of 3R between University Malaysia Pahang (UMP), University Malaysia Kelantan (UMK) and University Malaysia Terengganu (UMT). Therefore, Green Campus concept can be implemented.

1.4   OBJECTIVES

i.   To study the 3R (reuse, reduce, recycle) of solid waste activities among UMP students.

ii.   To evaluate the perception and awareness of students about the 3R of solid waste in UMP.

iii.   To evaluate the perception and awareness about the 3R (reuse, reduce, recycle) of solid waste between UMP, UMK and UMT.

1.5   SCOPE OF STUDY

This study will only focus on the 3R (reuse, reduce, recycle) of solid waste in UMP campus under the topic of Green Campus.

among students, and the involvement of students in reusing and reducing the solid waste in campus. Questionnaires will be distributed randomly for UMP students to analyze the awareness of students about 3R (reuse, reduce, recycle) of solid waste and suggest the solutions to involve students in 3R (reuse, reduce, recycle) of solid waste program. Visit to the residential colleges of students to analyze the solid waste will be carried out, and 100 sets of questionnaires will be distributed randomly to UMP students as respondents. From the questionnaires, we know the problems faced by the students to achieve 3R (reuse, reduce, recycle) of solid waste and suggestions can be provided to minimize the solid waste problem in UMP towards make UMP as a Green Campus.

1.6   SIGNIFICANCE OF STUDY

The concept of Green Campus is becoming more aware globally now. However in Malaysia, this concept is still new and just newly implemented in the tertiary education institutions. Therefore, those future graduates should be aware on the global sustainable issue and contribute toward it. Making the campus green, is the first step should take as the campus is where they educated and feeding with all the knowledge.

From this research, we can understand more in-depth the awareness of students toward 3R (reuse, reduce, recycle) of solid waste in campus, the causes of the problem, and recommendations can be provided to solve the solid waste problem in UMP.

1.7   EXPECTED FINDINGS

It is expected that this study will be able to offer understanding of students' background and the relations with recycling activities. Besides that, it is expected that this study also able to offer understanding of the students' awareness and perception toward 3R (reuse, reduce, recycle) of solid waste in UMP. It is hoped that this study will be able offer good suggestions in the involvement of students in 3R (reuse, reduce, recycle) of solid program toward making UMP as a Green Campus.

CHAPTER 2

LITERATURE REVIEW

2.1 SUSTAINABILITY

The word sustainability is derived from the Latin *sustinere*; *tenere* means to hold; *sus* means up. Dictionaries provide more than ten meanings for *sustain*, the main ones being to "maintain", "support", or "endure". Follow the development of society, since the 1980s sustainability has been used more in the sense of human sustainability on planet Earth. This has resulted in the most widely quoted definition of sustainability and sustainable development, that of the Brundtland Commission of the United Nations (1987):

> *"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."*

At the 2005 World Summit it was noted that this requires the combination of environmental, social and economic demands which recognized as the "three pillars" of sustainability. This view has been expressed as an illustration using three overlapping ellipses indicating that the three pillars of sustainability are not mutually exclusive but are mutually reinforcing; as shown below:
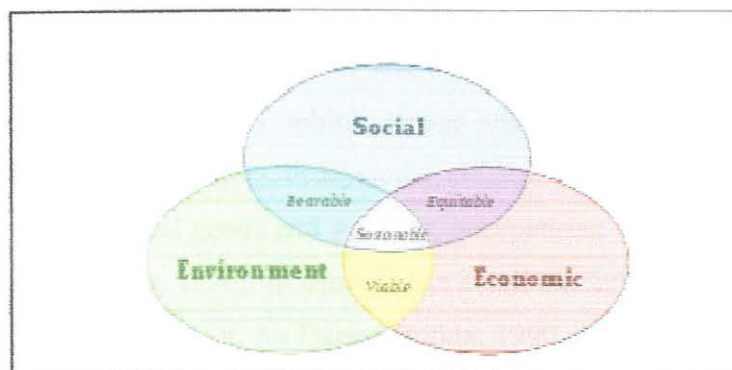
Figure 2.1 Definition of sustainability often refers to the "three pillars" of social, environmental and economic sustainability

Source: Adams, W. M., 2006

The simple definition of sustainability from World Wide Fund for Nature (WWF), 1991:

"Sustainability is improving the quality of human life while living within the carrying capacity of supporting eco-systems"

Although conveys the idea of sustainability having some limitations, but sustainability is also a call to action, a task in progress or "journey " and therefore a political process, so some definitions set out common goals and values. Besides, the word sustainability is applied not only to human sustainability on earth, but also to many situations and contexts over many scales of space and time; from local ones to the global balance of production and consumption. It can also refer to a future intention. For all these reasons sustainability is perceived as nothing more than a bom bastic word with beautiful empty meaning but, at the other, as an important but unfocused concept like "liberty" or "justice" (Blewitt J., 20 08).

