

Implementation of Green Technology in Library: A Proposed Framework

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Abstract

A library as a place for a lifelong learning for the society can be a role model to implement the go green projects whereby this projects need the support from the government and the society as a whole. This concept paper aims to give an idea on how the implementation of green environment can be implemented in the library by focusing on the following aspects which are (i) energy saving, (ii) the efficiency of resource usage, (iii) increasing natural environmental exposure, (iv) environmental load reduction and (v) sustainability of global development with respect to the friendly environmental library. Insight will benefited the librarian in handling issues on the rises of pollutions and energy consumption.

Keywords: Green Technology, Environmental Friendly, Energy Consumption, Recycling, Sustainability, Pollution, Library.

1.0 INTRODUCTION

As the world are concerning with the issues of global warming, greenhouse effects, and the rises of pollutions including water, air, land and sound pollution, many alternatives have been constructed and taken into serious action in order to overcome the issues as well as to attain the sustainability of the global development. The government has come up with the idea of go green whereby this idea cover up three important aspects mainly economic, social and environmental aspects for the green environment to be implemented. A library as a central of sources information for data collection has become a place for the social community to retrieve the knowledge and information.

As it is become the central community for the society, library need to become a role model to introduce to the society about go green project, and it significant for the sustainability of the global development, why the needs of go green for each component which are in economic, social and environmental aspect. The library has to be a starter for the go green to be implemented with support of the government as well as the community (Pangail, 2015).

2.0 LITERATURE REVIEW

Dike (2007) performs a survey on academic libraries in her study entitled "How green is the academic sector?" The study addressed the results of a questionnaire survey investigating environmental practices in academic libraries of the United Kingdom. In This paper, the authors try to emphasize how the implementation of green environment can be implemented

in the library by focusing on the following aspects which are (i) energy saving, (ii) the efficiency of resource usage, (iii) increasing natural environmental exposure, (iv) environmental load reduction and (v) sustainability of global development with respect to the friendly environmental library.

2.1 ENERGY SAVING

With the economy recession facing by the country, almost all of the organization was effected with the reduction of budget by the government. This phenomena also reflected to all the libraries as well. Library need to take a measure in allocating the budget in terms of reducing electricity consumption. As the library has a long service hour with the need of air-conditioning and lighting, the energy consumption seems crucial (Wong, W. 2016). In his paper published titled "More than just a green building developing green strategies at the Chinese", Jones stated that by installing the motion sensor in the system, the energy used can be reduced to several percentage (Jones, 2016). The time the lights stay on after a user has moved away was reduced in order to cut down the consumption of electricity. Shut down the computers, photocopiers and printers when library closes has been practice a long time ago. Every morning, the staff will no need to turn on the computers, only when the needed that the first staff that want to use it will switch on the machine. The practice seems fruitful since the annual energy consumption of the university library reduce down to eight percent (Jones, & Wong, 2016).

The other idea that has been discussion from the previous research is by installing the HVAC system. HVAC is stand for Heating, Ventilation and Air-Conditioning. As has been discussed by Linden (2012), this system has been known as a system that can reduce the energy consumption inside the building. HVAC has been implemented inside the building from the country with four seasons. The system will change the temperature based on the surrounding by using a temperature detector. During summer, the temperature will rise to a certain level set by the user. And it will happen during the winter season when the temperature detector detect the drop of temperature from surrounding, the system will increase the temperature so that the environment is getting warm for the user comfort (Reilly, & Herzog, 2012).

Libraries need to have a preservation environment due to its contained materials conditions. With respect to the temperature and relative humidity, certain guidelines has been made for example, the preservation of cultural materials must be in conditions at 70°F and 50 percent RH, with minimal fluctuation (Sebera, 1994; Reilly, 1995). The existence of mechanical systems in library environments are designed to maintain the desired environmental conditions, usually cause a high cost in both monetary and energy consumption. By changing the system into HVAC, not many librarian are ready to implement with the operating schedule of the system. (Linden, Reilly, Herzog, 2012).

