



UNIVERSITI PUTRA MALAYSIA

***GREEN BUILDING INDEX CONSULTANCIES ACCEPTANCE AMONGST
STAKEHOLDERS IN RESIDENTIAL BUILDING DEVELOPMENT***

LESLEY METIBOGUN

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**GREEN BUILDING INDEX CONSULTANCIES ACCEPTANCE AMONGST
STAKEHOLDERS IN RESIDENTIAL BUILDING DEVELOPMENT**

By

LESLEY METIBOGUN

**Thesis submitted to the School of Graduate Studies, Universiti Putra Malaysia, in
Fulfilment of the Requirement for the Degree of Master of Science**

November 2014

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DEDICATION

I dedicate this work to all those who believe in me and my dreams.



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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the Degree of Master of Science

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November 2014

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Sustainable or “green” building construction technology has been fully integrated into the Malaysian construction industry. Despite the awareness and several government initiatives to develop and promote the concept, developers rarely engage the services provided by green building consultants in their projects. Most developers are still not keen to invest in the green building initiative due to their worries on the consultancies and construction implementation cost overrun. Due to this factor, there is an imperative need to ascertain the current level of acceptance of the green building consultancies based on the industries experts’ opinions.

The study aims to examine the level of developers’ acceptance on the current services provided by GBI consultants in the Malaysian construction industry and how it assists in improving green building practices in Malaysian residential buildings. A questionnaire Survey was carried out on 150 respondents of architect, contractors, projects managers, quantity surveyor who were directly involved in green buildings. Meanwhile, an in-depth interview was also conducted on eighteen interviewees amongst professionals and regulators to seek their views on barriers and strategies to improve green building consultancy in residential buildings in Malaysian construction industry. The results from the survey were analyzed with Statistical Package for The Social Science(SPSS) for statistical analysis, while the interviews utilizes discourse analysis.

The analysis of this study demonstrates that the level of acceptance of GBI consultancies among developers was still low. The acceptance factors such as management and administration, quality of design, time effectiveness, quality of results and compliance to GBI requirements significantly influenced cost during the early design stages of residential green buildings. Furthermore, the cost implementations were very high due to ineffective time management. To counter this issue, increasing the competencies and knowledge in green buildings amongst the part of the consultants and clients and incorporating new green technologies are the major drivers to improve GBI consultancies.

The study provides valuable contribution to the pertinent discourse on green building practices in Malaysia by revealing the current concerns of stakeholders and assists the government policy system to promote the practices. Despite the low participation, Malaysian building industry stakeholders were observed to have an understanding of the need to embrace and improve GBI consultancy and mitigate the barriers to its implementation.



Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk Ijazah Master Sains

**ANALISIS GREEN BUILDING INDEX PERUNDINGAN PENERIMAAN DI
KALANGAN PELANGGAN DAN PERUNDING DALAM PEMBANGUNAN
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Teknologi pembinaan bangunan Mampan atau "hijau" telah diintegrasikan sepenuhnya ke dalam industri pembinaan Malaysia. Walaupun kesedaran dan beberapa inisiatif kerajaan untuk membangunkan dan mempromosikan konsep itu, pemaju jarang melantik perkhidmatan yang disediakan oleh perunding bangunan hijau di dalam projek mereka. Kebanyakan pemaju masih tidak berminat untuk melabur dalam inisiatif bangunan hijau kerana kebimbangan mereka mengenai perundingan dan kos lebihan implementasi pembinaan. Disebabkan faktor ini, terdapat keperluan penting untuk memastikan tahap semasa penerimaan perundingan bangunan hijau berdasarkan pendapat pakar industry.