Sustainability is studied and managed over many scales of time and space and in many contexts of environmental, social and economic organization. The focus ranges from the total carrying capacity which means sustainability; of planet earth to the sustainability of economic sectors, ecosystems, countries, neighborhoods, home gardens, individual lives, individual goods and services, occupations, lifestyles, behavior patterns and so on (Daniel Botkin, 1990). In short, it can entail the full compass of biological and human activity or any part of it. As Daniel Botkin, 1990, an author and environmentalist had stated:

"We see a landscape that is always in flux, changing over many scales of time and space."

The human impact on Earth systems is the consumption of biophysical resources. Human consumption can be divided into three key components: population numbers, levels of consumption, and impact per unit of resource use (which depends on the technology used). This has been expressed through an equation:

$$I = P \times A \times T \tag{2.1}$$

Where: I = Environmental impact, P = Population, A = Affluence, T = Technology

Source: Ehrlich, P.R, and Holden J.P., 1974

Historically, humanity has demand for more resources by trying to increase supply. As supplies become depleted sustainable practices are encouraged through demand management for all goods and services; by promoting reduced consumption, using renewable resources where possible, and encouraging practices that minimize resource intensity while maximizing resource productivity (Brower and Leon, 1999).

2.2 WASTE

Wherever there is living creatures, waste will be generated from their activities. To manage and reduce the waste, further understanding about the waste and the characteristics would help to enhance the waste management system.

2.2.1 Definition

Waste means "a resource that discarded by its processor or user (dweller, commerce, industry, government) because apparently it has no further use for the processor" (Diaz et. al., 1993). Solid wastes are the things that we throw away which embrace things commonly describe as garbage, refuse, and trash (Davis and Conwell, 2008).

2.2.2 Solid waste generation and characteristics

The Malaysian population has been increasing at a rate of 2.4% per annum or about 600,000 per annum since 1994. With this population growth, the municipal solid waste (MSW) generation also increases, which makes MSW management crucial. In 2003, the average amount of MSW generated in Malaysia was 0.5–0.8 kg/person/day; it has increased to 1.7 kg/person/day in major cities (Kathirvale et al., 2003). By the year 2020, the quantity of MSW generated was estimated to have increased to 31,000 tons.

Information on the quantity of solid waste generated is fundamental to almost all aspects of solid waste management (Tchobanoglous et al., 1993). Most studies on MSW generation used the load-account analysis, which is based on waste collected and disposed in the landfills. Changes in MSW generation rates are mostly caused by the demographic factors and facilities, which are provided by the respective departments.

2.3   SOLID WASTE MANAGEMENT

Waste management is the process consist of analysis waste materials, collection, transport, recovery, and recycling or disposal. It usually relates to materials produced by human activity, and is generally undertaken to reduce their effect on health, the environment or aesthetics. Waste management is also carried out to recover resources from the waste itself. Waste management can involve solid, liquid, gaseous or radioactive substances with different methods and fields of expertise for each (Tachobanoglous et al., 1993).

Analysis

Recycling / Disposal

Collection

Recovery

Transportation

Figure 2.2 Solid waste management processes

Source: Pichtel 2005

2.3.1 Collection

Waste collection is the component of waste management which results in the passage of a waste material from the source of production to either the point of treatment or final disposal. Waste collection also includes the kerbside collection of recyclable materials that technically are not waste, as part of a municipal landfill diversion program.

The frequency of collection is influenced by factors like volume of generation, fly production, rate of generation and cost (Davis and Cornwell, 2008). In hot and humid climate areas such as tropical area, the waste is collected more regularly due to the waste generation in large volume in order to prevent fly production.

2.3.1.1 Household waste collection

Household waste in economically developed countries will generally be left in waste containers or recycling bins prior to collection by a waste collector using a waste collection vehicle (Lyons and Burford, 1993).

However, in many developing countries, such as Mexico and Egypt, residents must interact with the waste collectors, or else trash is not removed (waste left in bins or bags at the side of the road cannot be expected to be removed) (Lyons and Burfor, 1993).

For example, in Mexico City residents must haul their trash to a waste collection vehicle which makes frequent stops around each neighborhood. The waste collectors will indicate their readiness by ringing a distinctive bell and possibly shouting. Residents line up and hand their trash container to the waste collector. Depending on the neighborhood, a tip may be expected. Additionally, private contractors' waste collectors may circulate in the same neighborhoods as many as 5 times per day, pushing a cart with a waste container, ringing a bell and shouting to announce their presence. These private contractors are not paid a salary, and survive only on the tips they receive. Later, they meet up with a waste collection vehicle to deposit their accumulated waste (Hardin G., 1986).

The waste collection vehicle will often take the waste to a transfer station where it will be loaded up into a larger vehicle and sent either to landfill or to an alternative waste treatment facility.