Based on the article "The human dimension of energy conservation and sustainability A case study of the University of Michigan's energy conservation program" it shows a significant

changes in how institutions taking care of their collections when it comes to environmental conditions for example the flat-line control of temperature and relative humidity conditions, gas-phase filtration, and upgrades to ultra-modern mechanical systems have all been implemented for collections preservation. Some of the standard guidelines focus on constant air volume, continuously running systems to maintain temperature and relative humidity conditions in collections areas where preservation is a priority (Maran, & Edelstein, 2010).

2.2 EFFICIENCY OF RESOURCES USAGE

The resources on the earth are considered as a limit sources. Thus, the usage need to be more efficient. By optimizing the resource usage, library can be a role model for the community on how to use the resources efficiently. Tseng, S. (2012) have done a research on Taipei Public Library in China. Several things have been analyzed by the author on how the library manage to utilize the resources. It comes from the design and the structure building of the library itself. Tseng mention that the design of the library made to be environmental friendly which provide a comfort ability to the visitors. The visitors also can have the feeling outdoor with the design of the location of the reading tables near the French windows so that the light can penetrate inside the building in optimal (Tseng, 2012).

The materials to build the chairs, tables and the shelves itself are made of wood. The outdoor reading area give a visitors a relaxing reading environment. The roof is made of light material. On the rooftop, the Solar cells is being installed in order to generate electricity from the light. The energy can be generated up to 16 thousand watts. In order to reduce the air-conditioning usage, the shades and wooden lattices is installed. This materials will prevent the heat from entering the building. The library also practice to utilize the use of water resource by installed the absorbable plants and grassy slope at the roof. The rainwater will be absorbed and collected into the tank for recycling purposes (Tseng, 2012).The recycled water will be used to water plants and flush toilets in order to minimize the waste of water resources. The building of the library has been constructed by using recyclable wood and steel in order to minimize the negative impact to the environment and the waste also will be reduced. At the same time, the wood used inside the building is coated with waterproof liquid in order to prevent termites. (Midla & Kikas, 2009). The paint used is also an ecologically friendly, and thus can avoid furnishing the unnecessary items (Fourie & Fourie, 2012).

Other factors that effect in efficiency of resource usage is the library designed the interior like for instance, the installation of wide French windows instead of full bricks will make this practice to happen. The entering of light will be in optimum level thus can reduce the usage of lighting. When you look out from inside the building, you can see outside with a full and clear view (Tseng, 2012). The French windows is design for the purpose of to penetrate the light inside the building with a percentage amount of light that can enter and at the same time it filter the ultra-violet that can damage the materials inside the building (Soares, 2015).

2.3 INCREASING NATURAL ENVIRONMENT EXPOSURE

Using the natural environment in replacing the usage of resources can give a contribution towards the green environment in library. Wong, W. (2016) also mentioned that the structure of the library building play an important role on how can natural environment exposure be increased. The design outcome was a minimalist, glass facade five-storey extension, two large atria and a learning commons basement with two skylights from ponds to maximize daylight penetration in a building with a deep floor plate. One of the skylights, which has become a key architectural feature of the library, re-instated an existing skylight that had been blocked for many years (Jones, 2016).

Other part of the building, they installed environmental sensors to monitor lighting and air conditioning, green roof design for the new extension roof in order to reduce heat gain. The glass facade used low-E double glazing to help reduce heat gain, and a dot-pattern to stop the swifts flying into the glass. The house swift conservation program was successful. (Jones, & Wong, 2016). There are some other libraries create an area where they will put all the preserved materials in one places so that the preservation can be remained. While at the reading area, the library is installed with open windows in replacing the air-conditioner. More air ventilation can be created with the open windows and indirectly more fresh air will flow inside the building and hence a healthy environment can be produced (Milda, & Kikas, 2009).

2.4 ENVIRONMENTAL LOAD REDUCTION

So many pollution has been occurred nowadays either be it in water pollution, the river or the seam be it of land pollution, sound pollution and air pollution. In Guiyu, china, land pollution has become a serious problem as most of the waste products from electronic company will dumped it in that area. Guiyu China is known as the world largest waste dump in the world (Leung, Cai, Wong, & Mater, 2006). Chinese University of Hong Kong Library (CUHK) planning to implement green practices in their services and daily operations, especially the effort to reduce the consumption of paper, as the other university target. Furthermore the library also disposes of its redundant IT equipment and furniture with care. All print cartridges are recycled by arrangement with EMO. Obsolete IT equipment is collected by ITSC and the business office, for resale or distribution to charities. A list of unwanted furniture is compiled and sent to all university offices via mass mailing to seek new owners before sending to recycling sites. (Jones, & Wong, 2016).

