

Master's Thesis

**The Influence of Certification and its Country-of-Origin on Green
Housing Purchase: The Case of Thailand**

By

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Table of Contents

Certification of Originality	v
Acknowledgements	vi
Summary	vii
Abstract	x
I. Introduction	1
I.1. Background	1
I.2. Research context	2
I.2.1 Green Building in Thailand	3
I.3. Objective	7
I.4. Significance of Study	7
II. Theoretical Background	8
II.1. Signaling theory	8
II.2. Country of origin	10
II.3. Brand Recognition	11
II.4. Conceptual Framework	13
III. Methodology	18
III.1. Experiment Design	18
III.2. Participants	22
III.3. Data Collection	23
IV. Data and Analysis	25
IV.1 Variables	25
IV.1.1 Independent variables	25
IV.1.2 Dependent variable	26
IV.2. Overall data analysis	27
IV.3 Analysis	29
IV.4 Results on overall analysis	35
IV.5 Sensitivity Analyses	38
IV.5.1 Analysis on Different Gender	38
IV.5.2 Analysis on different green attitude	42
V. Discussion and Conclusion	48
V.1. Discussion	48
V.2. Managerial Implication	50
V.3. Limitation	51

References.....	53
Appendix.....	56
Appendix1: Sample of Experimental survey (English version).....	56
Appendix2: Sample of Experimental survey (Thai version).....	59
Appendix3: Advertisements in experimental survey (English version).....	63

List of Tables and Figures

Table 1 PESTEL Analysis of Key Drivers for Green Buildings in Thailand.....	4
Table 2. Green Residential Building in Thailand	6
Table 3 List of Demographic information	20
Table 4 List of attitude of purchase intention towards “Green products”	21
Table 5 List of questions about attitude towards green building certificate	21
Table 6. Knowledge toward green building certificate.....	21
Table 7. Breakdown of respondents	24
Table 8. Summary of demographic information.....	27
Table 9 Descriptive information comparison for Hypothesis 2.....	30
Table 10. Multiple Comparisons the mean purchase intention for Hypothesis 2	31
Table 11. Descriptive information comparison for hypothesis 3.....	32
Table 12. Multiple Comparisons of the mean purchase intention for hypothesis 3	32
Table 13. Descriptive information comparison among six experiments	34
Table 14. Multiple Comparisons M_{Rwill_ad} for six experiments.....	34
Figure 1 the analysis concept of hypothesis 1	13
Figure 2 The analysis concept of hypothesis 2	15
Figure 3. Concept of Hypothesis 3	15
Figure 4. The analysis concept of hypothesis 3	17
Figure 5. Experimental Design	19
Figure 6. Sets of Experimental Design	19
Figure 7. Comparison M_{Rwill_ad}	36
Figure 8. Comparison M_{Rwill_ad} ; high brand conditions	37
Figure 9. Comparison M_{Rwill_ad} ; low brand conditions.....	37
Figure 10. Comparison M_{Rwill_ad} on Male and female respondents; hypothesis 1	39
Figure 11. Comparison M_{Rwill_ad} on Male and female respondents; hypothesis 2	40
Figure 12. Comparison M_{Rwill_ad} on Male and female respondents;	41
Figure 13. Comparison M_{Rwill_ad} on Male and female respondents;	42
Figure 14. Comparison M_{Rwill_ad} between green supporter and non-green supporters;	43
Figure 15. Comparison M_{Rwill_ad} between green supporter and non-green supporters;	44
Figure 16. Comparison M_{Rwill_ad} between green supporter and non-green supporters;	46
Figure 17. Comparison M_{Rwill_ad} between green supporter and non-green supporters;	47

Certification of Originality

I, **Nolaphan Sirisinudomkit (Student ID 52114623)**, hereby clarify that this thesis is my own original work and has not been submitted in any form for the award of another degree at any university or educational institute. Any information derived from the published or unpublished journal of others has been properly cited or acknowledged appropriately.

Nolaphan Sirisinudomkit

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Summary

Background

“Green building”, also known as a high performance building, is the practice of using environmentally friendly products and processes. This practice expands and supplements the normal building design concerns of economy, utility, durability, and comfort. Green buildings are designed to optimize utilities usage such as energy, water, and other resources; to protect occupant health and improve employee productivity; to reduce waste, pollution, and environmental degradation (Environment and Ecology , 2015).

Accordingly, “Green building certification” classically includes a set of standards for defining Green building, promoting integrated design practices, recognizing environmental leadership in building industry and increasing the awareness among customers by specifying the benefits of green building (USGBC , 2015).

Referring to the research of Solidiance (2012), the number of green buildings in Thailand has rapidly grown since 2007, almost doubling annually from 2007 to 2012 where most of the green buildings constructed are located in Bangkok. The demand for higher quality of living among the Thai society is increasing, such as the need for cleaner environment and reduced housing costs. The examples of advertising and providing benefit are able to influence Thai society to go for green and sustainable development in the future.

Many countries introduce green building certification to certify green buildings. In Thailand, there are two main types of Certifications; LEED (USA) and TREES, the local certification which is generated by Thai Green Building Institute (TGBI).

Objective

Referring to green building information, this research aims to address the following questions: “Does green building certification influence the purchase intention of green residential building in Thailand” and “Whether and how does the country-of-origin (foreign or local) and brand reputation explain the difference in moderate the effect of certification on the purchase intention of green residential building in Thailand.”

Conceptual Framework

In order to enhance the communication with consumers by using Green building, certification should be consistent with signaling theory, positing that credible signals are effective in reducing the information asymmetry between sellers and buyers (Zhang , Joglekar, & Verma, 2014). Based on this concept, the first hypothesis is developed as follows:

Hypothesis 1: Green Building certification positively influences the purchase intention of Green residential buildings in Thailand

According to Cai, Cude, and Swagler (2004), the sensitivity to country of origin varies by product category. In order to certify Green building in Thailand, there are two main types of Certifications; LEED (USA) and TREES, the local certification which is generated by Thai Green Building Institute (TGBI).

Furthermore, Ibrahim, and Sothornnopabutr (2006) stated that “COO effects appear to have a relatively stronger impact on consumers in Thailand”. Then, COO of global brand is positively accepted higher than COO of low perceived competence, such as local brand, among Thai people (Parkvithee & Miranda, 2012). Based on this concept, the second hypothesis is developed as follows:

Hypothesis 2: International certification (LEED) positively influences the purchase intention of green building more than local certification (TREES)

Finally, considering brand recognition as a moderator, the third hypothesis is as follows:

Hypothesis 3: The influence of Green building certification on purchase intention is stronger for developers with low brand recognition.

Methods

An experimental survey is used to test the hypotheses. Accordingly, six sets of the survey in Thai language were disseminated online and through paper-based distribution. The target samples are Thai employees who live in Bangkok and surrounding areas. Considering the target samples and referring to Krejcie and Morgan (1970), the appropriate sample size with 95% confidence is 384 people. Additionally, snowball sampling was used for this research.

Abstract

The development of Green buildings in Thailand has just started a few years ago. The incentive for the purchase of eco-friendly houses or residential buildings is high among Thai consumers in terms of energy saving, social acceptance, and other aspects. Moreover, many organizations in Thailand highlight the housing purchase along with the ‘go green’ concept as their main strategy. Therefore, the ‘go green’ concept has become the trend that influences the sustainable development in Thai market.

Drawing upon the signaling theory, this research examines how certification influences consumers’ purchase intention of green residential buildings. In addition, this research investigates how brand recognition and the country of origin moderate the effect of certification towards the purchase intention of green buildings.

By using ANOVA analysis and independent T-test, the experiment results demonstrate that green building certifications, especially, international certification (LEED) can be used as a tool for real estate developers in Thailand, to communicate the ‘go green’ concept of their condominium. Besides, the effect of COO can influence consumer purchase intention and direct variation to the brand recognition. Therefore, developers with high brand recognition suit to apply for the international certification, LEED. On the other hand, there are two suggestions for developers with low brand recognition, which are registering for the local certification, TREES, and advertising that the building is constructed following standards of international certification, LEED.

Moreover, gender insignificantly affects the relationship between perceiving benefits of green buildings and purchasing intention. However, women perceive higher purchase intention than men when green condominium is certified by an international institute.

Furthermore, a green attitude is significantly affecting consumer purchase intention. Green supporters not only have higher intention to purchase green condominium, but also perceive higher values towards international certification over non-green supporters.

The results also illustrate that even awareness towards green building and green building certifications is limited among Thai people; then again, the intention to gain more knowledge towards green building is positive among the society. Therefore, there is an opportunity for real estate suppliers to use the benefits of green building and certifications as a tool for promotion and differentiation.

Keywords Real estate, LEEDs, TREES, Green Building, Signaling Theory, Country of origin, Residential building, Thailand

CHAPTER 1

I. Introduction

I.1. Background

“Green building”, also known as a high performance building, is the practice of using environmentally friendly products and processes. This practice expands and supplements the normal building design concerns in aspect of economy, utility, durability, and comfort. Green buildings are designed to optimize utilities usage as energy, water, and other resources; to protect occupant health and improve employee productivity; to reduce waste, pollution and environmental degradation (Environment and Ecology , 2015).

Accordingly, “Green building certification” classically includes a set of standards for defining Green building, promoting integrated design practices, recognizing environmental leadership in building industry and increasing the awareness among customers by specifying the benefits of green building (USGBC , 2015). In order to certify a Green Building, there are many organizations, such as LEED (U.S.A.), Breeam (U.K.), dGnB (Germany) and CasBee (Japan), generating their own standards certifications to certify the building with a similar criteria. According to Solidiance (2012), key drivers for Green buildings include improving corporate image and CSR, lower operating cost, higher asset value while a higher rent can be charged to renters. Therefore, these factors influence many contractors interested in Green buildings which have potential growth in the future.

