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POTENTIAL RETROFITTING OF UTM EXISTING BUILDINGS
TO GREEN BILDING

FOO KIAN SENG

A project report submitted in partial fulfillment of the
requirement for the award of the degree of
Master of Science (Construction Management)

Faculty of Civil Engineering
Universiti Teknologi Malaysia

JULY 2011

I declare that this project report entitled “*Potential Retrofitting of UTM Existing Buildings to Green Building*” is the result of my own research except as cited in the references. The report has not been accepted for any degree and is not concurrently submitted in candidature of any degree.

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To my beloved parents and friends for their never ending care and support.
Thank you for everything.

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ABSTRACT

Green building is building that focuses on maximize the energy efficiency and resources used, while minimize building impact on human health and the environment during its life cycle. But previously, many building built is non-sustainable design and construction include UTM campus building. In Malaysia, existing buildings and its communities contribute over 40% of green house gases to the environment. Thus, there is potential retrofitting of existing buildings to green building. In order to achieve the above requirement, a rating system call Green Building Index (GBI) is used in Malaysia. The study is carried out in order to determine the potential of retrofitting the UTM existing buildings to green building. Although the establishment of GBI in the country had lead to the nation awareness on green building, but there is a need to figure out such awareness on UTM communitites. Serious awareness on the UTM community will give more confidence to top management to consider the potential of retrofitting for existing building to green building. Besides, recent year top management of UTM had taken a big step in green by comprehensive initiatives towards sustainable campus by its sustainable campus policies. These comprehensive campus sustainable policies had rise up the potential retrofitting of UTM existing building to Green building. In additional to, UTM had set a target to reduce 10% energy used in campus in 2010. This is because high and increasing cost of campus utilities, operation and maintenance indicate that UTM is practicing unsustainable living conditions. The nature of green building which is energy efficiency becomes a critical need. Therefore it becomes a need to retrofit the existing building to green building.

ABSTRAK

Bangunan hijau adalah bangunan yang memberi tumpuan kepada memaksimumkan kecekapan tenaga dan sumber yang digunakan, manakala mengurangkan kesan bangunan terhadap kesihatan manusia dan alam sekitar semasa kitaran hayatnya. Tetapi sebelum ini, bangunan yang dibina adalah reka bentuk dan pembinaan yang tidak lestari termasuk pembinaan kampus UTM. Di Malaysia, bangunan yang sedia ada dan penggunaanya menyumbang kepada lebih 40% gas rumah hijau ke alam sekitar. Oleh itu, terdapat potensi untuk mengubah suai bangunan yang sedia ada kepada bangunan hijau. Untuk mencapai keperluan di atas, satu sistem penarafan yang dipanggil Indeks Bangunan Hijau (GBI) telah digunakan di Malaysia. Kajian ini dijalankan untuk menentukan potensi ubah suai bangunan yang sedia ada di UTM kepada bangunan hijau. Walaupun penubuhan GBI di negara ini telah membawa kepada kesedaran warganegara pada Bangunan hijau, tetapi ada keperluan untuk mengenal pasti kesedaran di kalangan komuniti UTM. Kesedaran yang serius di kalangan masyarakat UTM akan memberi keyakinan yang lebih kepada pihak pengurusan atasan untuk mempertimbangkan potensi ubah suai bangunan yang sedia ada kepada bangunan hijau. Selain itu, kebelakangan ini pihak pengurusan atasan UTM telah mengambil langkah yang besar dalam inisiatif kehijauan yang menyeluruh ke arah kampus yang lestari melalui dasar-dasar kampus lestari. Dasar-dasar kampus lestari yang komprehensif ini telah membangkitkan potensi ubah suai bangunan UTM yang sedia ada menjadi bangunan Hijau. Tambahan pula, UTM telah menetapkan sasaran untuk mengurangkan 10% tenaga yang digunakan di dalam kampus pada tahun 2010. Ini adalah kerana kos yang tinggi dan utiliti kampus, operasi dan penyelenggaraan yang semakin meningkat menunjukkan bahawa UTM mengamalkan keadaan hidup yang tidak lestari. Sifat bangunan hijau yang cekap dalam penggunaan tenaga menjadi satu keperluan yang kritikal. Oleh itu ada keperluan untuk mengubah suai bangunan yang sedia ada kepada bangunan hijau.

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CHAPTER 1

INTRODUCTION

1.1. Research Background

Green building can be defined as the building that focuses on maximize the energy efficiency and resources used, while minimize building impact on human health and the environment during its life cycle. It has many benefits, such as better use of building resources, significant operational savings, and increased workplace productivity (Ar. Dr Tan Loke Mun, 2009).

