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SUSTAINABLE DEVELOPMENT IN HIGHER EDUCATION INSTITUTIONS (HEIS): TOWARDS SUSTAINABLE CAMPUS OPERATIONS (SCO)

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ABSTRACT

Sustainable development has become an important organizing principle for human life on this planet. It is related to the quality of life in a community, whether the economic, social and environmental systems that makes up the community with providing a healthy, meaningful and productive life for present and future. Thus, university is one of the mediums that can be particularly well suited for the realization of sustainable development. One of the most important themes used to promote sustainability at higher education institutions (HEIs) is through their campus infrastructure and operations. While some local HEIs perform a variety of green programs and initiatives, the actual campus sustainability practices are not much explored. Thus, this paper fills the gaps by investigating the actual areas of focus and common measures taken by some major HEIs around the world towards Sustainable Campus Operation (SCO). Hopefully, this paper will provide an aspiration to Malaysia's HEIs particularly to the management parties in making plan and framework of sustainable campus to meet the United Nation Decade of Education for Sustainable Development.

Keywords: sustainable campus development, campus infrastructure and operations, sustainable campus operation areas, sustainable campus operation impact.

INTRODUCTION ON SUSTAINABLE CAMPUS DEVELOPMENT

The environmental pollution and degradation caused by energy and material consumption through the operations and activities by HEIs such as in teaching and research, provision of support services, and in residential areas has become an issue of global concern for higher education institution policy makers and planners [1]. Thus, the idea of sustainability is triggered as a result of consciousness of the direct and indirect adverse effects on the environment due to the activities and operations at HEIs. In line with United Nations Decade of Education for Sustainable Development (2005-2014) which aims to promote education as a foundation for a creation of a more sustainable human society [2]. This idea also aims to integrate sustainable development into education systems at all levels. Apparently, higher education institution seems to be one of the important mediums that can be particularly well suited for the realization of sustainable development.

According to Cortese (2003); and Velazquez *et al*. (2004), greening the operation on campus is one of the four strategies used in HEIs around the world for achieving sustainability other than education, research, and outreach and partnership. This is proven when sustainable campus operations become important and are mostly mentioned in policy and are often the main thrust of sustainability initiatives on campus [5]. These initiatives, then, have been adopted by other academic institutions around the world and implemented through centralized programs to promote green practices in achieving their sustainability objectives. Although practices and programs may be different in their implementation, commonly these initiatives aims to reduce material consumption, minimize pollution and increase efficiency.

SUSTAINABLE CAMPUS INFRASTRUCTURE AND OPERATIONS

In adopting sustainability in campus operations, various areas of focus and goals are being set by HEIs around the world. Alshuwaikhat and Abubakar (2008) mentioned that environmental management system consists of two initiatives namely the environmental management and improvement, which relates to waste minimization, energy efficiency, and environmental conservation; and the green campus, which aims to promote construction of green buildings and transportation facilities. All these areas can be assembled together under a common theme, which is campus infrastructure and operations. Table 1, presents a listing of prominent HEIs with their focus areas of sustainable campus operations (SCO) [6].

Table-1. International HEIs and areas of focus towards SCO (Source: UI Greenmetric World University ranking 2013).

Sustainable Campus	Focus Areas						
	Energy	Building and grounds	Purchasing	Waste	Transportation	Food	Water
University of Nottingham	√	√	√	√	√	–	–
University College Cork	√	√	–	√	√	–	√
North-eastern University	√	√	√	√	√	√	–
University of Connecticut	√	√	–	√	√	–	√
University of North Carolina	√	√	√	√	√	√	√
University of California, Los Angeles	√	√	√	√	√	√	√
York University	√	√	√	√	√	√	√
University of California, Merced	√	√	√	√	√	√	√
New York University	√	√	√	√	√	√	√
University of Melbourne	√	√	√	√	√	–	√
University of Michigan	√	√	√	√	√	√	√
University of California, Berkeley	√	√	√	√	√	√	√
Vanderbilt University	√	√	√	√	√	√	√
Cornell University	√	√	√	√	√	√	√
University of British Columbia	√	√	√	√	√	√	√
University of Victoria	√	√	√	√	√	√	√
University of Maryland	√	√	–	√	√	√	√
University of Pennsylvania	√	√	√	√	√	√	–
Brandeis University	√	–	–	√	√	√	–
Clark University	√	–	–	√	√	√	√
Total =	**20**	**18**	**15**	**20**	**20**	**16**	**16**

From information displayed on the web by these international HEIs, it can be observed that generally there are seven common areas of focus in achieving SCO. It can be seen from the listing in Table-1 that all HEIs are giving a priority on energy, waste, and transportation area, followed by building and grounds, foods, water, and purchasing. For each focus area, various measures and guidelines are established toward achieving sustainability goal. As illustrated by New York University in their Sustainability Assessment Report, 2006 shown in Figure-1.

FOCUS AREAS OF SCO AND ITS IMPACT

Sustainability in campus are based on the Triple Bottom Line concept (TBL) which means all measures taken must be beneficial to the environment, economy, and social as described by Wiedmann & Lenzen, (2006). According to the World Watch Institute (2010), about 40% of world's total energy usage dedicated to the construction and operation of buildings [8]. Obviously, by reducing the total consumption of energy for the operation of campuses, it is not only beneficial to environment but will also reduce the financial spending of HEIs.

The proper handling of construction waste generated on campus offers economic benefits by reducing the purchasing of materials and generating additional income through the re-use or sale of used materials. In addition, it also can reduce the transportation of waste from campus to recycling and disposal facilities [9]. These practices can help to reduce the demand for virgin resources and eases more strain on the current waste stream.