In related to paper waste, one of the way is to convert services to online so that use of paper can be reduced as far as possible. In order to reduce paper consumption duplex printing option was made available as early as 2002. Eventually, double-sided printing was set as a default mechanism for all printing in September 2011. To encourage recycling of unwanted paper produced from photocopiers and printers, rubbish recycling bins are placed near photocopiers and printers. The library staff will collect unwanted paper with printing on one-side for reuse, placed in a tray in public areas for users to use as drafting paper. Scanning service. The library also reviewed the provision of multi-function photocopiers, and significantly increased scanning

provision in 2013-2014. The charge of scanning service is cheaper than the printing and the library hopes that this will attract users to use scanning more than printing so as to reduce paper consumption. The consumption of paper has reduced 1 per cent in 2015 as compared to 2014 (Collin, 2015).

Palilonis, A (2012) said that, the empty cartridges can be returned to the selected company that use it for the business purposes. This practice will prevent from landfill and save the materials. Most of the companies who doing business with the empty cartridges will pay with cash and the value per cartridges can be from 25 to 50 cents. For the empty laser printer cartridges, the value is much higher than the normal cartridges. Finally, postage-paid mailing envelopes for ink cartridges, cell phones and other small electronic items will be mailed to a recycler. This service is a low effort method to recycle empty ink cartridges (Dempsey, & Palilonis, 2012).

2.5 GLOBAL DEVELOPMENT SUSTAINABILITY

The term sustainability can be interpreted as the capability of continuous the needs of the current without changing the ability of future generations to meet their own needs. It has economic, social and environmental aspect (Pangail, 2015). "A true green library is one that promotes sustainability by leading as example and attempts to incorporate sustainability into all aspects of academic librarianship". Olson's view is that a green strategy should aim to cultivate a green culture that can reinforce people's behavior, provide appropriate tools and training in order to encourage change. Other activities to raise environmental awareness and promote sustainable lifestyle among students and staff include as examples, a farmers' market on campus, and a campaign to encourage walking. (Younghee , 2011).

As we all have bear in mind, the current resources supplied are finite resources where for a long term used, the resources may vanish from the earth in the future. Thus, the usage of the energy resources need to be monitored. According to the U.S. Green Building Council, U.S. residential and commercial buildings account for 68% of electricity consumption and 39% of total energy use (Yudelso, 2007). Other practice that can be implemented to achieve the sustainability, the community need to reduce the carbon footprint that come from the buildings. This carbon footprints is said to be the cause of greenhouse effect where the amount of carbon dioxide released in the air is greater than the average rate of normal gas. A simple practices that libraries can do for the wellbeing of the environment is by reducing of the toxic chemical cleaners. Instead, using the natural cleaning products is much encourage able (Antonelli, 2008).

2.6 FRIENDLY ENVIRONMENTAL LIBRARY

Based on analysis, it is shows that we are moving from the developing stage to the practicing stage, but the implementation of the green practices in libraries are still far away. We need to do on integrating green principles into our traditional business or service model, and have not started on building and maintaining a green knowledgebase. The traditional library is changing