Previously, many building built is non-sustainable design and construction. According to Malaysia Green Building Confederation president Von Kok Leong, existing buildings and its communities contribute over 40% of green house gases to the environment before the launch of MALAYSIA GBI NREB (thestar, 2010). Thus, there is a need to be redesigned or retrofit the buildings in order to reduce their negative impact to the environment (Ar. Dr Tan Loke Mun, 2009).

There is potential retrofitting of existing buildings to green building. Retrofitting is the process of renovate or refurnish the existing building by fulfilled to green building ratings system and improve their environmental attributes. Retrofitting of existing building to green building is needed in order to provide benefit especially response to engineer efficient.

In order to achieve the above requirement, a reference to standard system is a must. A rating system is a reference document that sets rules as a guideline to assess the existing building for future development. The contents in the system may consist of detail assessment criteria like score of item in building, classification, and description of area of assessment.

To date, the rating system used in Malaysia is Green Building Index (GBI). The purpose of GBI is evaluating the environmental design and performance of Malaysian buildings based on the six main criteria which is Energy Efficiency, Indoor Environment Quality, Sustainable Site Planning & Management, Materials & Resources, Water Efficiency, and Innovation (GBI NRED, 2010).

The establishment of GBI in Malaysia had rise up the awareness among all the party involve in building aspect and public about environmental issues and our responsibility to the future generations (GBI Fact Sheet, 2010). Besides, the rating system will enable the developers to design and construct a new building base on green concept. GBI also can help to convert existing building to green building. The conversion can be done by retrofitting, therefore the most comprehensive or economic solution for the continuous used of existing building can be achieved without total demolition.

1.2. Problem Statement

The establishment of GBI in the country had lead to the nation awareness on green building (Dr Tan Loke Mun, 2010). Currently there are 27 GBI certified buildings as listed in the website of GBI organization. In these listed buildings, only Bangunan Perdana Putra is from building categories of Non-Residential Existing Building (NREB). This show that many existing building still not response to proceed with GBI assessment. The decision for retrofitting of existing building to Green building is still lack of concerned by the building owner.

Based on above statement, the potential retrofitting of existing building to green building may become essential need to nation including UTM community. UTM campus building current is designed with non-sustainable consideration. High and increasing cost of campus utilities, operation and maintenance indicate that UTM is practicing unsustainable living conditions (KPI UTM, 2008).

Recent year, UTM had taken a big step in green by comprehensive initiatives towards sustainable campus by its sustainable campus policies. These comprehensive campus sustainable policies had rise up the potential retrofitting of UTM existing building to Green building. Besides, UTM had set a target to reduce 10% energy used in campus in 2010. The nature of green building which is energy efficiency becomes a critical need. Therefore it becomes a need to retrofit the existing building to green building.

This highly demand is added with less participation of campus community towards sustainability. Serious awareness on the UTM community, will give more confidence to top management to consider the potential of retrofitting for existing

building to green building. For example the Office of Asset and Development undergo the process of replace the centerline air- conditional system to split air- conditional of UTM existing building.

Thus, it comes out with the question on what is the awareness level for green building among UTM communities? Can the existing building in UTM retrofit to green building? What are the potential of retrofitting the UTM existing building to green building?

1.3. Aim

The aim of this study is to determine the potential of UTM existing buildings to be retrofit to green building.

1.4. Objectives

To achieve the aim, four objectives have been identified:-

- 1) To identify the benefits of retrofitting the existing building to green building.
- 2) To identify the potential retrofit that response to sustainable green building.
- 3) To identify the potential of UTM building toward green building initiative.

- 4) To propose retrofit for UTM existing building to green building.

1.5. Scope of the Study

This study will refer to Green Building Index (GBI assessment criteria for Non Resident Existing Building) for existing building. This research will focus on existing of “Faculty of Civil Engineering” buildings only. Thus, the limitation of study is only involving the communities who have involve in UTM building development and also point of view of UTM academicians and students that have building related expert.

1.6. Brief Research Methodology

In order to achieve the objectives of the study, essential stages of methodology were conducted from phase 1 to phase 3.

