

**GREEN DEVELOPMENT: DEVELOPERS'
MOTIVATION, EXPECTATION AND
EXPERIENCE**

NURUL DIYANA BINTI AFANDI

UNIVERSITI SAINS MALAYSIA

2015

**GREEN DEVELOPMENT: DEVELOPERS' MOTIVATION,
EXPECTATION AND EXPERIENCE**

by

NURUL DIYANA BINTI AFANDI

**Thesis submitted on fulfillment of the
Requirements for the degree of
Master of Science**

OCTOBER 2015

DECLARATION

I declare that this dissertation entitled 'Green Development: Developers' Motivation, Expectation and Experience' is the result of my own research except as cited in the references. This dissertation has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Name of Candidature : NURUL DIYANA BINTI AFANDI

Candidate's ID No : P-RM0005/12(R)

Programme : Master of Quantity Surveying

Thesis Title : Green Development: Developers' Motivation,
Expectation and Experience

Signature of Candidate :

Date : October 2015

ACKNOWLEDGEMENTS

First and foremost, I would like to express my sincere gratitude to my Supervisor, Associate Professor Dr. Nazirah Zainul Abidin for her continuous support throughout this research. Thanks to her patience, motivation, enthusiasm, immense knowledge and guidance throughout my postgraduate journey. My extended gratitude goes to all the respondents who have participated in this research. This research surely would not be successful without their invaluable knowledge and experiences. Finally, I would like to acknowledge the continuous support and encouragement that I receive from my family and friends. Thank you for believing in me.

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	ii
TABLE OF CONTENTS	iii
LIST OF TABLES	viii
LIST OF FIGURES	xi
LIST OF ABBREVIATIONS	xii
ABSTRAK	xiii
ABSTRACT	xv
 CHAPTER 1 – INTRODUCTION	
1.1 Introduction	1
1.2 Research Background	1
1.3 Research Problem	7
1.4 Research Aim and Objectives	14
1.5 Research Methodology	14
1.6 Guide to the Thesis	16
 CHAPTER 2 – LITERATURE REVIEW	
2.1 Introduction.....	18
2.2 Sustainable Development, Sustainable Construction and Green Development.....	19
2.2.1 Sustainable Development	19
2.2.2 Construction Industry and Its Impact to Environment....	21
2.2.3 Sustainable Construction	24

2.2.4	Green Building and Green Development	26
2.2.4.1	An overview of Environmental Building Assessment	28
2.3	Green Progress in Malaysia.....	35
2.4	Green Development and Role of Developers	42
2.5	Motivation, Expectation and Future Action	48
2.6	Motivation for Green Development	51
2.7	Barriers on Green Development	58
2.8	Expectation on Green Development	62
2.9	Future Action based on Green Development Experience	66
2.10	Summary	66

CHAPTER 3 – RESEARCH METHODOLOGY

3.1	Introduction	68
3.2	Research Design	68
3.2.1	Selection of Research Method	70
3.3	Research Development	71
3.3.1	Preliminary Study	71
3.3.2	Literature Review	72
3.3.3	Phase 1: The Survey	72
3.3.3.1	Aim of the Survey	73
3.3.3.2	Structure of Questionnaire Survey	73
3.3.3.3	Survey Preparation	75
3.3.3.4	Survey Sampling	76
3.3.3.5	Survey Data Collection and Analysis	77

3.3.4	Phase 2: The Interview	77
3.3.4.1	Semi-structured Research Interview	79
3.3.4.2	Research Interview Sampling Method	80
3.3.4.3	Interview Data Collection and Analysis	82
3.4	Ensuring Validity and Reliability	82
3.5	Summary	83

CHAPTER 4 – DATA ANALYSIS (QUESTIONNAIRE)

4.1	Introduction	84
4.2	Fieldwork Process	84
4.3	Survey Findings	87
4.3.1	Respondents Particulars	87
4.3.2	Green Development.....	89
4.3.3	Motivational Factors into Green Development	90
4.3.4	Barriers into Green Development	100
4.3.5	Expectation on Green Development	110
4.3.5.1	Expectation of Green Developers	110
4.3.5.2	Expectation of Conventional Developers.....	115
4.3.5.3	Comparison of Expectation between Green and Conventional Developers	121
4.4	Overall Discussion	129
4.5	Summary	133

CHAPTER 5 – DATA ANALYSIS (INTERVIEW)

5.1	Introduction	135
5.2	Fieldwork Process	135
5.3	Semi-Structured Interview Findings	136
5.3.1	Response and Respondents' General Information.....	136
5.3.2	Developers' Experience in Green Development.....	138
5.3.2.1	Maximise Profitability	139
5.3.2.2	Government Support	144
5.3.2.3	Green Certification	144
5.3.2.4	Marketability	146
5.3.2.5	Operational Advantages	148
5.3.2.6	Ethics and Responsibilities	148
5.3.3	Challenges and Mitigation	149
5.3.4	Lesson Learnt	153
5.3.5	Future Plan	155
5.4	Overall Discussion	156
5.5	Summary	159

CHAPTER 6 – CONCLUSION

6.1	Introduction	161
6.2	Revisit Aim and Objectives	161
6.3	Research Limitations	167
6.4	Recommendation for Improvement and Future Studies	167
6.5	Closing Remark	171