Thailand is Southeast Asia’s second largest economy with GDP of USD 986 billion in 2014. It is ranked number 22th in world GDP ranking 2014. Bangkok, capital city of Thailand, has a population of more than 8 million or close to 13% of the

country's population, and with this amount of population leads Bangkok as a center of economy in Thailand (World Bank, 2015). Bangkok's rapid development influences the growth of its real estate business, and Bangkok also has the highest rate of newly constructed building in Thailand.

Referring to the research of Solidiance (2012), the number of green building in Thailand has been growing rapidly since 2007, almost doubling annually from 2007 to 2012 with most of the green buildings located in Bangkok. This growth is the direct result of increasing awareness driven by the Thai government and many organizations. From that sense, if looking at the real estate sector, various groups of stakeholders are showing signs of support for the green movement; Government policies such as strong environmental, energy saving laws, green building standards; Thai developers set "go green" concept as a market trend. The demand of quality of life among Thai society is increasing, such as needs of cleaner environment, and reduced housing costs. These examples of advertising and providing benefit are able to influence Thai society to go for green and sustainable development in the future.

1.2. Research context

Green building, also known as a sustainable or high performance building, is the practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building's life-cycle from design, construction, operation, maintenance and renovation. This practice expands and complements the classical building design concerns of economy, utility, durability, and comfort (Environment and Ecology , 2015). Green buildings are designed to reduce the overall impact of the built environment on human health and the natural environment by; professionally using utilities as energy, water, and other resources; protecting occupant

health and improving employee productivity; reducing waste, pollution and environmental degradation (USGBC , 2015).

I.2.1 Green Building in Thailand

According to the research of Solidiance (2012), the number of green building in Thailand has been growing rapidly since 2007, almost doubling annually from 2007 to 2012 where most of the green buildings constructed are located in Bangkok, capital city of Thailand as shown in figure1. This growth is the direct result of increasing awareness driven by the Thai Green Building Institute, Universities, the private sector, and the Thai government.

This trend is consistent with the argument of Wilber's Integral Theory (Panthasen, 2010) that ‘one must consider four quadrants, or aspects of life; 1 Mind: subjective (interior) part of the individual; 2 Culture: subjective (interior) part of the human collective; 3 Health and behavior: objective (exterior) part of the individual; 4 social systems and environment: objective (exterior) part of the human collective. All factors are interrelated and any of these aspects cannot be separated from each other. From that sense, if looking at the real estate sector, various groups of stakeholders are showing signs of support for the green movement. Government policies such as strong environmental, energy saving laws, green building standards; Thai developers set “go green” concept as a market trend; Large number of energy saving and environmentally friendly concern in construction field with an aim to meet international standards and become recognized by global green building organizations; The demand of higher quality of life among Thai society such as needs of cleaner environment, and reduced housing costs.

The examples of advertising and providing benefit are able to influence Thai society to go for green and sustainable development in the future. As mentioned by Solidiance (2012) and Panthasen (2010), the key drivers for Green Buildings in Thailand can be determined by using PESTEL analysis as shown in Table 1.

Table 1 PESTEL Analysis of Key Drivers for Green Buildings in Thailand

<u>Political</u> - Government policies such as strong environmental policies, energy saving laws, green building standards	<u>Economics</u> - Increasing of number of green building in Thailand
<u>Social</u> - Thai developers set “Go Green” concept as a market trend - The demand of higher quality of life among Thai society	<u>Technology</u> - Green Innovation (Design of building) - Materials and Resource for Green building construction - Lower operating costs with green buildings
<u>Environment</u> - Demand of Improving corporate image and CSR (Sustainability development)	<u>Legal</u> - No issue related

In order to qualify to be a Green Building, there are many organizations such as LEED (U.S.A.), Breeam (U.K.), dGnB (Germany) and CasBee (Japan) which create their proprietary standards with similar criteria. In Thailand, there are mainly two types of certification to satisfy, namely, LEED and TREES (Solidiance, 2012).

The first version of LEED (USA) was launched in 2000 and introduced to Thailand in 2008 with 4 levels of certification as normal certification, silver certification, gold certification and platinum certification which is classified by scores. There are 7 major items to concern about; Sustainable Site, Water Efficiency, Energy and Atmosphere, Material and Resources, Indoor Environment Quality, Innovation and Design, and Process.

TREES launched in 2010 by groups of professional engineers and architects in Thailand with 8 major items which is similar to LEED's standard: Building management, Site and landscape, Water conservation, Energy and atmosphere, Material and resources, Indoor environmental quality, Environmental protection, and Green innovation.

The differences between the local certification and the US certification are seen to be the cost of registration and audit to reach the certification which is approximately 1 million THB (32,000 USD) for LEED, and 200,000 -300,000 THB (6,400USD – 9,600 USD) for TREES. In addition, there is no research about the consumer perceived values toward those two certifications so that this paper is not able to conclude the comparison of other aspects between LEED and TREES (USGBC , 2015; TGBI , 2016).

Focusing on residential buildings in Thailand, there are several condominiums which are provided by both well-known and unknown real estate developers. These condominiums are concerned about green building certification (LEED and TREES) by mentioning about 'go green' concept and green building certification on their advertisements, as shown in Table 2 (UNITY, 2013; LUMPINI , 2015; ANANDA, 2015).

Table 2. Green Residential Building in Thailand

Name	Company	Location	Advertisement	Brand Recognition
Lumpini Place Rama9-Ratchada (L.P.N. Green)	Condo Lumpini by L.P.N. Development Public Co., Ltd.	Bangkok	Construction under LEED standard	Well-known real estate provider
Lumpini Park Beach Cha-am (L.P.N. Green)		Phetchaburi	Construction under LEED standard	
Lumpini Park Nawamin-Siburapa (L.P.N. Green, under construction)		Bangkok	Construction under LEED standard	
U Delight Ratchavipa (U Delight, under construction)	Grand Unity Development Co., Ltd.	Bangkok	Urban Ecology Condo (increase green space)	New real estate providers
Ideo MOBI Sathorn Condominium Project	Ananda Development PCL	Bangkok	Certified by TREES Certification	Well-known real estate provider

Moreover, there are several barriers against green building in Thailand; especially higher construction cost compared to a non-green building, lacking of knowledge from local architects and contractors, lacking of awareness from building owners about the benefits of green buildings, and restrictions on commercial buildings (Solidiance, 2012). However, there are some potential growth of green building in Thailand because of the key drivers, such as improving corporate image and CSR, lower operating costs with green buildings, green buildings translating into higher asset value, and higher rent that can be charged to renters. As a result, future trends for green building in real estate stakeholder perspective are as follows; Green building trends are rapidly growing for both new and existing building, Real estate companies still consider green buildings as marginal in their portfolio of buildings; Cost of going green will be declined.

I.3. Objective

Referring to green building information, this research aims to address the following questions: “Does green building certification influence the purchase intention of green residential building in Thailand” and “Whether and how does country-of-origin (foreign or local) and brand reputation explain the difference in moderate the effect of certification on the purchase intention of green residential building in Thailand.”

I.4. Significance of Study

This study aims to examine the influence of green building certification origin on housing purchase in Thailand, where the opportunities and demand for green residential buildings are increasing. It also can be used as information in conducting a marketing campaign for the real estate providers who are interested in green building area in Thailand.

Due to the lack of understanding about the effect of country of origin (COO) on green building certification among Thai society and in general, therefore, this study also considers on this aspect.

CHAPTER 2

II. Theoretical Background

II.1. Signaling theory

Generally, in marketing aspects, the definition of signaling theory refers to a communication between two parties which transmits information by observable, noticeable, or other measurable means (Alhabeeb, 2007). Moreover, signaling theory is useful for describing behavior when two parties (individuals or organizations) accessed to different information. Typically, the sender must choose a method to transfer (or signal) information and the receiver must choose how to interpret the signal (Brian , Connelly, Trevis, & Duane, 2011).

In the business perspective, suppliers generally have more information about their own products than their stakeholders, including consumers. Information asymmetries increase transaction costs for companies in terms of customer's cost of searching and identifying suppliers; costs of verifying the prescribed terms; and costs related with agreements to declare the unobservable features of suppliers (Montiel, Husted, & Christmann, 2012). Therefore, signaling theory could address as method for reducing the information asymmetry between sellers and buyers (Zhang , Joglekar, & Verma, 2014).

However, in consumers' perspective, messages are effective when consumers find themselves relevant to perceived content and the content itself is believable. Therefore, the sender has to consider the right messages in order to properly communicate with their consumers (Dunham, 2011)

Furthermore, companies, which offer a signaling tool to customers in the sense of product's quality, cannot only reduce asymmetric information, but also can separate

themselves from the weak companies which is unable to communicate with customers (Karasek, Ray, & Bryant, 2012).

Auriol and Schilizzi (2003) claimed that using prices or reputation building as signaling tool are inefficient for credibility qualities guarantee contract, because consumers do not experience the product; moreover, they cannot boycott or return that product due to a poor quality. Moreover, consumers do not intend to pay an extra for a product's guarantee. To solve this issue, certification could be used as signaling tool instead of prices or reputation building because using certification as signaling tool provides a competitive advantage over competitors who have not certified their products (Terlaak & King, 2006).

Moreover, using certification as a signaling tool is sufficiently trustworthy to exist and transmit useful information even the signaling of quality through certification is not perfect (Auriol & Schilizzi, 2014; Terlaak & King, 2006). Labeling of credibility qualities is generally trusted by consumers who purchase everyday pharmaceutical, organic, fair-trade or eco-friendly products (Auriol & Schilizzi, 2014).