Kajian ini bertujuan untuk mengkaji tahap penerimaan pemaju ke atas perkhidmatan yang ditawarkan oleh perunding GBI di dalam industri pembinaan Malaysia dan bagaimana ia membantu dalam meningkatkan amalan bangunan hijau di bangunan kediaman di Malaysia. Kajian soal selidik telah dijalankan terhadap 150 orang responden yang terdiri daripada arkitek, kontraktor, pengurus projek jurukur bahan yang terlibat secara langsung di dalam bangunan hijau. Manakala temuramah terperinci juga telah dijalankan ke atas lapan belas penemuramah dikalangan profesional dan pihak berkuasa tempatan untuk meneroka halangan dan strategi untuk memperbaiki amalan konsultansi bangunan hijau di bangunan kediaman di dalam industri pembinaan Malaysia. Keputusan kajian soalselidik di analisa menggunakan 'Statistical Package for The Social Science' (SPSS) untuk analisis statistik manakala kaedah temuramah menggunakan analisa perbualan.

Analisa kajian ini menunjukkan bahawa tahap penerimaan perundingan GBI di kalangan pemaju masih rendah. Faktor penerimaan seperti pengurusan dan pentadbiran, kualiti reka bentuk, keberkesanan masa, kualiti hasil dan pematuhan kepada keperluan GBI sangat mempengaruhi kos semasa peringkat reka bentuk awal pembangunan bangunan hijau kediaman. Tambahan pula, pelaksanaan kos yang sangat tinggi kerana pengurusan masa yang tidak berkesan. Untuk melawan isu ini, meningkatkan kecekapan dalam ilmu

bangunan hijau di kalangan pihak perunding dan pelanggan dan menggabungkan teknologi hijau baru adalah pemacu utama untuk meningkatkan perundingan GBI.

Kajian ini memberi sumbangan yang berharga kepada wacana penting mengenai amalan bangunan hijau di Malaysia dengan mendedahkan kebimbangan semasa pihak berkepentingan dan membantu sistem dasar polisi kerajaan untuk menggalakkan amalan. Disebalik penyertaan yang rendah, pihak berkepentingan industri pembinaan di Malaysia di perhatikan mempunyai pemahaman keperluan untuk memeluk dan meningkatkan perundingan GBI dan mengurangkan halangan kepada pelaksanaannya



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Finally, many thanks to all my 150 survey respondents for taking time to fill the questionnaire and to all the 18 interviewees for agreeing to be interviewed despite their tight schedule and short time notice, I am indeed very thankful.

I certify that a Thesis Examination Committee has met on 28 November 2014 to conduct the final examination of Metibogun Lesley on his thesis entitled "Green Building Index Consultancies Acceptance amongst Stakeholders in Residential Building Development" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Master of Science.

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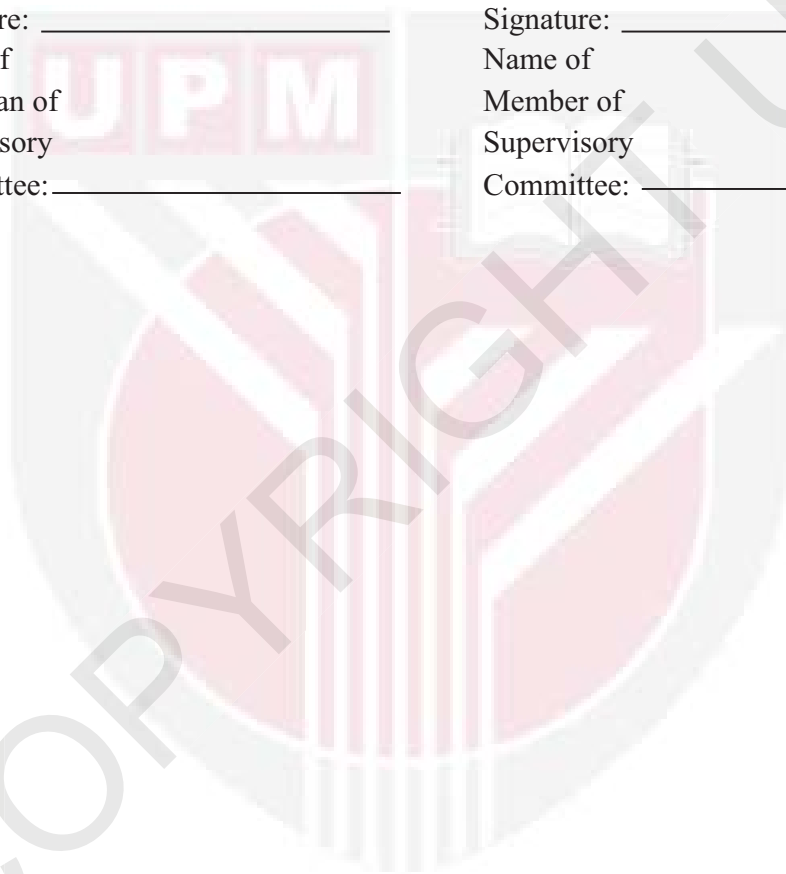