REFERENCES	173
-------------------------	------------

APPENDICES

A QUESTIONNAIRE SURVEY	183
B SEMI-STRUCTURED INTERVIEW QUESTIONNAIRE	190

LIST OF TABLES

		Page
Table 2.1	Summary of building assessment method	30
Table 2.2	Comparison GBI and GreenRE	38
Table 2.3	GBI certified projects by rating categories (GBI, 2014 _b)	41
Table 2.4	GBI registered projects and certified projects by states (GBI, 2014 _b)	41
Table 2.5	Various term used to represent the client in a project (Hughes & Murdoch, 2001)	45
Table 2.6	Summary of motivation factor into green development	57
Table 2.7	Summary of barriers into green development	61
Table 2.8	Developers' expectation towards green development	65
Table 4.1	Numbers of projects awarded by site location and value range as of September 2014	86
Table 4.2	Result for the reliability test	87
Table 4.3	Respondents' working experience and position in the company	88
Table 4.4	Green projects particulars	90
Table 4.5	Green developers' response rate on motivational factors into green development	92
Table 4.6	Green developers' rating of motivational factors into green development in six categories	93
Table 4.7	Motivational factors into green development	99
Table 4.8	Conventional developers' response rate on barriers into green development	101
Table 4.9	Conventional developer s' rating barriers into green development in six categories	102
Table 4.10	Barriers into green development	108

Table 4.11	Green developers' expectation under 'Maximise Profitability' category	110
Table 4.12	Green developers' expectation under 'Government Support' category	112
Table 4.13	Green developers' expectation under 'Green Certification' category	112
Table 4.14	Green developers' expectation under 'Marketability' category	113
Table 4.15	Green developers' expectation under 'Operational Advantage' category	114
Table 4.16	Green developers' expectation under 'Ethics and Responsibilities' category	115
Table 4.17	Conventional developers' expectation under 'Maximise Profitability' category	116
Table 4.18	Conventional developers' expectation under 'Government Support' category	117
Table 4.19	Conventional developers' expectation under 'Green Certification' category	118
Table 4.20	Conventional developers' expectation under 'Marketability' category	119
Table 4.21	Conventional developers' expectation under 'Operational Advantage' category	120
Table 4.22	Conventional developers' expectation under 'Ethics and Responsibilities' category	120
Table 4.23	Comparison of expectation under 'Maximise Profitability' category	121
Table 4.24	Comparison of expectation under 'Government Support' category	123
Table 4.25	Comparison of expectation under 'Green Certification' category	124
Table 4.26	Comparison of expectation under 'Marketability' category	125
Table 4.27	Comparison of expectation under 'Operational Advantage' category	126

Table 4.28	Comparison of expectation under ‘Ethics and Responsibilities’ category	126
Table 5.1	Respondents particulars in semi-structured interview	138

LIST OF FIGURES

		Page
Figure 2.1	Three fundamental principles of sustainability (Beheiry et al., 2006)	21
Figure 2.2	Social Cognitive Theory (Adapted from Bandura (2001) & Feather (1982))	50
Figure 3.1	Research design framework	69
Figure 4.1	Percentage of respondents' involvement in green construction	89

LIST OF ABBREVIATIONS

4FDP81	Four Fuel Diversification Policy 1981
5FP2000	Fifth Fuel Policy 2000
ACEM	Association of Consulting Engineers Malaysia
BEES	Building for Environmental and Economic Sustainability
BIPV	Building Integrated Photovoltaic
BREEAM	Building Research Establishment Environmental Assessment Method
CASBEE	Comprehensive Assessment System for Built Environment Efficiency
CIB	Conseil International du Batiment
CIDB	Construction Industry Development Board Malaysia
CIMP	Construction Industry Master Plan
EQA	Environment Quality Act
GBI	Green Building Index
GDP	Gross Domestic Products
GHG	Greenhouse Gas
GreenRE	Green Real Estate
GTFS	Green Technology Financing Scheme
IBS	Industrialised Building System
IPCC	Intergovernmental Panel on Climate Change
LEED	Leadership in Energy and Environmental Design
MGBC	Malaysia Green Building Confederation
MyCREST	Malaysian Carbon Reduction and Environmental Sustainability Tool
M&E	Mechanical And Electrical
NDP80	National Depletion Policy 1980
NEP79	National Energy Policy 1979
NGTP2009	National Green Technology Policy
PAM	Malaysian Institute of Architects
REHDA	Real Estate and Housing Developer's Association
SPA	Sales and Purchase
UBBL	Uniform Building By-Laws
UK	United Kingdom
US	United States of America
USGBC	U.S. Green Building Council