Barone, Taylor, and Urbany (2005) illustrated that using advertising as signaling tool is one of the ways to communicate with the customer. However, the level of perceiving information of product and its quality for customers depend on the perception of brand differences within the same product's category.

II.2. Country of origin

Country of origin (COO) describes the origin of the product, which is normally communicated through the phrase “made in__”. COO is an intangible product characteristic that can separate that product from others. A signal of COO is similar to price, brand name, or guarantee (Peterson & Alain , 1995). COO image plays as a significant factor which affects consumers’ perceptions on products and brands and that also further impact on purchase intention (Wang & Yang, 2008).

Furthermore, consumers use COO to justify and create positive or negative perceptions towards products. In many markets, consumers are willing to pay an extra for the products from more industrialized countries such as Germany, Switzerland and Japan. The reputations of these countries are noticed as “high quality” producers (Knight, Holdsworth, & Damien, 2007).

The study of Lee (2013) aims to examine the relationship between brand knowledge and informational cues including macro COO image, micro COO image, globalness of brand, and the effect of signal on purchase intention using three brand origin countries or regions: The United States, Japan, and Europe. A survey was conducted in three major cities in China and results showed that there is no statistical significance related to cues. Although brand knowledge influences macro COO image positively, the influence of macro COO image on purchase intention did not reach a significant level for the respondents in this study. However, that brand globalness has a direct influence on purchase intention, and ethnocentrism does not affect purchase intention negatively.

According to Li and Wyer (1994), the reputation of COO, the country where products are made from, affects the favorableness of product evaluation in its role as a source of information about product's attribute. COO's effect is strongest on consumers who are not knowledgeable about the product, and weakest on consumers who are well-informed.

Ibrahim & Sothornnopabutr (2006) illustrated that the effects of COO are not substantial as other factors such as price, design, brand, functions, and product's life time for case study of mobile handsets. However, the findings identified that effects of COO have reasonably strong impact among Thai consumers. Made in- label is interesting and there is a strong preference toward particular origin of the products for Thai people, but again, COO effects also depend on consumer preference and their demographic information. Moreover, COO of global brand is positively accepted higher than COO of low perceived competence, such as local brand, among Thai people (Parkvithee & Miranda, 2012).

II.3. Brand Recognition

Brand Recognition is considered as the psychological mechanism of consuming behavior (Becker, 1960). The meaning behind "recognition" is an awareness, loyalty and commitment from consumers (Mitchell, 1979). People, who strongly perceive value of brand recognition, will express three trends: 1) Believe and accept of the product's values; 2) willing to spend more efforts toward the product; 3) Confidence toward constant ability to purchase the product (Yang, Wang, Song, et al., 2011).

Furthermore, brand recognition is one of the factors that positively impacts perceived value, and purchase intention (Monroe & Krishnan, 1985). The high brand recognition has low consumers' perceived risks and high consumer perceived value,

therefore, consumer are more expected to purchase well-known brand products (Wang & Tsai, 2014).

Brand awareness has two sub-dimensions which are brand recognition and brand recall (Keller, 1993). Brand recognition is involved in brand communication as the basic first step to interact with consumers about the product's characteristics until an establishment of brand name. Brand awareness can be used as a sign of quality and guarantee, therefore, the more consumers aware of brand name means the more opportunity to increase consumer intention to the point of purchase (Tong & Hawley, 2009).

For the green market aspect, there is 'eco-brand' which is selling environmentally friendly products; a company with eco-brand is able to differentiate itself from non-green products (Chatterjee, 2009). Environmental labels positively impact a consumer's evaluation towards brand performance. Green brand recognition should emphasize its differences separately from non-green products with the same functions. The purchasing behavior can shift to eco products because of the advantages of green brands; emotional brand benefits are significant factor that motivate consumers to change their purchase behavior toward eco products. Thus, consumers who positioned themselves as green product supporters prefer to select green brand recognition to satisfy their emotional needs (Roe, Teisl, Rong, et al., 2001; Rezai, Mohamed, Shamsudin, et al., 2011)

II.4. Conceptual Framework

While there is an increasing interest in green building, quality assurance of green buildings remains to be a complex process from real estate investors' perspective (Solidiance, 2012; Panthasen, 2010). Thus, consumers perceived values of green building through Green building certification are indistinct. Enhancing the communication with consumers by using Green building certification is consistent with signaling theory, positing that credible signals are effective in reducing the information asymmetry between sellers and buyers (Zhang , Joglekar, & Verma, 2014). Based on this concept, the first hypothesis is developed as follows:

Hypothesis 1: Green Building certification positively influences the purchase intention of Green residential building in Thailand

For Hypothesis 1, the aim of this hypothesis is measuring an effect of values of green building certification on the purchase intention. An analysis can be measured without concentrating on brand recognition and types of green building certification. Hence, an analysis concept of hypothesis 1 can be analyzed as exhibits in Figure 1.

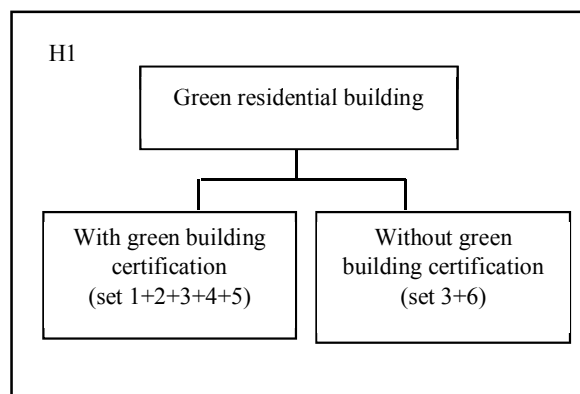


Figure 1 the analysis concept of hypothesis

The sensitivity to country of origin varies by product category (Cai, Cude, & Swagler, 2004). In order to certify Green Building in Thailand, there are two main types of certifications in Thailand; LEED (USA), and TREES, the local certification which is generated by Thai Green Building Institute (TGBI). However, there is little evidence to claim that certification for Green building in Thailand can be influenced by COO. Focusing on Green residential buildings, there are a few buildings in Thailand which were certified by those two certifications, but again, there are opportunities and demands among Thai residents for purchasing Green residential buildings.

Furthermore, Ibrahim & Sothornnopabutr (2006) stated that “COO effects appear to have a relatively stronger impact on consumers in Thailand”. Then, COO of global brand is positively accepted higher than COO of low perceived competence, such as local brand, among Thai people (Parkvithee & Miranda, 2012). Based on this concept, the second hypothesis is developed as follows:

Hypothesis 2: International certification (LEED) positively influences the purchase intention of green building more than Local certification (TREES)

Hypothesis 2 aims to measure the effect of COO. Therefore, an analysis focuses on types of origin of green building certification; in this study has International certification (LEED) and local certification (TREES). Similar to hypothesis 1, an investigation of hypothesis 2 is analyzed by eliminating the effect of brand recognition. An analysis concept of hypothesis 2 can be indicated as exhibits in Figure 2.

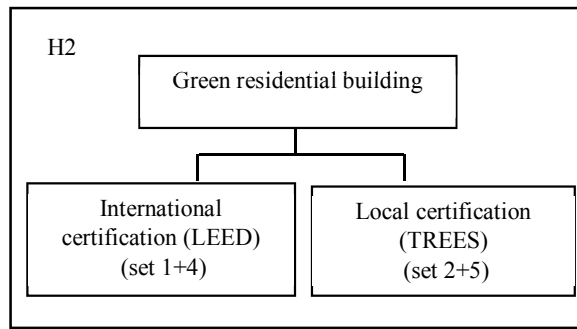


Figure 2 the analysis concept of hypothesis

Recently, both well-known and unknown real estate providers in Thailand have been promoted ‘go green; concept in their marketing campaigns as mentioned in Chapter 1. Moreover, brand recognition positively increases the purchase intention (Wang & Tsai, 2014). Therefore, this study develops a third hypothesis by considering Brand recognition as another moderator beside COO of green building certification as in second hypothesis then, the third hypothesis is developed as follows:

Hypothesis 3: The influence of Green building certification on purchase intention is stronger for developers with Low brand recognition.

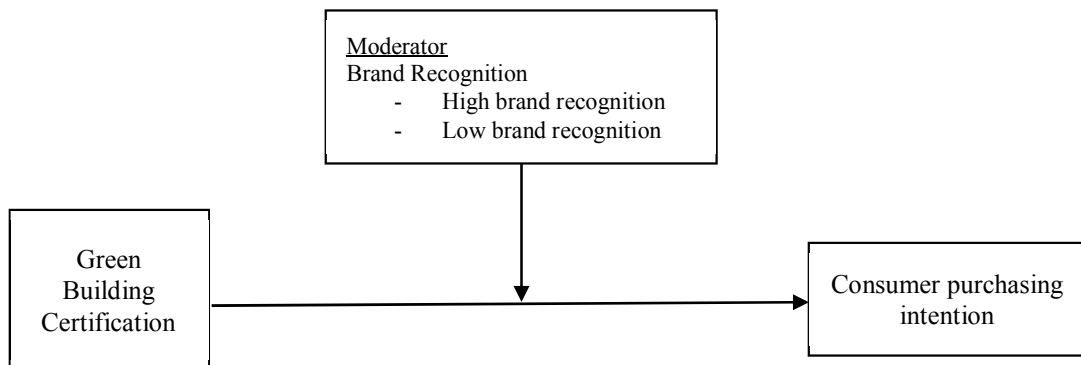


Figure 3. Concept of Hypothesis 3

Hypothesis 3 emphasizes on the effect of brand recognition towards purchase intention. Thus, an analysis of hypothesis 3 can be classified into 3 approaches by comparing between high brand recognition and low brand recognition.