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LIST OF ABBREVIATIONS

ACEM	Association of Consulting Engineers Malaysia
ANOVA	Analysis of variance
BMS	Building Management Systems
BREEAM	Building Research Environmental Assessment Method
CASBEE	Comprehensive Assessment System for Built Environment Efficiency
CPERF	Consultant Performance Evaluation Report Form
CVA	Completion and Verification Assessment
CIDB	Construction Industry and Development Board
CFDND	Canadian Forces and the Department of National Defense
DA	Design Assessment
EPN	Malaysian Plan (EPN, Tenth Malaysian Plan 2011-2015)
EE	Energy Efficiency
GHG	Green House Gas
GBIAP	Green Building Index Accredited Professional
GBIC	Green Building Index Certifier
GBIF	GBI Facilitator
GBI	Green Building Index
GBCA	GreenStar in Australia
GM	Green Mark in Singapore
IN	Innovation
INC	Industrial New Construction
IEB	Industrial Existing Building
IEQ	Indoor Environment Quality
LEED	Leadership in Energy and Environmental Design
MR	Material and Resources
MOF	Ministry of Finance
MHLG	Ministry of Housing and Local Government
MGBC	Malaysian Green Building Council
NRNC	Non-Residential New Construction
RNC	Residential New Construction
NREB	Non Residential existing Building
PAM	Persatuan Arkitek Malaysia / Malaysian Institute of Architects
ROI	Return on Investment
SM	Sustainable Site Planning & Management
T	Township
USGBC in 1998	United State Green Building Council was later launched its own
WE	Water Efficiency
UNEP-SBCI	United Nations Environment Programme - Sustainable Buildings and Climate Initiative

CHAPTER ONE

INTRODUCTION

1.1 Introduction

This chapter introduces the background to the study, problem statement, aim and objectives of this study, research questions, significance, assumption and the limitation. It also highlights the structure of this thesis. The Green Building Index (GBI) has long been introduced in the Malaysian building sector in which this thesis will analyze to what extent it has been received among the construction key players.

1.2 Background of the Study

The Construction Industry Master Plan (2005 – 2015) pinpointed that sustainability as being indispensable in the Malaysian construction industry (CIDB, 2006) and has become a surrogate practice to conventional building (Nobe & Dunbar, 2004). It has been fully integrated into the Malaysian construction industry; stakeholders are beginning to adopt the concept into their design and projects. GBI is an extensive rating system and environmental assessment used for appraising the environmental design and the performance of Malaysian buildings (ACEM, 2012; Samari et al., 2013). The Malaysian construction industry however recognizes the imperative to improve and attune GBI to tropical climate (Samari et al., 2013). GBI has enjoyed a strong support from the government through income tax deduction equivalent to the additional capital expenditure incurred by building owners in obtaining GBI certification from 24 October 2009 to 31 December 2014, and stamp duty exemption for the first owner of green buildings (Sood et. al., 2011; Samari et al 2013; Abidin, 2012; Atsusaka, 2003; Samari, 2012). Over the years, Malaysia demonstrated and established the ability of employing energy efficient strategies in minimizing energy consumption and carbon emission in buildings, especially in its housing sector (Aziz et al, 2010).