MOTIVASI, JANGKAAN DAN PENGALAMAN PEMAJU TERHADAP PEMBANGUNAN HIJAU

ABSTRAK

Kajian ini mengkaji tentang motivasi, jangkaan dan pengalaman pemaju terhadap pembangunan hijau. Pembangunan hijau dalam sektor pembinaan dapat membantu memelihara alam sekitar. Malaysia didapati telah mencatatkan kadar kenaikan dalam bilangan pembangunan bangunan hijau. Namun, perkembangan ini masih dikira berada ditahap sederhana. Sebilangan besar pemaju masih lagi tidak mahu mengambil pendekatan pembangunan hijau. Sehubungan itu, kajian ini dilakukan bagi menyelidik faktor-faktor yang merangsang pemaju untuk mengambil pendekatan pembangunan hijau. Kajian turut difokuskan kepada jangkaan pemaju terhadap pembangunan hijau kerana jangkaan ini dilihat boleh mempengaruhi tindakan pemaju. Kajian diteruskan dengan pengumpulan maklumat mengenai pengalaman pemaju yang diperolehi semasa terlibat dalam proses pembangunan hijau. Pengumpulan data bagi kajian ini diperolehi melalui dua kaedah iaitu borang soal selidik dan temubual. Sebanyak 435 borang soal selidik telah dihantar melalui pos kepada responden yang dikenalpasti dan alamat mereka diperolehi melalui pangkalan data REHDA. Responden yang dipilih adalah pemaju berdaftar dari Kuala Lumpur (termasuk Putrajaya), Selangor dan Pulau Pinang. Ini adalah kerana ketiga-tiga negeri ini mencatatkan bilangan tertinggi dalam aktiviti pembinaan, pendaftaran projek hijau yang baru serta jumlah bangunan hijau yang telah diiktiraf di Malaysia. Sebanyak 51 (11.72%) borang soal selidik yang lengkap telah dikembalikan untuk di analisa. Pengumpulan data melalui kaedah temubual pula dijalankan untuk mengukuhkan hasil analisa kajian soal selidik. Seramai 20 pihak pemaju telah dihubungi dan hanya 3 pihak memberi persetujuan untuk ditemubual. Keputusan

analisa data menunjukkan faktor utama yang merangsang penglibatan pemaju dalam pembangunan hijau adalah kerana pembangunan hijau berupaya untuk meningkatkan nilai kepada sesebuah hartanah dan boleh digunakan sebagai satu alat pemasaran yang baik. Faktor utama yang mengekang kemasukan pemaju adalah disebabkan keperluan kos yang tinggi, kekurangan bantuan kewangan dari kerajaan dan juga pelbagai keperluan yang dikenakan oleh agensi yang memberi pengiktirafan bangunan hijau. Pemaju menjangkakan bahawa pembangunan hijau memerlukan kos yang tinggi dan bangunan hijau pula dapat dijual dengan harga yang tinggi. Pemaju tidak menjangkakan untuk menerima sebarang bentuk bantuan dari kerajaan. Kajian juga mendapati bahawa pembangunan hijau memerlukan penambahan kos sekitar 10 ke 20 peratus. Walaubagaimanapun, pemaju dapat memperoleh kembali pelaburan ini melalui kenaikan pada harga jualan unit. Unit hartanah dari pembangunan hijau dapat dijual pada kadar yang lebih tinggi iaitu pada kira-kira RM50 bagi setiap kaki persegi. Hasil daripada kajian ini dapat memberikan peluang pada para pemaju lain untuk menimba pengetahuan dari pemaju yang berpengalaman dan untuk mendorong mereka kearah pembinaan hijau.

**GREEN DEVELOPMENT: DEVELOPERS' MOTIVATION,
EXPECTATION, AND EXPERIENCE**

ABSTRACT

This research explores the developers' motivation, expectation and experience in green development. Green development offers an opportunity to leave a lighter footprint on the environment. Malaysia has reported an increasing trend of companies developing green buildings. However, even with this increasing number, the level of green development is still moderate. Majority of developers are still resisting to green changes. Following this awareness, this study investigated the factors that drive developers' into green development. This study also focused on the developers' expectation, as expectation is perceived to have an influence in developers' commitment towards green development. Next, this research gathered the information on developers' experience in green development. The data was collected using two methods: a survey and semi-structured interview. The survey questionnaire was posted to 435 respondents, whom contact details were retrieved from REHDA databases. The respondents are from Kuala Lumpur (including Putrajaya), Selangor and Pulau Pinang as these three states reported the most numbers of the construction activities and reported the highest numbers of registered green project and certified green project in Malaysia. In total, 51 (11.72%) completed questionnaires were obtained for generating valid analysis. The interview was conducted to compliment the findings from the survey. The total of 20 developers was contacted, however only 3 developers (15%) agreed to be interviewed. The findings of the research revealed that developers were highly motivated with the opportunity that green development is a great marketing tool and will enhance the

value of the property. The barriers will be due to the higher cost, insufficient government incentives and tedious green certification bodies' requirement. Developers hold high expectation that green building required higher cost, sold at higher price, and have very low expectation on the government support. Study discovered that green building required additional cost from 10 to 20 percent. The additional cost however can be recovered from higher sales price from RM50 per square feet. The findings of the research provide the learning opportunities and lessons to drive other developers into green development.

CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter introduces the research by discussing its background, highlighting on the problems before stating the research aim and objectives. A brief explanation of research method adopted is also included before this chapter concludes with the guide to the thesis.

1.2 Research Background

Construction industry is a significant contributor to the world economy as the industry contributed a sizeable proportion of most countries' Gross Domestic Products (GDP). The products of this industry are not only provides the setting of all our lives' events, but it also plays an important measure to the economic development of the countries. The development of construction projects has been used as one measure to indicate the economic growth of the countries. The importance of the construction industry and its many significant contributions specifically in terms of impacts of the industry on GDP and the economic growth have been reported in many studies (Bon and Crosthwaite, 2000; Ofori, 2001; Thomsen, 2008; Khan 2008; and Dlamini, 2012). As in Malaysia, the construction industry has recorded rapid economic growth since 1970s and is considered as one of the fastest developing country in Asia. The industry certainly has played a vital role

in the country economic growth as the construction activity has been contributed between 3 to 7 per cent to the GDP for over 20 years (Department of Statistics Malaysia, 2015).