Considering both green building (international certification (LEED) and local certification (TREES)),

H3.1: The influence of both international and local green building certification on purchase intention is stronger for developers with Low brand recognition.

Secondly, considering only green building with international certification (LEED), therefore, H3.2 is developed as follows;

H3.2: The influence of international certification (LEED) on purchase intention is stronger for developers with low brand recognition.

Thirdly, considering both green building which is certified by international certification (LEED) and local certification (TREES), therefore, H3.3 is developed as follows;

H3.3: The influence of local green building certification (TREES) on purchase intention is stronger for developers with low brand recognition.

The analysis concept of hypothesis 3 can classify as exhibits in Figure 4.

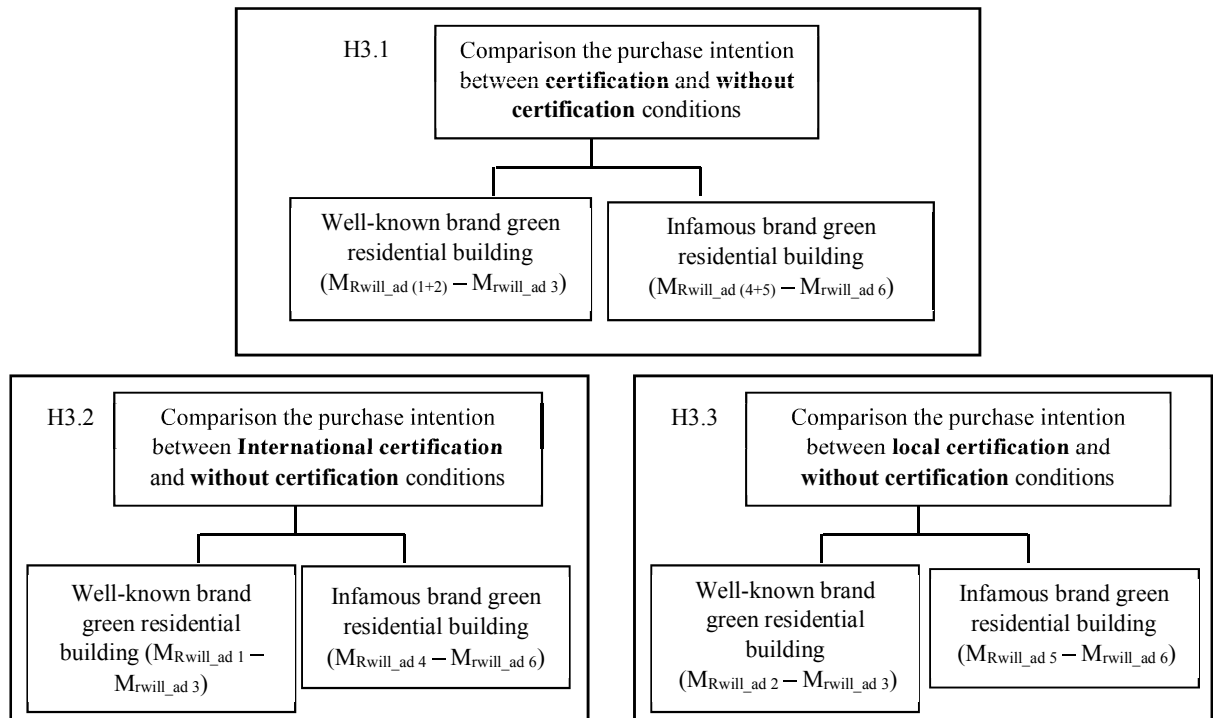


Figure 4. The analysis concept of hypothesis 3

CHAPTER 3

III. Methodology

III.1. Experiment Design

In order to test the hypotheses, a 3 X 2 experimental survey was designed as shown in Figure 6. The high brand is distinguished by imitating the name of a well-known real estate provider in Thailand and showing ‘Leader of real estate’ statement on poster; and the low brand is an imaginary name as exhibited in appendix 3. For the second level, the impact of green building certification was considered and divided into two groups which are green residential building with certification and without certification. Additionally, types of green building certification were used and divided into International green building certification (LEED) and Local green building certification (TREES) in the final level. The concept of categorization experimental surveys in this study is developed as exhibit in Figure 2. Furthermore, the number for each set of experiment is shown as in Figure 3.

The study compares level of the purchase intention towards green residential building among 6 sets of experimental survey based on hypotheses as mentioned in conceptual framework. In addition, in order to conduct sensitivity analyses, hypotheses are tested using a breakdown of samples using gender and attitude toward green products. Moreover, list of questions in Table 5 (Rezai, Mohamed, Shamsudin, & Teng, 2011; Wen & Li, 2013) are asked to measure attitudes toward green products and categories respondents into two groups as “green products supporters” and “non-green products supporters”. This study aims to investigate whether the hypothesized relationships differ among these two groups.

Referring to three hypotheses of this study, the relationship between values of green building certification and the purchase intention is measured by asking respondents about the purchase intention towards 6 similar condominium advertisements which are located in the center of Bangkok. The advertisements are created based on the experimental design as in Figure 5 and Figure 6. The statements are used to measure the purchase intention towards green residential building as shown in Table 5 and these statements are asked for all sets of experimental survey.

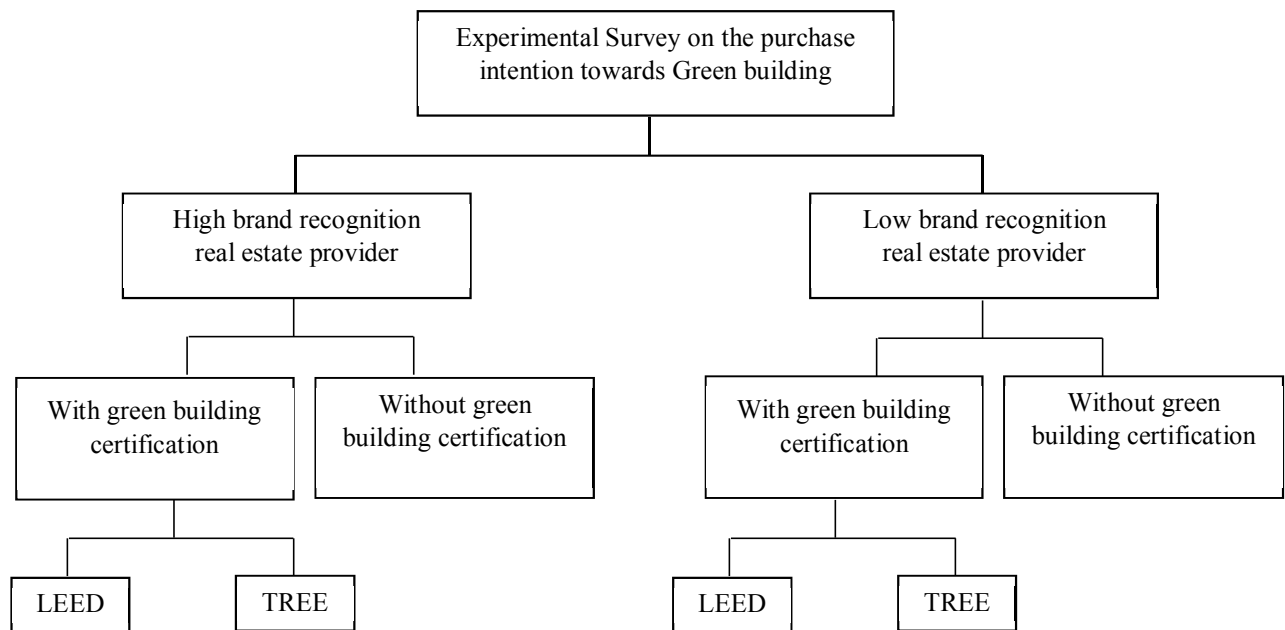


Figure 5. Experimental Design

Green Building Certification				
Brand Recognition		International certification (LEED)	Local certification (TREES)	No Certification
	High	1	2	3
	Low	4	5	6

Figure 6. Sets of Experimental Design

Table 3 List of Demographic information

Moderator	Category	Description	Source
Gender	Male	Exploring gender differences as differences on the purchase intention of green residential building	(Rezai, Mohamed, Shamsudin, & Teng, 2011)
	Female		
Age	29 or younger	Exploring the effect of age differences on the purchase intention of green residential building	(Rezai, Mohamed, Shamsudin, & Teng, 2011)
	30-50		
	Older than 50		
Marital Status	Single	Exploring the effect of marital status differences on the purchase intention of green residential building	(Rezai, Mohamed, Shamsudin, & Teng, 2011)
	Married		
	Divorced		
Education Level	Lower than high school	Exploring the effect of education level differences on the purchase intention of green residential building	(Wen & Li, 2013)
	High school		
	Diploma		
	Bachelor		
	Master		
	Higher than Master		
Occupation	Students	Exploring the effect of participants' occupation on the purchase intention of green residential building	(Wen & Li, 2013)
	Office worker		
	Business owner		
	Public sector		
Household Income	Less than ₪ 20,000/month (low income)	Considering low, middle and high income people as prospective	(Rezai, Mohamed, Shamsudin, & Teng, 2011)
	₪ 20,001-40,000 / month (low-middle income)		
	₪ 40,001-60,000 / month (middle income)		
	₪ 60,001-80,000 / month (middle – high income)		
	₪ 80,001 and above/month (high income)		
Household size	1-2	Consider effect of household size to the purchase intention of green residential building	(Rezai, Mohamed, Shamsudin, & Teng, 2011)
	3-4		
	5-6		
	Higher than 6		