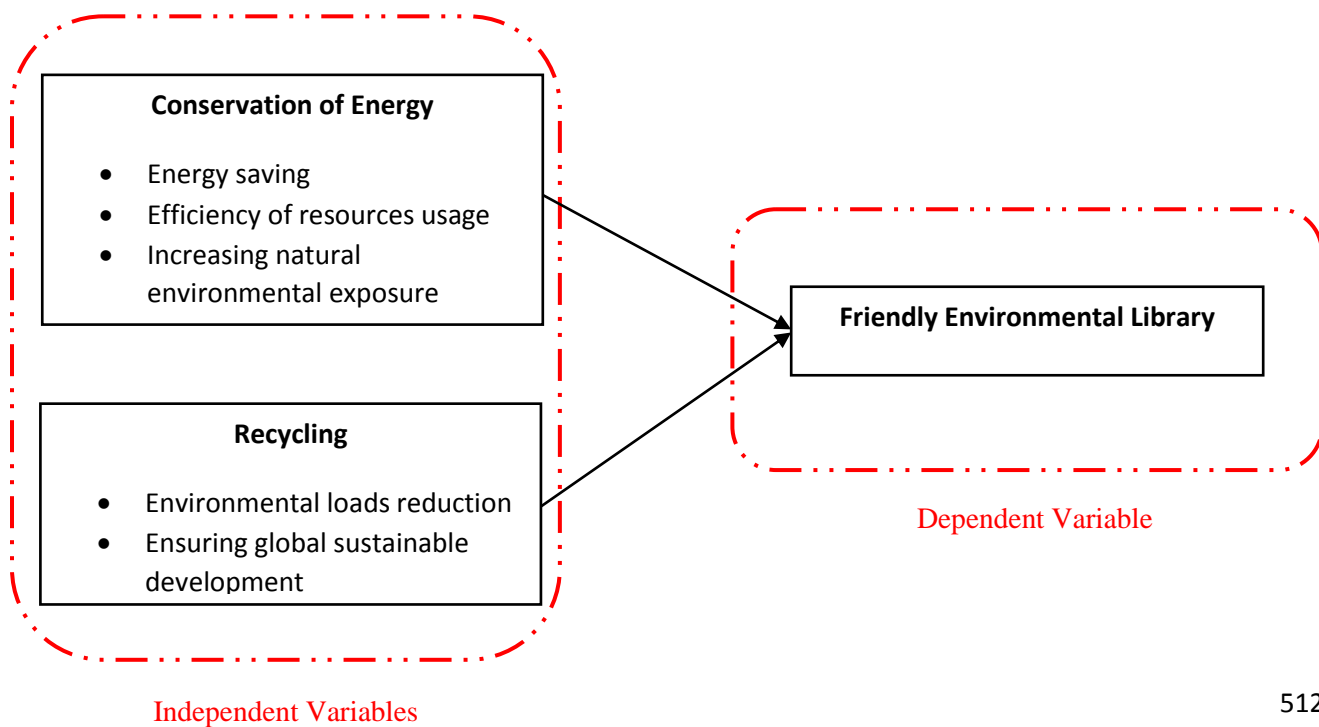
as the digital library and green computing impact. But still in terms of the financial cost, energy intensity and their carbon footprint have not yet been measured (Jones, & Wong, 2016).

Wong, W (2016) said that for the friendly environmental library to be accepted by the community, the library itself need to be the starter and role model to the community by practicing all the green activities. Such green activities will resulting a healthy environment and maintain the sustainability of the global development. The library building should implement green qualities of saving energy, recycling water, and generating energy with its solar panels, as well as the collection of rainwater for the recyclable water practice. Being a role model will give a great impacts to the community from young generations to the old generation.

The benefits of environmental friendly library, it increases the number of library visits. At the same level, the environmental friendly library should manage to attract many researchers as well as scholars from all over the world. This example can be found from the Beitou Branch Library in China. Based on Taipei Public Library (2007b) statistic, the book borrow from visitors increased positively from year to year. Furthermore, the environmental friendly library will the typical thinking of public towards the library itself (Pangail, 2015).

3.0 CONCEPTUAL FRAMEWORK

The framework below (figure 3.1) shows the independent variables and dependent variable in this study. The independent variables will give effect and interrelated to the dependent variable. In this study, the independent variables are energy saving, efficiency of resource usage, increasing natural environmental exposure, the reduction of environmental loads and the sustainability of global development. Meanwhile, the dependent variable for this study is friendly environmental library.



4.0 CONCLUSION

The environmental friendly library still did not being a concern for the developing countries. It is kontras with the develop countries where the green activities has been their practices in almost in every aspects of their daily lives as they have realized the importance and benefits for themselves as well as the future generations. With the rises of pollution and increases of greenhouse effect at the global level, actions must be taken to prevent the current problems become worst. With the first steps taken by the library to be a role model to the community, this efforts will be fruitful at least for the young generations to start realized and appreciated the importance of the resources given as well as not to repeat the mistakes made by the previous generations.

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