Inevitably, construction industry cannot be disassociated from its negative impact on degrading our natural environment. The rapid increased of world population has resulted in the increasing demand for basic human needs such food, water, shelter and electricity. The increase in demand has degrading our natural environment as more natural sources been exploited to supply the demand as the result of multiplying world's population. Construction industry is the largest exploiters of natural resources that contribute significantly to the environmental stress as many natural resources were used to build a building and the materials needed to operate them. Construction activity has contributed to deforestation, the loss of wildlands and water and air pollution (Spence and Mulligan, 1995).

The resource exploitation activities due to the rapid population have also led to high and noticeable global warming; which resulted in ecological and environmental imbalance. Global warming or commonly known as carbon footprint results due to the increasing emission of greenhouse gasses (GHGs) in the atmosphere due to human activity. GHG emissions are largest in the industrialized countries, however rapid growth are recorded in developing countries (Dosi and Moretto, 2003). The global warming phenomenon will cause in the variability of climates and changes in the frequency and intensity of some extreme climates phenomena such as higher minimum temperatures, and more intense precipitation events such as intensified droughts and flood (Dosi and Moretto, 2003).

Sustainability is the current subjects that making the headlines of many countries in the world. Over the last two decades, there has been growing understanding of the world and its inhabitants as a single system that the human development must be done without depleting the natural resources and the biological systems of the planet to such extent that future generation will be impoverished (Spence and Mulligan, 1995). In 1987, the World Commission on Environment and Development had presented in their report on sustainable development that was formulated to address the problem of conflicts between the environment and development (Harris, 2000).

Sustainable development sought the idea that the present physical developments are lack of integrated approaches. Since the Brundlant Report, the concept of sustainability has been further developed and has generally been a credit with three aspects: Economic, environmental and social (Harris, 2000). Sustainable solutions for development as discussed by many authors shall be achieved only when the development is simultaneously economically feasible, environmentally viable and socially desirable (Beheiry et al., 2006).

The pressures from the business world have led the construction industry to embrace sustainable concept in its processes and outputs. The Conseil International du Batiment (CIB) an international construction research networking organization, has stated that sustainability in construction aimed for a healthier built environment created and operated based on resource efficiency and ecological design (Kibert, 2007_a). Sustainable construction is part of the larger concept of “sustainable development” is a way to improve our environment within the context of the construction industry. Sustainability in construction involved three key areas which

are environmental responsibility, social awareness and economic profitability (Pitt et al., 2009). Pitt et al., (2009) in defining the sustainability in construction stressed that to accomplish sustainable construction it requires bridging the gap between the client demands and the awareness in environmental considerations with what is being offered as sustainable process and products in the construction industry.

Sustainable construction basically represented a movement to change the way we understand building architecture, design, construction, use and decommission in creating a healthy built environment based on ecologically sound principles and it addresses the ecological, social and economic issues of a building in the context of its community (Kibert et al., 2002; Kibert, 2007_b, Robichaud and Anantatmula, 2011; Karolides, 2006). There are many terms used to describe the movement of sustainability in construction industry. The word of 'green' is also a shorthand term in order to represent the concept of sustainability in construction (USGBC, 2011). Other common terms used include, green construction, high performance construction, sustainable architecture, ecological architecture and ecologically sustainable design (Kibert, 2007_a; Robichaud and Anantatmula, 2011). Despite of various term used, it is basically represents a movement to change the way we understand building architecture, design, construction, use and decommission (Robichaud and Anantatmula, 2011).

The idea of sustainable in construction has been widely accepted by most of world's nation. Developed countries such as the United States of America (US), United Kingdom (UK) and European countries have set the trend towards green building practices. The trend has been contributing to the transformation of building products

and services and the increasing demand for skilled professionals. Building certification mechanism is then developed providing the green building rating tools, green building rating methods, design tools, green building performance tool and validation tools to satisfy green building certification.

A green building is a high-performance property that was created using the principles and methodologies of sustainable construction. Kibert (2007_a) defined green building as “healthy facilities designed and built in a resource-efficient manner, using ecologically based principles”. A green building is designed to use less energy and water and to reduce the life-cycle environmental impacts of the material used that is achieved through better siting, design, material selection, construction, operation, maintenance, removal, and possible reuse (Yudelson, 2009).

Green building is often developed according to the guideline of a rating system. In the commercial and institutional arena, if a building is not rated and certified by an independent third party with an open process for creating and maintaining a green building rating system, it can't be really called a green building (Yudelson, 2009). The Leadership in Energy and Environmental Design (LEED), Building Research Establishment Environmental Assessment Method (BREEAM), Green Star, and Green Mark are among green body certifiers that have been introduced to provide the green building certification. For a building to become 'green', the process flows throughout the entire life cycle of a project, from the beginning of developing the project idea to planning, design, construction, operation, and to end-of-life recycling or renewal of structures (USGBC, 2011). The process applies to buildings, sites, interiors, operations and also to the communities in which they are situated.

Green building development is characterized as a means to achieve a built environment that reflects the needs and interest of a wider society (Martinez and Olander, 2015). Development projects are the products of a complex process that were guided by structural forces such as resources, regulations and with numerous players with different interests, needs and concerns including land owners, investors, financiers, managers, consultants, builders, valuers, insurers and suppliers which will influence on how the development process takes place and how realities are constructed (Calderon and Chelleri, 2013; Ang and Wilkinson, 2008; McCormick et al., 2013; Martinez and Olander, 2015).