Table 4 List of attitude of purchase intention towards “Green products”

No.	Statement	Type of scale and its construction	Description	Source
1	I am willing to buy green products	5-point Likert scale (1)Strongly disagree (5) Strongly agree	Measuring green mindset	(Rezai, Mohamed, Shamsudin, & Teng, 2011; Wen & Li, 2013)
2	I am willing to spend a little more money to buy green products.	5-point Likert scale (1)Strongly disagree (5) Strongly agree	Measuring willingness towards green products	
3	I will continue to buy green products.	5-point Likert scale (1)Strongly disagree (5) Strongly agree	Measuring purchase intention towards green product in the future	
4	I recommend the green products to others.	5-point Likert scale (1)Strongly disagree (5) Strongly agree	Measuring willingness to distribute green mindset to others	

Table 5 List of questions about attitude towards green building certificate

No.	Item No.	Statement	Type of scale and its Construction	Description
1	Rwill_ad	I am interested in buying the condominium in the above advertisement.	5-point Likert scale (1)Strongly disagree (5) Strongly agree	Measuring the purchase intention toward green building on the advertisement
2	Fwill_ad	I intend to purchase the condominium as shown in the above advertisement in the future	5-point Likert scale (1)Strongly disagree (5) Strongly agree	Measuring forthcoming purchase intention toward green building on the advertisement

Table 6. Knowledge toward green building certificate

No.	Item No.	Statement	Type of scale and its construction	Description
1	LEED, TREES	Which of the following labels are you familiar with?	Options: Yes/ No	Measuring awareness towards green building certification
2	CuriosityGB	After you finished this survey, would you like to know more about “Green Building”?	5-point Likert scale (1)Strongly disagree (5) Strongly agree	Measuring curiosity towards green building

Knowledge toward green building certification among targeted respondents is measured by using the statements as mentioned in Table 6 (item 1) to classify respondents who have knowledge of green building certification and respondents who are not aware of green building certification. The breakdown analysis can use this information to analyze effect of this factor on relationship between green building certification and the purchase intention. Furthermore, the end of experimental survey has a statement for measuring a curiosity towards green building as shown in Table 6 (item 2).

III.2. Participants

Referring to the research of Solidiance (2012) and TGBI (2016), most of green buildings in Thailand, which were certified by green building institutes, are located in Bangkok and its surrounding areas. Based on these evidences, the purchase behavior for Green residential building will be measured from Thai employed persons who live in Bangkok and surrounding areas as the targeted respondents.

With the intention of collecting information about the purchase intention towards green residential building among Thai people, the indicators will be used to measure the purchase intention from experimental survey. For the approximately 7 million Thai employees who live in Bangkok and surrounding areas, it is essential to get the appropriate sample size of representative respondents for experimental survey. According to Krejcie and Morgan (1970) sample size table, the number of populations over 100,000 people at 95% confidence level can determined as the sample size of 384 people. Thus, this study aims to achieve the minimum number of sample size as in Krejcie & Morgan (1970) sample size table.

III.3. Data Collection

In order to get information about an attitude towards green building from consumers as mentioned in the previous Chapters, the purchase intention is evaluated through an experimental survey approach. By collecting data from experiment, the purchase intention towards green residential building will be analyzed.

In this research, experimental surveys were distributed by online survey and paper based. Both online based and paper based survey have 15 questions which can be finished within 3 minutes. In order to get respondents incoherently and variously, snowball sampling was used for both online survey and paper based survey. The online survey was conducted by using Google Forms and distributed through friends, relatives, and networks as random Thai employees who live in Bangkok and surrounding areas uses the social media (i.e. Line, Facebook and Twitter) and e-mail. The paper based questionnaire survey was also distributed to Thai employees who live in Bangkok and surrounding areas through networks who work in public sectors and private sectors randomly.

The experimental surveys were distributed to many sectors and some of them are willing to help and discuss. However, some refused to provide any support for the research. Therefore, from 180 paper based questionnaires which were distributed (30 experimental surveys per each set), 123 filled papers can be obtained (68% response rate). In addition to online survey after deleting incomplete surveys, the final response was 283 respondents. The total respondents gathered are 406 respondents and the breakdown of respondents can be seen in Table 7.

Table 7. Breakdown of respondents

Experiment No (i)	Attribute Name	No.	Percentage
1	High brand recognition with LEED	68	17%
2	High brand recognition with TREES	72	18%
3	High brand recognition without green building certification	67	17%
4	Low brand recognition with LEED	64	16%
5	Low brand recognition with TREES	65	16%
6	Low brand recognition without green building certification	70	17%
total		406	100%

Moreover, the experimental survey will be used for measuring an attitude towards the purchase intention of green residential building by conducting 6 sets of survey which has similar contents. However, there is the difference in terms of advertisement about green condominium in each experiment and these advertisements were set according to the hypothesis of this study as shown in Figure 6. All six advertisements of green condominium are exhibited as in Appendix part.

In order to get the accurate primary data from respondents, the survey were conducted in Thai and the sample of experimental survey were both in English and Thai are shown as in Appendix part.

CHAPTER 4

IV. Data and Analysis

IV.1 Variables

IV.1.1 Independent variables

Referring to the hypotheses of this study, there are two independent variables which are as following:

Types of green building certification

Types of green building were conducted based on types of certification as mentioned in previous Chapter (international certification (LEED), and local certification (TREES)). Therefore, there are three types of green building including green building with international certification, green building with local certification and uncertified green building which are all promoted as a green building.

Brand recognition

Considering brand recognition, this study divided brand recognition of the green residential building into two groups as high brand recognition real estate providers and low brand recognition real estate provider.

By using these two independent variables, this study created the relationship between types of green building certification and designed the experimental surveys. Hence, the analysis considered six sets of experimental survey (in Figure 6) as Independent variables.

IV.1.2 Dependent variable

As mentioned in the research objective, this study aims to measure the purchase intention towards green residential building. Thus, this factor will be considered as the dependent variable.

The purchase intention towards Green building

Referring to experiment design in Chapter 3, the purchase intention was measured through statements about attitude towards advertisement in each set of experimental survey. The two statements are: “I am interested in buying the condominium in the above advertisement.” and “I intend to purchase the condominium as shown in the above advertisement in the future”. There are 5 points Likert scale: “strongly disagree”, “disagree”, “neutral”, “agree” and “strongly agree” for respondents to choose what range are they agree with the given statement. First statement is asked with the aim of measuring the purchase intention towards green building on the advertisement (Rwill_ad). Additionally, second statement is asked for measuring forthcoming purchase intention toward green building on the advertisement (Fwill_ad).

However, subject evaluated by using SPSS to confirm reliability statistics of these two purchase intention factors (Rwill_ad & Fwill_ad), found that Cronbach's Alpha score is higher than 0.7 (Cronbach's $\alpha = 0.802$). Thus, these two factors have similarity and can be used as a same factor. In this research, the first factor (Rwill_ad) is only used to measure level of the purchase intention towards green residential building.

IV.2. Overall data analysis

Overall data

A total 406 respondents, breakdown of respondents by set of experiment exhibits as in Table 7, participated in this research; Table 8 shows a summary of demographic information of the respondents.

Table 8. Summary of demographic information

Category	Options	Frequency	%	Category	Options	Frequency	%
Gender	Female	214	53%	Occupation	Office worker	251	62%
	Male	192	47%		Business owner	56	14%
Marital status	Single	295	73%		Public sector	80	20%
	Married	107	26%		Other	19	5%
	Divorced	4	1%	Income	Less than ₪ 20,000/ month	48	12%
Age	less than 30	210	52%		₪ 20,001-40,000 / month	156	38%
	Age 30-50	134	33%		₪ 40,001-60,000 / month	89	22%
	More than 50	62	15%		₪ 60,001-80,000 / month	44	11%
Educational level	Lower than High school	2	0.5%		₪ 80,001-100,000 / month	25	6%
	High school	4	1%		Above ₪ 100,000 / month	44	11%
	Diploma	20	5%	Household Size	1-2	76	19%
	Bachelor	259	64%		3-4	74	18%
	Master	108	27%		5-6	236	58%
	Higher than Master	13	3%		above 6	20	5%
Green mind-set	Green supporters	284	70%	Familiarity on green building certification	International certification (LEED)	60	15%
	Non-green supporters	122	30%		Local certification (TREES)	43	11%

Table 8 exhibits the majority of participants aged less than 30 years old (52%) and most respondents are single (73%). Female respondents are accounted for 53 percent of the total number of respondents. The educational level, which has the most respondents, is Bachelor degree (64%). The majority of respondents earn THB 20,001-40,000 per month (38%) while the majority of size of household is 5-6 persons in each family.

In order to classify green supporters and non-green supporters, the questions, as in Table 4, were asked to measure the level of attitude towards green products. Subject was evaluated by using SPSS to confirm reliability statistics of these four factors. An analysis found that Cronbach's Alpha score is higher than 0.7 for all factors (Question 1: Cronbach's $\alpha = 0.806$; Question 2: Cronbach's $\alpha = 0.844$; Question 3: Cronbach's $\alpha = 0.779$; Question 4: Cronbach's $\alpha = 0.817$), therefore, these four questions are statistically reliable. The mean average of these four factors is 4.14 which showed that average of respondents have positive attitude towards green products. In this study, green attitude factor is classified by the mean average of each respondent. Green supporters are respondents who have the mean average of four factors, attitude towards green products, over 4.00. Rests of the respondents are classified as non-green supporters. Therefore, the sample size of green supporters and non-green supporters are 284 respondents (70%) and 122 respondents (30%) respectively.