Current statistics of GBI certified green buildings in Malaysia show that, as at October 15 2013, 259 Non-Residential New Construction (NRNC), 182 Residential New Construction (RNC), 12 Industrial New Construction (INC), 16 Non Residential Existing Building (NREB), 3 Industrial Existing Building (IEB) and 11 Township (T) applications were received amounting to a total of 483 applications while only 449 were registered representing 233 NRNC, 175 RNC, 11 INC, 16 NREB, 3 IEB and 11 T (GBI,2013). As of October 30, 2013, 175 buildings had been certified consisting of 85 NRNC representing 49% and 76 RNC (43%), 2 INC, 7 NREB, 1 IEB and 4 T had been certified representing 1%, 4% and 2% respectively. 71 RNC and 78 NRNC received provisional certification after design assessment (DA). 5 RNC, 7 NRNC, 2 INC, 2 NREB, 1 IEB, 0 T received final certification after Completion and Verification Assessment (CVA) (GBI,2013).

While it is too early to comment on the CVA stage as GBI is fairly new in the construction industry, and it would be required that green buildings are 12 months completed or 50 % occupied in order to apply for CVA assessment (GBI, 2013),

available data from GBI, 2013 reveals that 40.57% RNC and 44.57% NRNC received provisional certification after DA. It is a common knowledge that residential buildings are on high demand compared to commercial buildings in Malaysia (Abdulllah et al., 2004 and Kats et al., 2003), it should have been seen that, green buildings are commonly practiced in NRC in comparism to NRNC.

It is worth to highlight that low awareness of green issues on the part of architects, consultants and clients is key to the low progress and general acceptance of green building practices (Esa et al., 2011). Not only that, unwillingness to be involved in green buildings issues, poor contribution and participation from the government and private entities in the green building movement and shortage of competent local energy specialists to provide useful data and advice on green building systems and concepts were identified challenges in green building development (Esa et al., 2011 Shafii & Othman, 2005 and Ofori, 1998). It is also apparent that developers not keen or willing to pay for more or invest in the green building initiatives (Matraschid, 2011) as it is believed that green buildings cost more than conventional buildings due to consultancies and construction implementation cost overrun. These issues are among the stakeholders' concerns in the general acceptance of green buildings.

As a result of intricacy of the design process, there could be insufficient or inappropriate efforts put in place for planning and control (Tilley, 2005). More knowledge and experience will be needed to cope with green design requirements. Collaboration, communication, efficient and effective coordination among design team members and GBI consultants could contribute to enhancing the efficiency for the success of project delivery at early design stage; they are also required to subjugate complications and challenges inherent within the design process of green buildings (Elforгани and Rahmat, 2012). It is rather unfortunate that these have become critical issues being contended within the industry.

The challenges above establish the need to redevelop an alternative approach to enhancing green practice for a wider acceptance among stakeholders in the construction industry. This could be achieved by ascertaining the current level of acceptance of GBI consultancies in the construction industry and utilize the expert views of the professionals and regulators in the public and private sectors to examine how GBI consultation can be improved in order to increase green building practices and client's acceptance during early design stages of residential buildings development in Malaysia.

1.3 Problem Statement

By the 10th Malaysian Plan (EPU, 2010), it is projected that, urban areas in peninsular alone will need to accommodate six million residents between 2012-2020 (Abidin et al., 2012). Despite the awareness among developers and other stakeholders in the construction industry coupled with several government initiatives and support to promote sustainability in the built environment (Sood et. al., 2011; Samari et al 2013; Abidin, 2012; Aziz et al, 2013; Atsusaka, 2003; and Samari, 2012) green building

practice is not a commonplace in residential building development in Malaysia while most certified buildings are still at early design stage.

It is apparent that, developers rarely engage the services provided by GBI consultants in their projects (Esa et al., 2011). They are not keen or willing to pay for more or invest in the green building initiatives (MatRaschid et al., 2011; Abubakar et al. 2010) as it is believed that green building incur more cost compare to conventional building consultancies and construction implementation cost overrun. Cost overrun and the use of good project cost control procedures according to Grootroos and Bowyer, (1999) are major concern of clients and owners in the general acceptance of green building development. Shortcomings that influence additional cost during early design stage could be non-involvement of GBI consultants at the initial stage; lack of competence and expertise of design team members in the knowledge of sustainable design.