A more holistic approach is vital to allow the balancing of these different needs to achieve more than just built environment. A shift to a triple bottom line approach requires that social and environmental impacts to be explored whilst fundamental of economic performance remain an intrinsic part of development (Ellison et al., 2007). The adoption of sustainability or green concept into development refers to the process in which social, economic and environmental issues are considered throughout the stages of the development project, i.e planning, design, construction and operation (McCormick et al., 2013; Martinez and Olander, 2015). The inclusion of three drivers in sustainability is central to any development response to sustainability.

As in Malaysia, the introduction of new guidelines, revision of current regulations, collaborative efforts with professional bodies, encouragement of research and development (R&D), development of pilot projects and existence of financial incentives to boost green implementation indicating that the government and private

parties are paying serious attention to greening the construction sector. The government of Malaysia has adopted series of action to show their serious concern towards the environment. In June 2006, the Construction Industry Master Plan 2006-2015 (CIMP) has been published to chart the way forward for Malaysian construction. In that Master Plan, environmental sustainability has been identified as necessary to achieve and sustain economic growth and social development (Kamar and Hamid, 2012).

Following similar action by many developed countries, Malaysia has introduced its own building assessment called Green Building Index (GBI) in 2009. GBI is similar to LEED, BREEAM, Green Star and Green Mark. It is a rating system providing a comprehensive framework for building assessment to enable green grading and certification but tailor made to Malaysian needs. As an alternative to the existing green building assessment body, the Real Estate and Housing Developer's Association (REHDA) have also introduced its own green rating tool known as Green Real Estate (GreenRE) in March 2013. Malaysian Carbon Reduction and Environmental Sustainability Tool (MyCREST) and Meterai Hijau Melaka are among other alternative green building certifier that were introduced in Malaysia. The development of the green building certifier will encourage industry professionals to design and build more sustainable buildings.

1.3 Research Problem

The Malaysian construction industry has developed rapidly since 1957 after Malaysia gained its independence from British. The industry played a vital role in the

country economic growth as the construction activity has been contributed between 3 to 7 per cent to the GDP for over 20 years (Department of Statistics Malaysia, 2015). However, the industry cannot be disassociated from its negative impact on our natural environment. The rapid economic development and the active pursuit of industrialisation had been responsible for the damage to the country's limited resources especially the forest and its ecosystem. The urbanization and industrialisation activities have led to frequent occurrence of environmental disasters most notably the landslides and building collapses, flash floods and global warming (Chan, 1998).

The United Nations Millennium Development Goal indicator had listed Malaysia at the third position of countries in South East Asia with the most carbon emissions after Thailand and Indonesia in 2006 with 164 million tonnes (CDIAC, 2012). Buildings – the core product of the property development sector are the major contributor to the carbon emissions that lead to the global warming phenomenon. The desire for rapid economic development to catch up with the developed countries has multiplied the development numbers which opted for the unbalance development strategy that sacrifice the environmental principles for the sake of economic gain.

Holistic approach on reducing the effect of the greenhouse, monitoring the environmental degradation and sustainable development is the current subjects that making the headlines and championed by many developed countries. Malaysia, catching up with the trends, has adopted series of action to show their serious concern towards the environment. Malaysia's commitment toward environmental protection is showed through the series of regulated laws, regulations and act

requirement towards development which can have affected on the natural environment. Unfortunately, despite the government commitment and its stance against environmental degradation, many aspects of Malaysia's environment on the local front is still being exploited and degraded by irresponsible parties (Chan, 1998).

The continuous development and urbanization has led to deforestation and soil erosion. This has led to more serious consequences such as landslides, flash floods and sedimentation problem. Malaysia experiences frequent landslides which reported occurred almost every year from 2000 to 2013, most of which have been fatal (Pradhan, 2010; Nik Ahmad and Ahmed Haraf, 2013). To name a few tragic landslides incidents includes the collapse of the Highland-Towers luxury condominium in 1993 which claimed 48 lives, Genting Highland landslide tragedy in 1995 which killed 20 persons and most recent incidents that took 16 lives mostly children and caretaker of an orphanage at the Children's Hidayah Madrasah Al-Taqwa orphanage in Hulu Langat Selangor (Chan, 1998; Nik Ahmad and Ahmed Haraf, 2013).

Due to this and the widely publicised other possible adverse impacts of the development and urbanization on the environment, there has been demands for greater accountability and pressure in Malaysia for more responsible way of development. Therefore, the industry must seek for an alternative solution from this conventional way of development to a better way of development. Green development is seen as a holistic approach for developers to achieve the balance in development. The inclusion of three drivers in sustainability into development process will ensure the social and environmental aspects will not be neglected whilst

fundamental of economic performance remain an intrinsic part of development (Ellison et al., 2007).

However, it is a tough task to reverse the unsustainable trends of development. The transition from conventional to sustainable approach requires the interaction of various players in this complex sector. Interaction from public policy in the form of regulations, incentives and disincentives; the role of the real estate, finance and insurance industries; the role of the institutions of higher learning; and the close interaction between design firms, and construction companies are crucial in ensuring sustainable growth of green application (Kibert, 2007_b; Zainul Abidin et al., 2013). Each construction player has a certain degree of influence to enhance sustainability outcome. Some are regarded as having greater influence than others and would lead to greater impact on the final outcome. The primary focus would have been on those building industry professionals those that design, build, and operates facilities that hold influential power and greater influence to enhance sustainability and would lead to greater impact on the final outcome (Kibert, 2007_b; Robin and Poon, 2009).