Besides, familiarity on green building certification, LEED and TREES is measured in this study. The results indicated those 60 (15%) respondents aware of LEED and 43 (11%) respondents aware of TREES. Most of respondents have positive attitude towards curiosity towards green building ($M_{\text{curiosity_GB}} = 3.82$, $SD = 0.91$)

IV.3 Analysis

The hypotheses were tested using independent T-test and one-way ANOVA. The results are discussed next.

First hypothesis stated that green building certification positively influences the purchase intention of Green residential building in Thailand. An analysis is studied without considering the effect of brand recognition and types of green building certification which is investigated as the following:

H1. Green Building certification positively influences the purchase intention of both high brand and low brand recognition green residential building in Thailand.

An independent T-test indicated that the mean purchase intention towards green residential buildings with green building certification ($M_{\text{Rwill_ad (with certification)}} = 3.33$, $SD = 0.85$) was significantly higher than mean purchase intention of green residential buildings without certification ($M_{\text{Rwill_ad (without certification)}} = 2.78$, $SD = 0.991$); $t(404) = 5.82$, $p < 0.05$). **H1 is, therefore, supported.**

Second hypothesis focused on a comparison between effects on international certification (LEED) and local certification (TREES) toward the purchase intention. Hypothesis 2 aims to measure an effect of COO with 3 approaches, as mentioned in experiment design part, for second hypothesis which are as discussed next:

H2: International certification (LEED) positively influences the purchase intention of green building more than Local certification (TREES) for both high brand and low brand recognition.

Excluding the effects of brand recognition, the mean purchase intention towards green residential building with international certification ($M_{\text{Rwill_ad (international)}} = 3.50$,

SD = 0.796) was significantly higher than green building with local certification ($M_{\text{Rwill_ad (local)}} = 3.17$, SD = 0.87); $t(267) = 3.261$, $p < 0.05$.

Focusing on the effect of COO towards certification and excluding the effect of brand recognition, a one-way ANOVA was presented to compare the effect of green building certification and brand recognition on the purchase intention towards green residential building in residential building with international certification; residential building with local certification; and residential building without certification conditions. There was a significant effect of green building certification and brand recognition on the purchase intention at the $p < 0.05$ level for the three conditions [$F(2, 403) = 21.98$, $p < 0.05$]. Post hoc comparisons using the Tukey HSD test showed that the mean purchase intention for green condominium with international certification condition ($M_{\text{Rwill_ad (international)}} = 3.50$, SD = 0.80) was significantly higher than green condominium with local certification condition ($M_{\text{Rwill_ad (local)}} = 3.17$, SD = 0.87); and green condominium without certification condition ($M_{\text{Rwill_ad (without certification)}} = 2.78$, SD = 0.99). The results showed as in Table 9 and post hoc in Table 10. Hence, **H2 is supported.**

Table 9 Descriptive information comparison for Hypothesis 2

Experiment	N	$M_{\text{Rwill_ad}}$	Std. Deviation
International certification	132	3.50	.796
Local certification	137	3.17	.871
Without certification	137	2.78	.991
Total	406	3.15	.935

Table 10. Multiple Comparisons the mean purchase intention for Hypothesis 2

Experiment (I)		M _{Rwill_ad} Difference (I-J)
International certification	Local certification	.332*
	Without certification	.719*
Local certification	International certification	-.332*
	Without certification	.387*
Without certification	International certification	-.719*
	Local certification	-.387*

Note. * Significance at $p < 0.05$

Third hypothesis indicated that the influence of Green building certification on purchase intention is stronger for developers with Low brand recognition. The analysis was comparing the mean difference between high brand recognition conditions and low brand recognition conditions. Referring to the experiment design, third hypothesis can be separated into 3 approaches and the results are as following discussion:

H3.1: The influence of both international and local green building certification on purchase intention is stronger for developers with Low brand recognition.

Focusing on the effect of brand recognition and eliminating the effect of COO towards certification, a one-way ANOVA was shown to compare the effect of green building certification and brand recognition on the purchase intention towards green residential building with well-known provider with certification; well-known provider without certification; new real estate provider with certification; and new real estate provider without certification conditions. There was a significant effect of green building certification and brand recognition on the purchase intention at the $p < 0.05$ level for the four conditions [$F(3, 402) = 12.61$, $p < 0.05$]. Post hoc comparisons using the Tukey HSD test indicated that the mean purchase intention for well-known provider, green building with certification condition (M_{Rwill_ad} (high brand with certification) = 3.36, $SD = 0.87$) was significantly higher than building without certification

condition (M_{Rwill_ad} (high brand without certification) = 2.93, SD = 0.97). Similar result to new real estate provider cases, green building with certification (M_{Rwill_ad} (low brand with certification) = 3.29, SD = 0.83) was also significantly higher than green building without certification (M_{Rwill_ad} (low brand without certification) = 2.64, SD = 0.99). On the other hand, unknown brand provider with certification condition did not significantly differ from famous brand provider with certification condition. The results concluded as in Table 11 and post hoc in Table 12.

Table 11. Descriptive information comparison for hypothesis 3

Experiment	N	M_{Rwill_ad}	Std. Deviation
High brand with certification	140	3.36	.867
High brand without certification	67	2.93	.974
Low brand with certification	129	3.29	.833
Low brand without certification	70	2.64	.993
Total	406	3.15	.935

Table 12. Multiple Comparisons of the mean purchase intention for hypothesis 3

Experiment (I)		M_{Rwill_ad} Difference (I-J)	Experiment (I)		M_{Rwill_ad} Difference (I-J)
High brand with certification	High brand without certification	.439*	Low brand with certification	High brand with certification	-0.07
	Low brand with certification	0.07		High brand without certification	.369*
	Low brand without certification	.721*		Low brand without certification	.652*
High brand without certification	High brand with certification	-.439*	Low brand without certification	High brand with certification	-.721*
	Low brand with certification	-.369*		High brand without certification	-0.283
	Low brand without certification	0.283		Low brand with certification	-.652*

Note. * Significance at $p < 0.05$

An analysis indicated that the mean difference of the purchase intention on condominium with certification and without certification is higher in unknown brand provider conditions; the mean difference in low brand conditions (M_{Rwill_ad} (low brand with certification) - M_{Rwill_ad} (low brand without certification) = 0.65) was significantly higher than the mean

difference on high brand conditions ($M_{\text{Rwill_ad (high brand with certification)}} - M_{\text{Rwill_ad (high brand without certification)}} = 0.44$) which was also statistically significant. **Therefore, H3.1 is supported.**

H3.2: The influence of international certification (LEED) on purchase intention is stronger for developers with low brand recognition.

A one-way ANOVA was conducted to compare the effect of green building certification and brand recognition on the purchase intention towards green residential building among six experiments (exhibited in Figure 3). Considering the six experiments, there was a significant effect of green building certification and brand recognition on the purchase intention at the $p < 0.05$ level for the six conditions [$F(5, 400) = 11.53, p < 0.05$]. Post hoc comparisons using the Tukey HSD test indicated that the mean purchase intention for well-known provider with international certification condition ($M_{\text{Rwill_ad}} = 3.69, SD = 0.76$) was significantly higher than well-known provider with local certification condition ($M_{\text{Rwill_ad}} = 3.06, SD = 0.85$); well-known provider without green building certification ($M_{\text{Rwill_ad}} = 2.93, SD = 0.97$); and infamous brand provider without certification ($M_{\text{Rwill_ad}} = 2.64, SD = 0.99$). Moreover, both mean purchase intention for infamous brand provider with international certification condition ($M_{\text{Rwill_ad 4}} = 3.30, SD = 0.79$); and infamous brand provider with local certification condition ($M_{\text{Rwill_ad 5}} = 3.39, SD = 0.88$) is significantly higher than infamous brand provider without certification condition ($M_{\text{Rwill_ad 6}} = 2.64, SD = 0.99$). However, infamous brand provider with international certification condition; and infamous brand provider with local certification condition did not significantly differ from well-known brand provider with international certification condition; well-known brand provider with local certification condition; and well-known brand provider

without certification condition. The results are summarized as in Table 13 and post hoc in Table 14.

Table 13. Descriptive information comparison among six experiments

Experiment	N	M _{Rwill_ad}	Std. Deviation
High brand with international certification	68	3.69	.758
High brand with local certification	72	3.06	.854
High brand without certification	67	2.93	.974
Low brand with international certification	64	3.30	.790
Low brand with local certification	65	3.29	.879
Low brand without certification	70	2.64	.993
Total	406	3.15	.935

Table 14. Multiple Comparisons M_{Rwill_ad} for six experiments

Experiment		M _{Rwill_ad} Difference (I-J)	Experiment		M _{Rwill_ad} Difference (I-J)
High brand with international certification	High brand with local certification	0.636*	Low brand with international certification	High brand with international certification	-.394
	High brand without certification	0.766*		High brand with local certification	.241
	Low brand with international certification	.394		High brand without certification	.372
	Low brand with local certification	.399		Low brand with local certification	.005
	Low brand without certification	1.048*		Low brand without certification	0.654*
High brand with local certification	High brand with international certification	-.636*	Low brand with local certification	High brand with international certification	-.399
	High brand without certification	.130		High brand with local certification	.237
	Low brand with international certification	-.241		High brand without certification	.367
	Low brand with local certification	-.237		Low brand with international certification	-.005
	Low brand without certification	.413		Low brand without certification	0.649*
High brand without certification	High brand with international certification	-.766*	Low brand without certification	High brand with international certification	-1.048*
	High brand with local certification	-.130		High brand with local certification	-.413
	Low brand with international certification	-.372		High brand without certification	-.283
	Low brand with local certification	-.367		Low brand with international certification	-.654*
	Low brand without certification	.283		Low brand with local certification	-.649*

Note. * Significance at $p < 0.05$

An ANOVA analysis showed that the mean difference between the purchase intention on condominium with international certification and condominium without certification is lower on low brand conditions; the mean difference on low brand recognition conditions ($M_{\text{Rwill_ad low brand with international certification}} - M_{\text{Rwill_ad low brand without certification}} = 0.65$) was statistically significant, however, it was lower than the mean difference in high brand recognition condition ($M_{\text{Rwill_ad high brand with international certification}} - M_{\text{Rwill_ad high brand without certification}} = 0.766$). **Thus, H3.2 is not supported**

H3.3: The influence of local green building certification (TREES) on purchase intention is stronger for developers with low brand recognition.