In pursuit of this challenge, appropriate understanding of the consultants' roles in controlling risk is important during the early design stage and preventing the increase of related costs (Jaworski & Samanta, 2006) within the Client's operating environment and objectives and of the needs of the project is crucial (CPERF, 2013). Therefore an effort to curb the growing challenges through an integrated approach by conducting a research that seek to ascertain clients' level of acceptance on the GBI consultancies in residential building development in Malaysia whilst utilizing the expertise of professionals and regulators -Public (Local Building authorities and Construction agencies) and private sectors (Architects and Planners) policies on housing and guidelines and available green rating tool is imperative and it is the subject pursued in this study.

1.4 Research Focus

The Malaysian Government identified residential development as essential human requirement and all-important integrant in nation's economy and it is used as government's political strategy to effectuate both her social and economic goals (Aziz, 2007). It is worth knowing that building industry has alone contributed to the economic growth of the nation representing about 3-5% of Gross Domestic Product (GDP) of the country. It has provided employment for close to 10% of the total labour force (Malaysian MOF, 2009). This research focuses on residential buildings in that, it is vital in the country's policy system development. The existing GBI's residential rating tool evaluates the sustainable aspects of residential buildings which include exclusive buildings which include linked houses, apartments, condominiums, townhouses, semi-detached and bungalows (GBI, 2013), this is considered necessary as environmental quality of homes and their inhabitants is gradually becoming a forgotten past.

Residential buildings are designed without consideration to the natural environment (Chappells & Shove, 2005 and Dear & Brager, 2002). For example, poor ventilation, poor building orientation and non-adherence to passive design in residential building has led to the use of cooling by air-conditioning which is spreading throughout the world (Biddle, 2008; Hidalgo et at, 2008 and Hitchings & Lee, 2008; Hubacek, 2007 and Chappells & Shove, 2005) and has been one of the fastest international growth

industries (Roaf et al, 2004; Upham, 2003 and Brager & Dear, 2003) for the last ten years. While air-conditioning may appear to be a useful way to improve comfort in buildings, there is a more sinister side to this technology (Baker, & Steemers, 2003). From the building occupant's point of view, it is one of the causes of fuel poverty (Simshauser et al, 2010; Wilkinson et al, 2007;), it is claimed to be addictive (Hitchings & Lee, 2008), has been associated with increased obesity (Kleiner, 2006) and is one of the main causes of 'legionnaires disease' (Che et al, 2002). Not only that, increasing amounts of energy in such buildings has led to power cuts (Herring & Roy, 2007 and Byrd & Matthewman, 2011), increased electricity prices (Summers et al, 2012; Henning, 2007; Balaras et al, 2007) and increased costs of electrical infrastructure.

It might be too early to examine post occupancy of GBI rating buildings at this stage as GBI consultancy is very new in Malaysia construction industry not only that, buildings require to have been at least 50% occupied or 12 months after completion (GBI, 2013). Most GBI rated residential buildings are still at design stage. Design stage of consultancy is however the most critical stage of green building (Todd et al., 2001 and Lam et al., 2008) and it is key to overall success of green building project (Yudelson, 2008 and Chua, 1999). It is worth to note that, the involvement of stakeholders - professionals and building regulators with knowledge green building at the design stage cannot be over emphasised, this is because very crucial decision are made in achieving measures that help reduce the negative impact to the environment while also creating a good and safer place for residents and the community as a whole which is the overall aim for going green (Sassi, 2006). Therefore, this study shall primarily focus on design stage of GBI consultancies in order to meet the pressing residential development need in Malaysia.