Developers in construction industry are often regarded as project client, whose roles are to dictate the course of the projects and as the main decision makers. They are ranked as the most important agent to determine the extent of sustainable approach for a particular development project (Pitt et al., 2009). Developers provide opportunity to advancing green into the development project through various aspects and should take leadership role in transforming the construction industry towards sustainability (Majdalani et al., 2006). Developers are ranked as the most important agent to determine the extent of sustainable approach for a particular project (Pitt et.

al., 2009). Therefore, their positions are strategic to ensure green practices are effectively applied (Zainul Abidin 2010; Bunz et. al., 2006). Thus, this study focuses on the role of developer in Malaysia in addressing the sustainability issue in the construction industry.

Previous study had indicated that the lack of developers' commitment to inaugurate changes has been identified as a crucial challenge towards the wider application of sustainable construction in Malaysia (Zainul Abidin, 2010). A survey based study among the professionals of the Malaysian construction industry revealed that developers held the highest commitment in developing more green building in the industry (Samari et al., 2013). However, to inaugurate commitment to change their internal motivations must be satisfied first. The question is what are the drivers that will motivate the developers into green development? Following this gap, this study investigated the factors that will drive developers' commitment towards behaviour change. Understanding of what can initiate the commitment of 'first-time' developers or to maintain the interest of 'experience' developers in green development can generate further recommendations that will induce wider acceptance on the practice.

There has been an increasing trend of companies developing green building in Malaysia recently. GBI reported 636 applications for GBI certification had been submitted by the end of December 2014 since the index was introduced in April 2009. GBI reported 75 total numbers of projects have been fully certified at 15 December 2014 making the total numbers of 265 projects have been fully certified since April 2009 (GBI, 2014_b). Kuala Lumpur, Selangor and Pulau Pinang are the leadings states which had the most certified green projects out of this number.

GreenRE had reported that they had also received more than a dozen registered development to be assessed since launched in March 2013 (GreenRE, 2014_c).

However, the increasing number of developers seeking for green certification is largely from well-established developers. The response from larger population of developers, mainly consist of small and medium size companies, is still low (Zainul Abidin, 2010). The positive movement in green development was still at the moderate progress. Most prior research had been carried out to investigate the barriers associated with sustainable construction in general. It is found that the greatest obstacle to sustainable construction is the higher investment cost that may incur and the risk of unforeseen cost (Robichaud and Anantatmula, 2011; Hakkinen and Belloni, 2011; Zainul Abidin, 2010; Yudelson, 2009; Pearce, 2008; McGraw, 2013). The question is, whether cost issue are the major barrier for developers entering green development? Or will there be other factors? This study therefore seeks to investigate the barrier factors into green development from developers' point of view. With the current state of the developers' moderate entrance into green development, it is significant to seek for the reasons that have had led to the developers' resistance to change.

People are capable to predict and assumed to possess cognitive structures that concern with the implication of their action (Feather, 1982; Maddux, 1999). Based on theoretical framework adapted from social cognitive theory, developers through the exercise of forethought will motivate themselves and create rational grounds of expectations that will guide their actions in anticipation of future benefits (Bandura, 2001). An act will not be performed when they recognized that the action will have

detrimental values during the forethought phase (Brannon, 1976; Bandura, 2001; Feather 1982). Developers' expectations on green development were perceived to have the influence in developers' commitment and decision to venture into green development. Developers' expectation on higher cost involve in green development may be the factor that holding them back from entering green development. The question is what is developers' expectation towards green development? Will these expectations motivate or hinder them into green development? This research therefore aims to explore the developers' expectation towards green development to examine the link of the expectation and developers' commitment towards behaviour changes into sustainable construction.

Fear of the unknown, lack of understanding and lack of demand for green buildings are among the identified culprits of wider application of sustainable construction (Zainul Abidin, 2013). This research will tap into the knowledge accumulated by the developers from delivering green development to disseminate the lesson learnt from experienced developers to other construction practitioners. Therefore, this research seeks to explore the developers' experience with green development. The results will be significantly used to validate and strengthen the relation of the developers' motivation, barriers and expectations towards green development and the real life experience on green development.

The data recorded in this study will contribute knowledge from different perspective compared to available literature. There is currently no available literature that recorded such information from developers' perspective in Malaysia. Therefore, the contributed knowledge will be the basis to display the uniqueness of the study. This

research presents a wealth of learning opportunities and could be transformed into lessons that will drive forwards the ‘first-time’ developers or to maintain the interest of ‘experience’ developers into green development. The experiences also provide the opportunity for other developers to proceed with green development to seek and address problems earlier rather than later and to seek for solutions.

1.4 Research Aim and Objectives

The aim of the research is to investigate the motivating and hindering factor, expectation and experience of developers in green development. This aim is divided into four objectives as below:

- a) To identify the factors that motivates developers to commit to green development.
- b) To identify the barriers hindering developers into green development.
- c) To investigate developers’ expectations towards green development.
- d) To investigate developers’ experience on green development.

1.5 Research Methodology

This research is an exploratory in nature, which is used optimally for situations which will increase understanding, expand knowledge and explore phenomenon that has little research done on it (Creswell, 2003). The research started off by identifying the research problems and establishes the research aim and objectives. The research continues with a comprehensive literature review and outlining the research methodological approach. The methodology must appropriately design according to

research aim and objectives to produce insights that lead to valuable research contribution. Deciding on the appropriate research method is crucial to produce the significant outcomes to address the research problems.