As shown in Table 13, an ANOVA analysis exhibited that the mean difference of purchase intention on local certification and without certification is higher in low brand recognition conditions; the mean difference in low brand recognition conditions ($M_{\text{Rwill_ad low brand with local certification}} - M_{\text{Rwill_ad low brand without certification}} = 0.65$) was significant at 95% confident but the mean difference on high brand recognition conditions ($M_{\text{Rwill_ad high brand with local certification}} - M_{\text{Rwill_ad high brand without certification}} = 0.13$) was not statistically significant. However, when comparing the mean difference of the purchase intention, low brand recognition was higher than high brand recognition with partially significant. Hence, **H3.3 is partially supported.**

IV.4 Results on overall analysis

Referring to analysis on 406 respondents as above hypotheses testing, the results indicated that the purchase intention towards green condominium without certification was lower than the one with certification. In addition to the effect of COO as shown in Figure 7, green condominium with international certification perceived highest benefit when compared to green building with local certification and without certification.

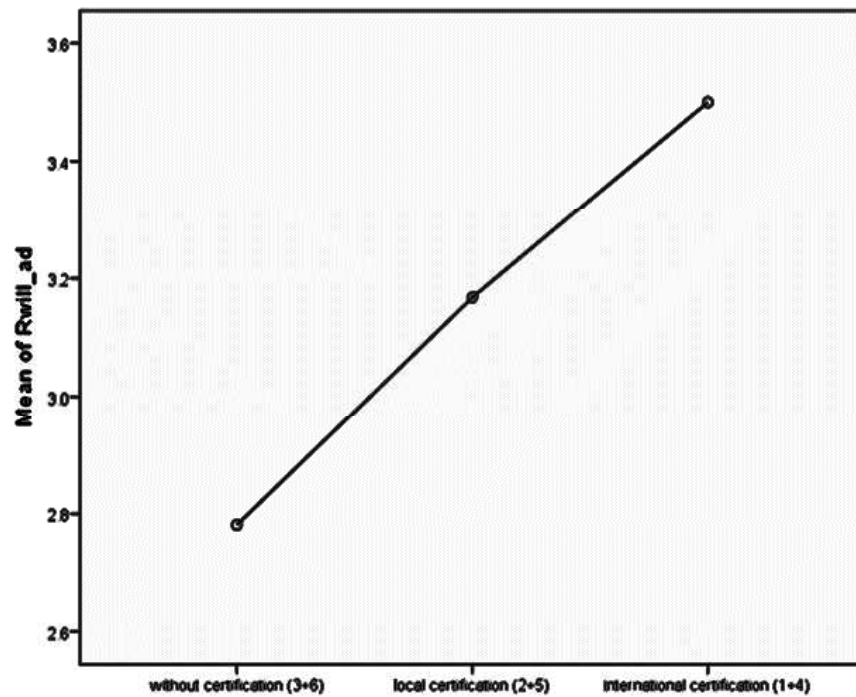


Figure 7. Comparison M_{Rwill_ad}

The purchase intention towards high brand conditions, as shown in Figure 8, international certified green condominium had highest purchase intention. However, there was no evidence to state that the purchase intention towards local certification condition is higher than without certification condition.

For the low brand conditions, the purchase intention, as exhibited in Figure 9, low brand provider had higher purchase intention when that building was certified by green building institute. However, the building, which was certified by international institution and local institution, slightly perceived the same level of purchase intention.

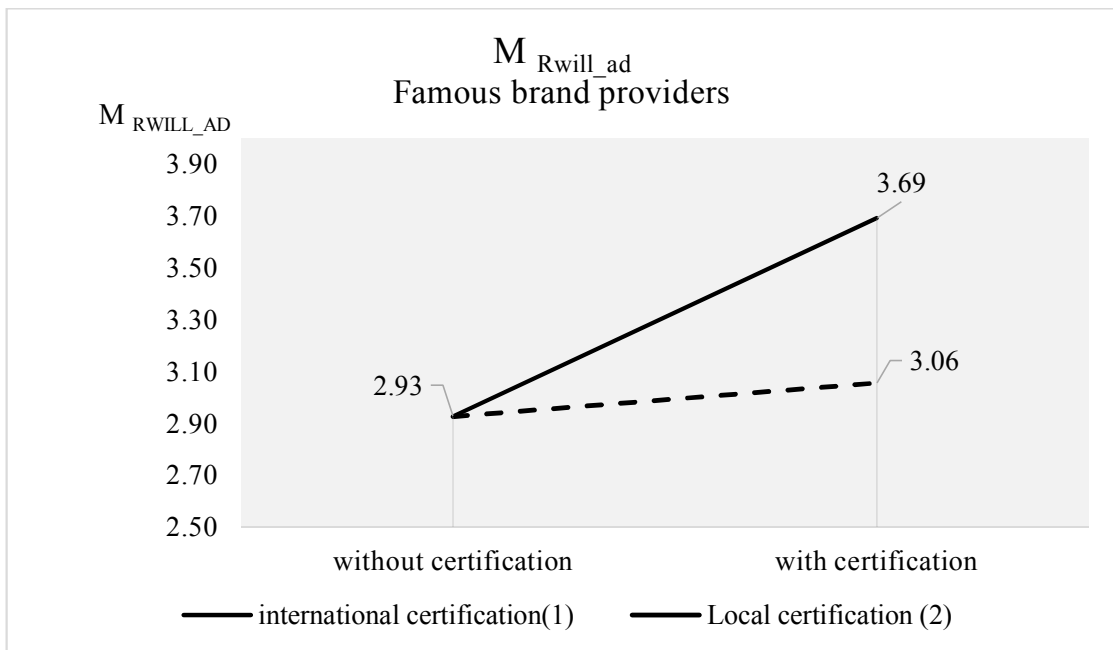


Figure 8. Comparison M_{Rwill_ad} ; high brand recognition conditions

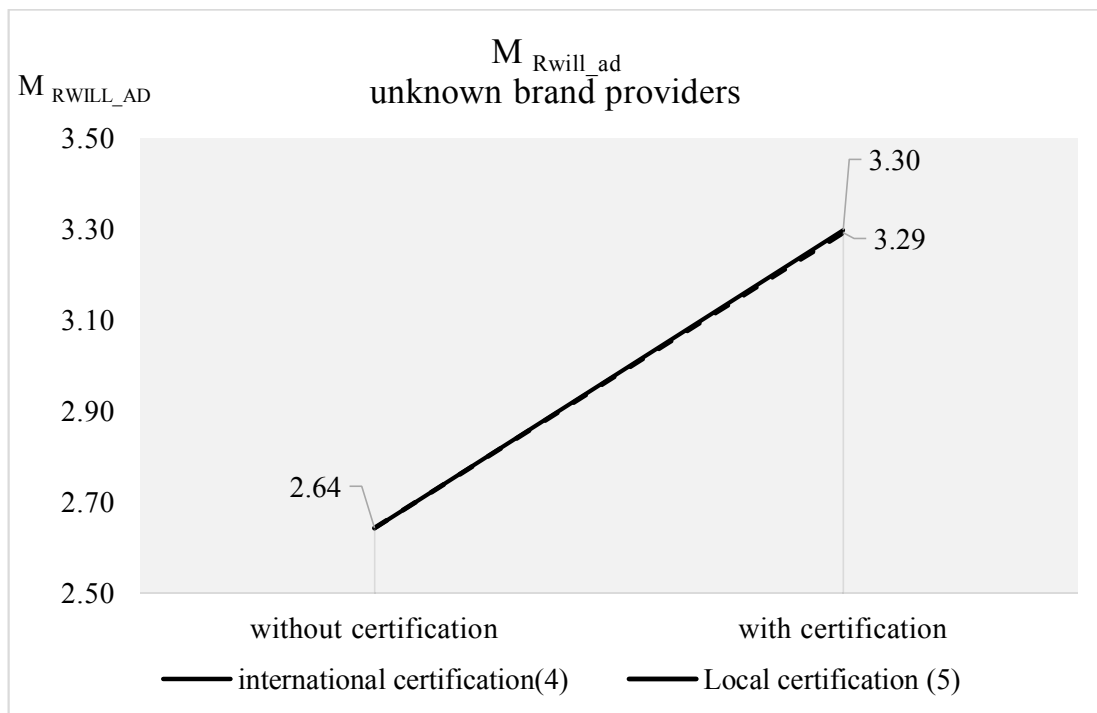


Figure 9. Comparison M_{Rwill_ad} ; low brand recognition conditions

IV.5 Sensitivity Analyses

IV.5.1 Analysis on Different Gender

There are 214 female respondents (53%) and 197 male respondents (47%) in this research. An analysis was conducted by using a factorial ANOVA in order to study the effects of gender on the purchase intention, the interaction effect of gender and the six sets of experiment (generated based on types of green building certification and brand recognition). Related to the three hypotheses of this study, an analysis on gender was conducted separately into 3 approaches by comparing the level of purchase intention on condominium in different conditions; 1) comparing green building certification and without certification conditions; 2) comparing international certification and local certification conditions; 3) comparing high brand recognition and low brand recognition.