1.5 Research Aim and Objectives

The study aims to ascertain the level of clients' acceptance on GBI building consultancies during early design stages of residential buildings in the Malaysian construction industry. The study will utilize the expert view of building construction consultants, developers and regulators, guidelines and available green rating tools. In realizing this aim, the following objectives were identified:

- i.) To examine the level of clients' acceptance on current services provided by GBI building consultants in Malaysian construction industry.
- ii.) To determine the barriers in accepting GBI consultancies and strategies to increase green building practices in Malaysian residential buildings.
- iii.) To recommend the general strategies to improve the acceptance of GBI consultancies in Malaysian construction industry.

1.6 Research Questions

The main research question is:

How extensive is the GBI consultancies acceptance amongst the developers and building consultants and what are the common strategies that can be recommended to improve green building practices during early design stage in Malaysian residential building development? Subsequently, the following sub-research questions were derived:

- i.) What are the current levels of acceptance on the current services provided by GBI consultants in Malaysian construction industry?
- ii.) What are the current scenarios and barriers to GBI implementation in Malaysian residential buildings?
- iii.) How extensive can developers and building consultants' acceptance on GBI and general strategies be improved?

1.7 Significance of Research

The study is anticipated to identify the key factors that can increase the level of clients' acceptance of green building consultancies during early design stage. The study provides a better understanding of the factors that determine the acceptance of GBI consultancies and followed by key strategies to improve green practices in residential buildings. This could lead to expand green residential building development in the construction industry.

Finally, this study would make valuable contribution to the pertinent discourse of green building practices in Malaysia by revealing the current concerns of stakeholders and developers on GBI building consultancy. The recommendations can be used to stimulate changes in the building industry by providing appropriate means to address and improve green building practices; it can be used by government as a guide policy system to promote green building practices in Malaysia. It can also be used as an education medium to transfer, to produce knowledge and to encourage collaboration among stakeholders in further adopting the concept in the community. GBI building consultants can also use this study to evaluate their current services and real success factors for knowledge management exercises.

1.8 Structure of the Thesis

This research consists of five main chapters as follows:

1.8.1 Chapter One: Introduction

An introduction of the main intention of the researcher for embarking on this research, problem statement, aim and objectives of this study, research questions, significance, assumption and the limitation of the study were discussed in this chapter. It also describes the structure of this thesis.

1.8.2 Chapter Two: Literature Review

This chapter constituted the foundation to the study. It addressed the definition of green building, green building consultancies, clients and consultants, acceptance. It also identifies barriers in adopting green building listed in previous studies and highlights the GBI consultancy services and GBI certification process. The presentation and identification of the effect of cost on the acceptance factor concluded this chapter.

1.8.3 Chapter Three: Methodology

The chapter explains the methods adopted for approaching and organizing the study. It consists of the scope and parameter of the study, procedures for developing the survey instruments and in-depth interview, data collection procedures and the appropriate data analysis method used will be described in detail. Overall, this chapter seek to ensure that opinion of Malaysian building stakeholders were captured in increasing green building practices and general acceptance of GBI consultancies during early design stages of Malaysian residential building development.

1.8.4 Chapter Four: Quantitative Results and Discussion

This chapter elaborated the relevant statistical analysis conducted on the data collected through questionnaire survey. This chapter reported the findings of the survey results, where descriptive analysis, one-way ANOVA, correlation and multiple regression analyses were applied as the key statistical technique and multiple regression analysis was employed to achieve the research objectives.

1.8.5 Chapter Five: Quantitative Results and Discussion

This chapter qualitatively explores the how consultation be improved to increase green building practices during early design stage of Malaysian residential buildings. Different opinion of GBI consultancies among building stakeholders in residential building development were sort for Sample data from semi-structured interview of 18 stakeholders from various backgrounds in the Malaysian construction industry. It presented the selection of participants, interview protocol, analysis of interview data, followed by results and discussions. Discourse analysis was utilized to analysis the result from interview conducted.

1.8.6 Chapter Six: Conclusion and Recommendation

This chapter finalizes the thesis in presenting the conclusion based on the outcome of the previous chapters. It also shed light on the recommended measures related to barriers and way forward to increase the acceptance of GBI consultancies. As an extension of this research, further studies are proposed in this chapter to increase the body of knowledge in this field.

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