This research utilised the combination of quantitative and qualitative research methodologies to create better understanding of the research issue. The survey questionnaire is the most feasible quantitative research method for this research as it enables the data collection from a large group of people. In this case of research, developers particularly from Kuala Lumpur (including Putrajaya and Cyberjaya) and Selangor which are strategically located in the central region of Malaysia and Pulau Pinang from the northern region were identified as the sample population of the study. Most of the construction projects are being concentrated within these states and many construction companies have either main office or branch located in these states for their business purposes. The development of the research has been further explained in Chapter 3.

The second stage of data collection was conducted via semi-structured interviews. Semi-structured interview was conducted with an aim to investigate the experience and the knowledge of the developers in developing green projects. Green developers identified from the survey participants were re-approached for the interview session.

Semi-structured interview is used to seek more information and provide a higher chance in gathering in depth and valuable information. All the respondents were questioned with an identical set of questions and they were also asked to extend their opinion based on their experience in developing green project. The interview was

also designed to seek respondents' experiences on the challenges they faced in developing green project and their knowledge on factors contributing to the successful green projects.

The interviews supplied the extended knowledge from respondents' perspective where it might be different from the available literature, hence can be used as the base to prove the uniqueness of the study. The development of the semi-structured research interviews were also discussed in details in Chapter 3. The data analysis and results were discussed comprehensively and presented in the Chapter 4 and 5.

1.6 Guide to the Thesis

This thesis consists of six (6) chapters. The chapters has been organised in the following order:

Chapter 1 – The chapter is an introduction to the entire thesis by starting with research background, research problems and objective. This chapter provides the introduction of the outline of the research methodology employed throughout the research.

Chapter 2 – This chapter presents the current state of knowledge by reviewing the existing literature. The areas covered include: the overview of the sustainable development concept in construction industry, the importance and benefit of sustainable construction, sustainable construction progress in Malaysia, green

development in Malaysia, conceptual model of green motivation and its impact towards expectancies, and relationship of expectation, experience and future action.

Chapter 3 – This chapter discusses the research methodology employed in this research. The data collection consists of quantitative and qualitative method. The tools used are the survey questionnaire and semi-structured interviews.

Chapter 4 – This chapter describes the analysis of the data and the results of the questionnaire survey. Data from the survey were discussed comprehensively based on the descriptive statistics and all the data gathered in the interview surveys were analysed qualitatively as all were in the form of comments and opinions.

Chapter 5 – This chapter describes the analysis of the data and the results of the interview. Data from the interview surveys were analysed qualitatively as all were in the form of comments and opinions.

Chapter 6 – This chapter conclude the findings from the quantitative and qualitative data collection. The findings outline of research limitation and recommendations for future research.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter provides an overview about sustainable development and sustainability in construction to impart the basic understanding of the sustainability in construction. Following that, there is a brief explanation on the green development, green building and green building assessment method. The table of comparison of different green building assessment method has been tabulated to provide the information on the similarities and the differences between the building assessment method. Next, this research touches on green progress in Malaysia and the development of local green building assessment tools. The extensive discussion on the differences between two local green building assessment tools is provided to give further understanding. Following that, is a section explaining and discussing the developers' role in the construction project and their role in initiating green projects. The theoretical framework adopted in the study that demonstrates how the developers' commitment was influenced by the motivation and expectation was provided in the section 2.5. Next, this chapter provides a discussion on the motivation factor that drive developers into green development as well as the factors hindering them. Identified motivation and barriers are tabulated in table. Finally, this chapter discuss on the developers' expectation towards green development. The summary of expectation was also tabulated in a table.

2.2 Sustainable Development, Sustainable Construction and Green Development

This section provides an extensive literature review on sustainable development and the movement of sustainability in construction. This section also looks into green development, green building and the overview and characteristic of green building assessment method.

2.2.1 Sustainable Development

Sustainability is the current subjects that making the headlines of many countries in the world. Over the last two decades, there has been a growing understanding of the world and its inhabitants as a single system that the human development must be done without depleting the natural resources and the biological systems of the planet to such extent that future generation will be impoverished (Spence and Mulligan, 1995).

Brundlant (1987), has defined sustainable development as “development that meets the needs of the present without compromising the ability of the future generation to meet their own needs”. This concept of sustainable development addresses the needs of current and future generations.

Since the Brundlant Report, the concept of sustainability has been further developed and has generally been a credit with three aspects: Economic, environmental and social (Harris, 2000). John Elkington, coined the term triple bottom line to refer the

three concepts of sustainability (USGBC, 2011). Harris (2000) further explained the three aspects in achieving sustainability in development,

- i. Economic aspect refers to an economically sustainable system that can be achieved through a continuing process in producing goods and services that maintain manageable levels of government and external debt without damaging the agricultural or industrial production.
- ii. The environmental aspect refers to an environmentally sustainable system that maintained the stable resource base that can be achieved without over exploitation of renewable resource systems, depleting non-renewable resources and the ecosystem functions. Environmentally sustainable development includes the maintenance of biodiversity and atmospheric stability.
- iii. Social aspect refers to a socially sustainable system that can be achieved through distributional equity, including adequate provision of social services in health and education, gender equity, and political accountability and participation.

Sustainable development is achieved when the development is simultaneously is economically feasible, environmentally viable and socially desirable (Beheiry et al., 2006).