Other than the parameters stated above, transportation is also one of the important areas that need attention in order to achieve sustainability. It has been shown in many studies that transportation has a huge impact to the natural environment. Fossil fuels such as diesel oil and gasoline contributes to global warming through the release of emissions of several greenhouse gases (GHGs) that is harmful to human health and the environment. Fossil fuel based vehicles emit pollutants such as carbon monoxide which contributes to the formation of smog, and produce nitrous oxide which is a cause to acid rain. Sulphate aerosols which are generated from fossil fuel combustion produce negative effect to human health such as asthma and lung cancer [10]. A proper management of the transportation system, such as total amount usage of fuel utilized in campus vehicles or increasing pedestrian networks will instantaneously bring into being positive impact for the environment.

The concept of green buildings is to reduce the overall impact of the built environment on human health and the natural environment. Buildings are understood to be the biggest consumer of energy. Although initial cost to build green buildings often reach 10-15% more than the conventional ones, its long-term savings can be obtained by the efficiency and productivity of the building itself [11]. Materials used for green buildings are derived locally thus supporting the local economy and use less energy to transport the materials to the construction site. In addition, green buildings incorporate water and energy efficient designs while maintaining the health and well-being of occupants. The purpose of green space is to help to restore the natural ecosystem while purifying the air and improve the quality of life for the institution's community. Generally the use of native flora as green areas help to restore habitat and minimize maintenance needs. Furthermore, the use of vertical or plant-covered expanse that is anchored to a wall will act as a natural air filters to remove CO_2 and volatile organic compounds (VOC_S) as well as providing an aesthetic value [11].

Last but not least, organic foods are the most environmentally conscious method for growing food, and it also yields greater nutrition and higher quality taste. Organic farming thrives by maintaining crop biodiversity and is premised on the non-usage of pesticides and antibiotics. Crop rotation, crop diversity, and integrated pest management are all effective methods for preventing infestations while not endangering biodiversity or enhancing soil acidity [12]. Local food has a lower environmental cost than non-local food due to its proximity to the site of delivery. It also serves the social and economic component of sustainability by supporting the local economy and establishing connections with the local community. Local foods minimize the amount of transportation and packaging required, significantly lowing the energy impacts of food distribution. There are social, economic, and environmental benefits of buying local foods.

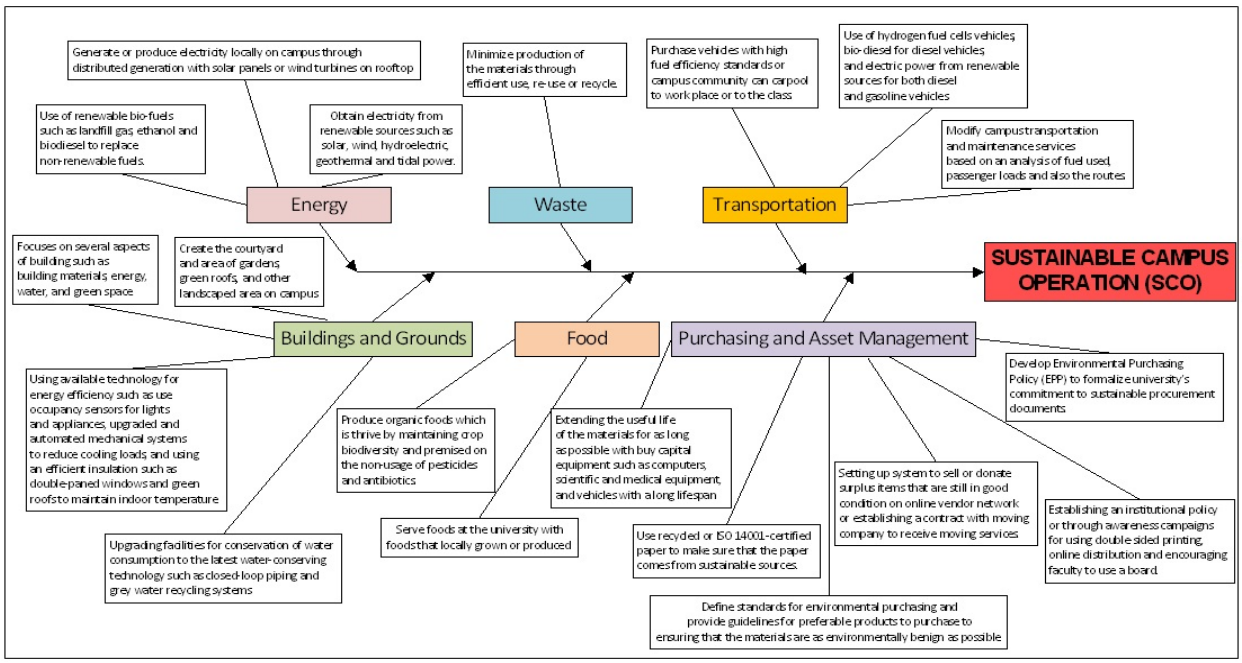

Figure-1. Measures taken towards SCO (Source: Sustainability Assessment of New York University's Report (2006)).

CONCLUSIONS

The purpose of sustainable campus development is to ensure that human life will be organized in a proper manner with respect to the environment, social and economic systems. The focus areas of sustainability and measures described above are not necessarily followed, but it can be used by local HEIs as a guide in the initial steps towards developing and constructing sustainable campus infrastructure as well as promoting and implementing sustainable campus operations. This paper provides the broad overview of the overseas institutions' experiences that will give an aspiration to Malaysia's HEIs particularly to the top management members in making plan and framework of sustainable campus to meet the United Nation Decade of Education for Sustainable Development.

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