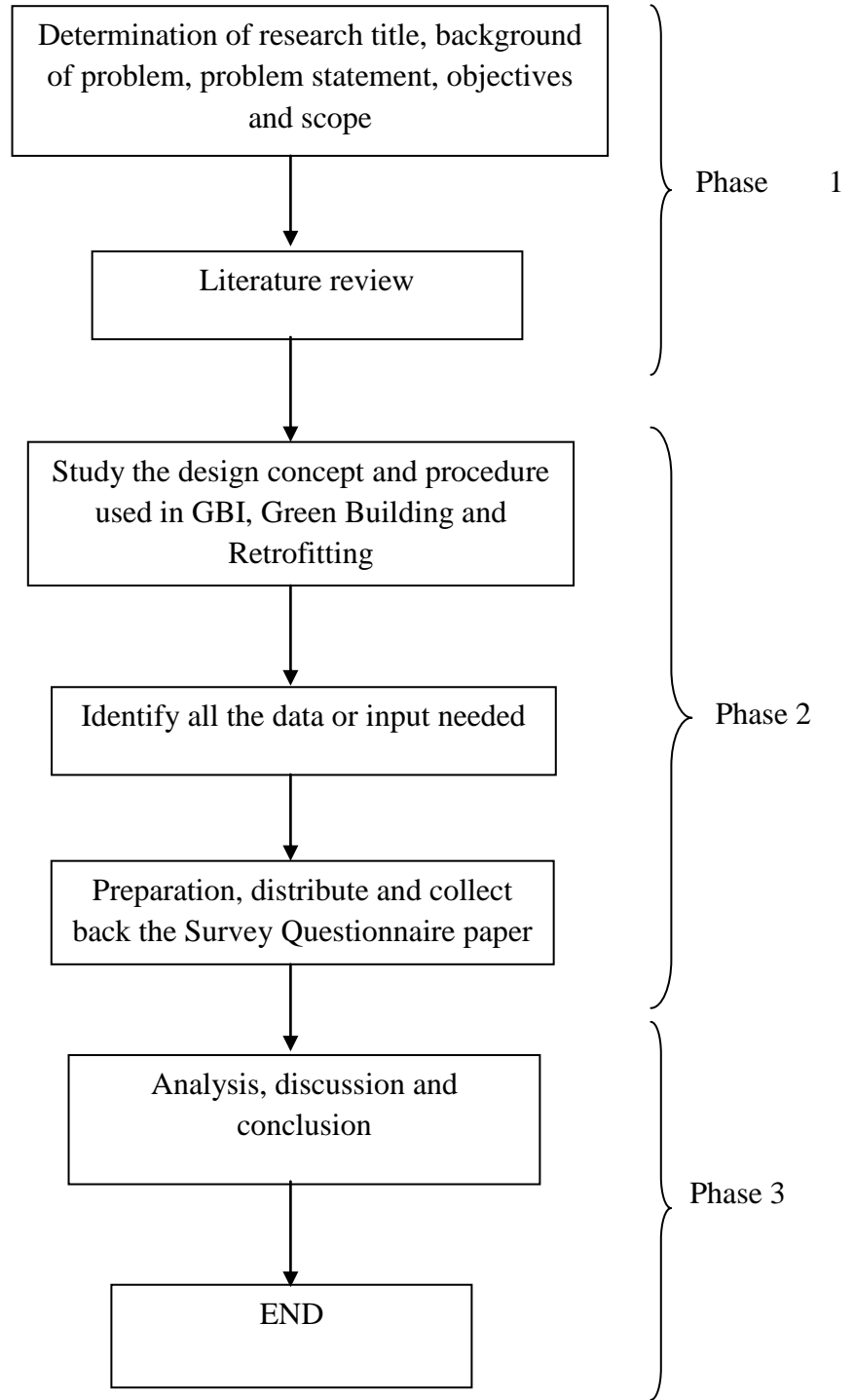


Figure 1.1: Flowchart Diagram of the Study Methodology

1.7. Expected Finding

This study led to the potential retrofitting of UTM existing buildings to green building that provide following findings.

The first expected finding will figure out the benefits of retrofitting existing building to green building. This include reduce energy consumption by using energy efficient application and sustainable material is applied in renovation.

The second finding will enables us to identify the potential retrofit that response to sustainable green building in Malaysia. Higher nation awareness on green building will become a benchmark for UTM top management to put more effort in green initiative in UTM campus.

The third finding will enables us to identify the potential retrofit of the existing building to green building in UTM campus. These potentials will become a milestone of UTM top management to implement the policy of retrofit the existing building to green building in campus.

The forth finding will highlight the retrofit for UTM existing building to green building. The results will enable us to identify which item supposedly to be retrofit. This will be used as the guidance for the party involve in construction area to consider the green initiative in construct a new building or retrofit existing building in the future.