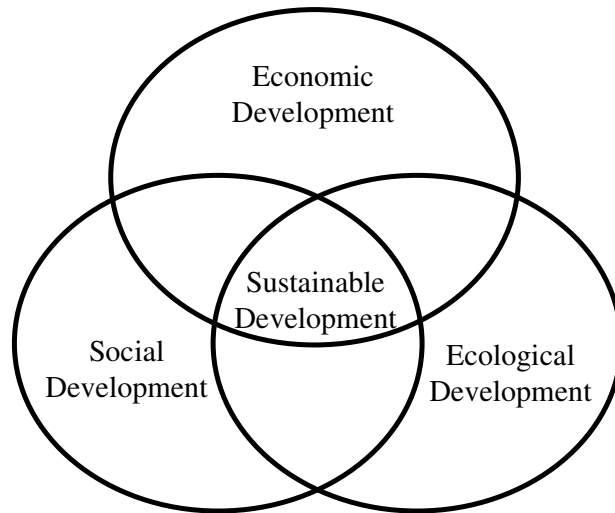


Figure 2.1: Three fundamental principles of sustainability (Beheiry et al., 2006).

2.2.2 Construction Industry and Its Impact to Environment

Construction industry is a significant contributor to the world economy as the industry contributed a sizeable proportion of most countries' Gross Domestic Products (GDP). The construction industry is a major catalyst in creating the physical assets which are the basis of virtually every aspect of development. It provides for one of our most basic needs and is also an immense factor in the economy. The development of construction projects has been used as one measure to indicate the economic growth of the countries.

The importance of the construction industry and its many significant contributions specifically in terms of impacts of the industry on GDP and the economic growth have been reported in many studies (Bon and Crosthwaite, 2000; Ofori, 2001; Thomsen, 2008; Khan 2008; and Dlamini, 2012). As in Malaysia, the construction

industry has recorded rapid economic growth since 1970s and is considered as one of the fastest developing country in Asia. The industry certainly has played a vital role in the country economic growth as the construction activity has been contributed between 3 to 7 per cent to the GDP for over 20 years (Department of Statistics Malaysia, 2015).

But the industry as well as the building materials industries which supply it has become one of the largest exploiters of natural resources and contributes to negative impacts towards the environment. The rapid increased of human population had been reported, as of today the world population multiplied by a billion in less than twelve years than it previously took more than forty years for human population to reach one billion (Worldometers, 2015). The population explosion has resulted in the increasing demand for basic human needs such as food, water, shelter and electricity.

The construction activity contributes to the loss of soil, forests, air pollution and is a major of the world's non-renewable energy sources and minerals. The majority of construction activity transforms natural habitats into environments where species other than human struggle to exist (ZainulAbidin, 2007; Spence and Mulligan, 1995; Halliday, 2008).

The resource exploitation activities due to the rapid population have also led to high and noticeable global warming; which resulted to ecological and environmental imbalance. Global warming or commonly known as carbon footprint results due to the increasing emission of greenhouse gasses (GHGs) in the atmosphere due to human activity. GHG emissions are largest in the industrialized countries, however

rapid growth is recorded in developing countries (Dosi and Moretto, 2003). The carbon emission in Europe countries grew by only five per cent from 1996 to 2006 whereas in Asia region, especially China the rate grew massively at 64 per cent within the same 10 years (CDIAC, 2012).

Intergovernmental Panel on Climate Change (IPCC) had released the report that the globally averaged surface temperatures had increased by $0.6 \pm 0.2^{\circ}\text{C}$ over the 20th century and its forecast that temperatures will warm between 1.4° 5.8°C by 2100. The global warming phenomenon will cause in the variability of climates and changes in the frequency and intensity of some extreme climates phenomena such as higher minimum temperatures, and more intense precipitation events such as intensified droughts and flood (Dosi and Moretto, 2003).

Many developing countries including Malaysia, are adopting styles and scales of development that are now recognized as inappropriate and unsustainable. However, the industry still continues to design resource-inefficient buildings which undertaken development that remain to utilise on highly polluting materials and transportation, inefficient equipment without paying the attention to the long-term communities. Poorly designed buildings and built environment has been associated to directly contribute to ill-health, crime and disaffection, undermine community and create excessive financial liability in the long term (Halliday, 2008).

2.2.3 Sustainable Construction

The pressures from the business world have led the construction industry to embrace sustainable concept in its processes and outputs. More people in the industry are becoming more conscious of the importance to minimize exposure to ‘environmental risk’. Although the most common construction and development have been associated with polluting activities or the failure of industry specialists to deal with the environmental risks, the future scope of environmental liability may have influential implications for the construction industry (Anderson et al., 2009).

The Conseil International du Batiment (CIB) an international construction research networking organization, has stated that sustainability in construction aimed for a healthier built environment created and operated based on resource efficiency and ecological design (Kibert, 2007_a). Pitt et al., (2009) in defining the sustainability in construction stressed that to accomplish sustainable construction it requires bridging the gap between the client demands and the awareness in environmental considerations with what is being offered as sustainable process and products in the construction industry.

Sustainable construction basically represented a movement to change the way we understand building architecture, design, construction, use and decommission in creating a healthy built environment based on ecologically sound principles and it addresses the ecological, social and economic issues of a building in the context of its community (Kibert et al., 2002; Kibert, 2007_b, Robichaud and Anantatmula, 2011; Karolides, 2006).