First hypothesis, comparing green building certification and without certification conditions, a factorial ANOVA indicated that there was no statistical evidence in aspect of comparing the effect of genders and sets of experiment on the purchase intention at the $p < 0.05$ level for this condition. Therefore, the level of purchase intention on female and male does not differ in the same condition. When observing at the level of purchase intention towards green condominium, male respondents have lower purchase intention towards green condominium without certification than female respondents, then again, when a condominium has green building certification, the purchase intention on male respondents was higher than on female respondents. The estimated marginal M_{Rwill_ad} on male and female respondents are exhibited as in Figure 10.

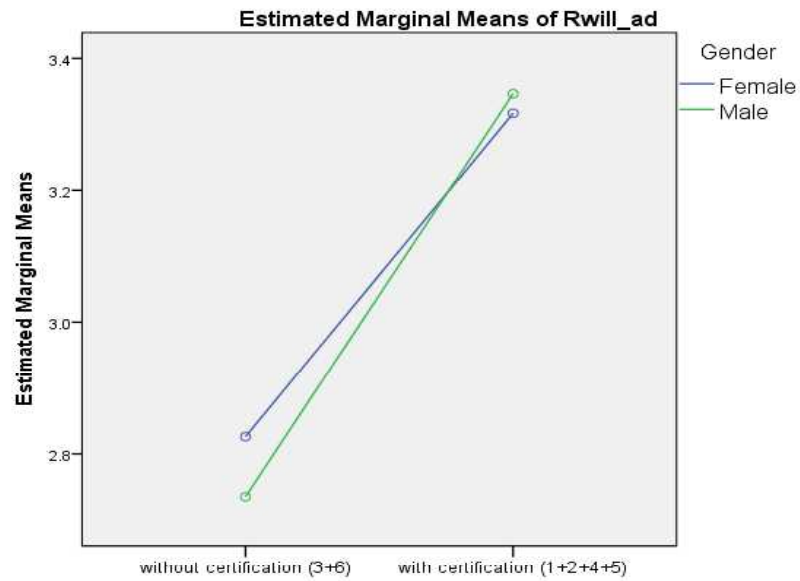


Figure 10. Comparison M_{Rwill_ad} on Male and female respondents; hypothesis 1

Second hypothesis, considering the effect of COO, an analysis was conducted for comparing effects of gender and sets of experiment on the purchase intention in international (1+4) and local (2+5) certification conditions. A factorial ANOVA revealed that there was a significant main effect of green building certification and brand recognition on the purchase intention [$F(2, 402) = 21.85, p < 0.05$]. There was, however, no main effect of gender on the purchase intention [$F(1, 400) = 0.06, p > 0.05$]. There was also no significant interaction between the two factors (gender and sets of experiment). Therefore, in this approach, effects of gender on the purchase intention are the same for both male and female. When focusing on the level of purchase intention towards green condominium in each condition, as shown in Figure 11, the purchase intention increased more in male respondents while comparing uncertified green condominium (3+6) to condominium with local certification. However, there was a contrast in the case of comparison between local certified and international certified condominium that the purchase intention increased more on female respondents.

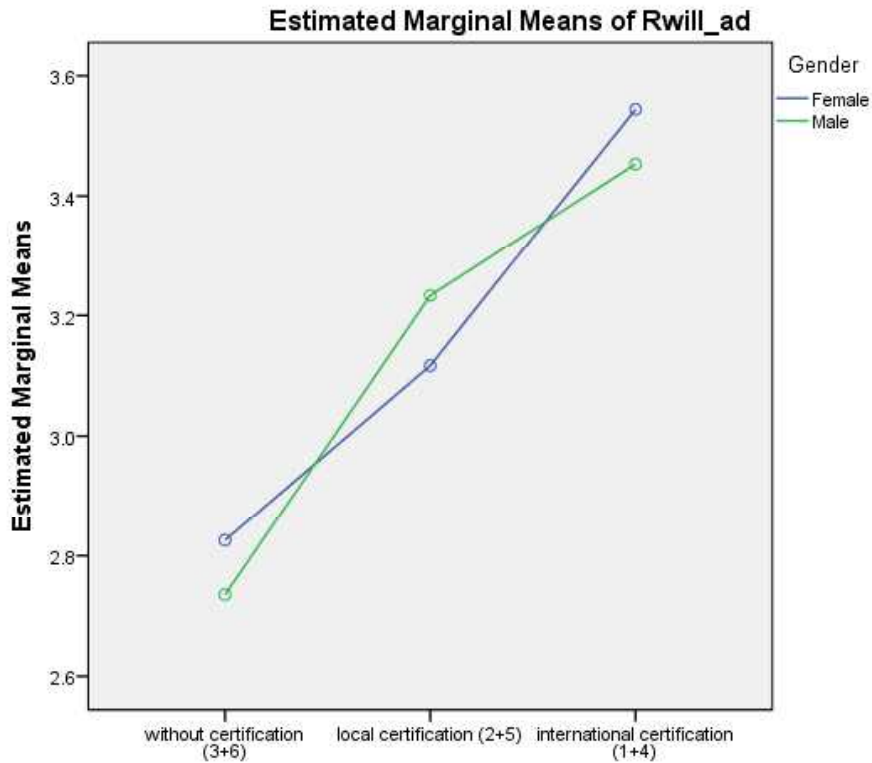


Figure 11. Comparison M_{Rwill_ad} on Male and female respondents; hypothesis 2

Third approach is focused on effect of brand recognition, therefore, in this approach was divided into high brand and low brand condition.

For high brand recognition conditions, a factorial ANOVA exposed that there was a significant main effect of green building certification and brand recognition on the purchase intention [$F(2, 201) = 15.42, p < 0.05$]. There was, conversely, no main effect of gender on the purchase intention [$F(1, 201) = 0.248, p > 0.05$]. There was also no statistically significant interaction between the two factors (gender and sets of experiment). Observing the profile plots as exhibited in Figure 12, the purchase intention positively increased more on female respondents while shifting from uncertified green condominium to condominium with certification, especially in international certification case. In case of local certification condition, the purchase

intention was insignificantly increasing from without certification condition to local certification condition for both male and female.

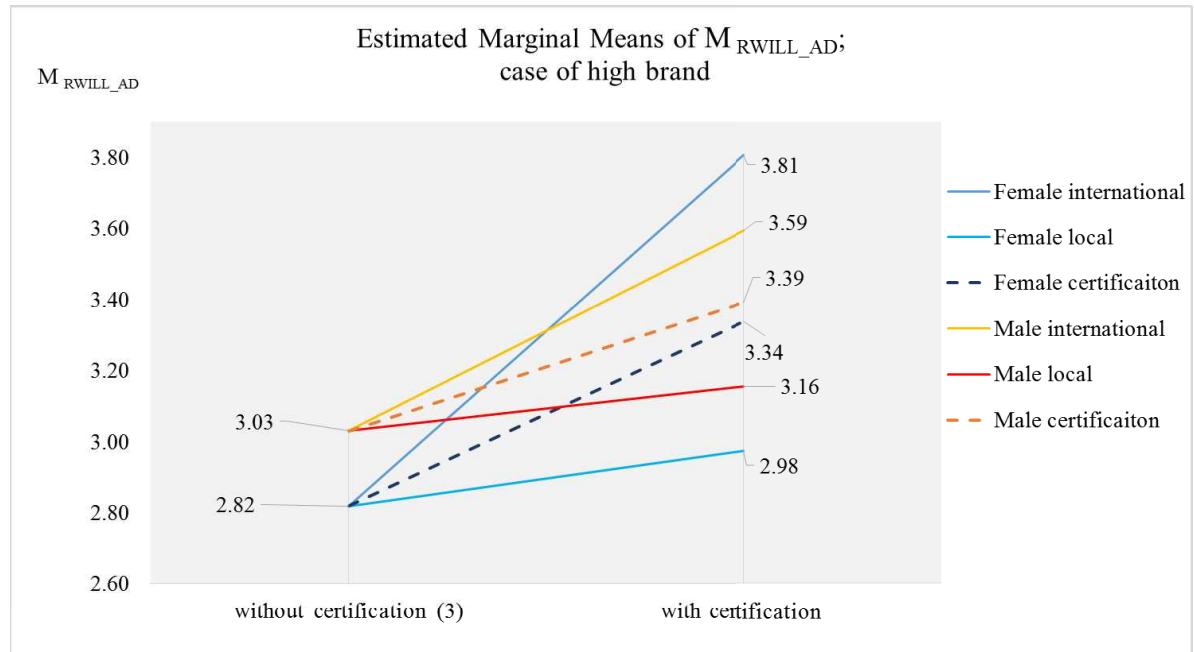


Figure 12. Comparison M_{Rwill_ad} on Male and female respondents; hypothesis 3 (high brand providers)

For low brand recognition conditions, there was no statistical proof to compare the effect of gender to the purchase intention, and interaction between the two factors (gender and sets of experiment). However, profile plots of the purchase intention on low brand conditions (Figure 13) showed that the purchase intention towards uncertified green condominium was higher on female respondents. However, considering the changing of level of intention from uncertified building to certified building, the purchase intention was positively increasing on male respondents. Therefore, male respondents perceive value of green building certification more than female respondents in case of low brand providers.

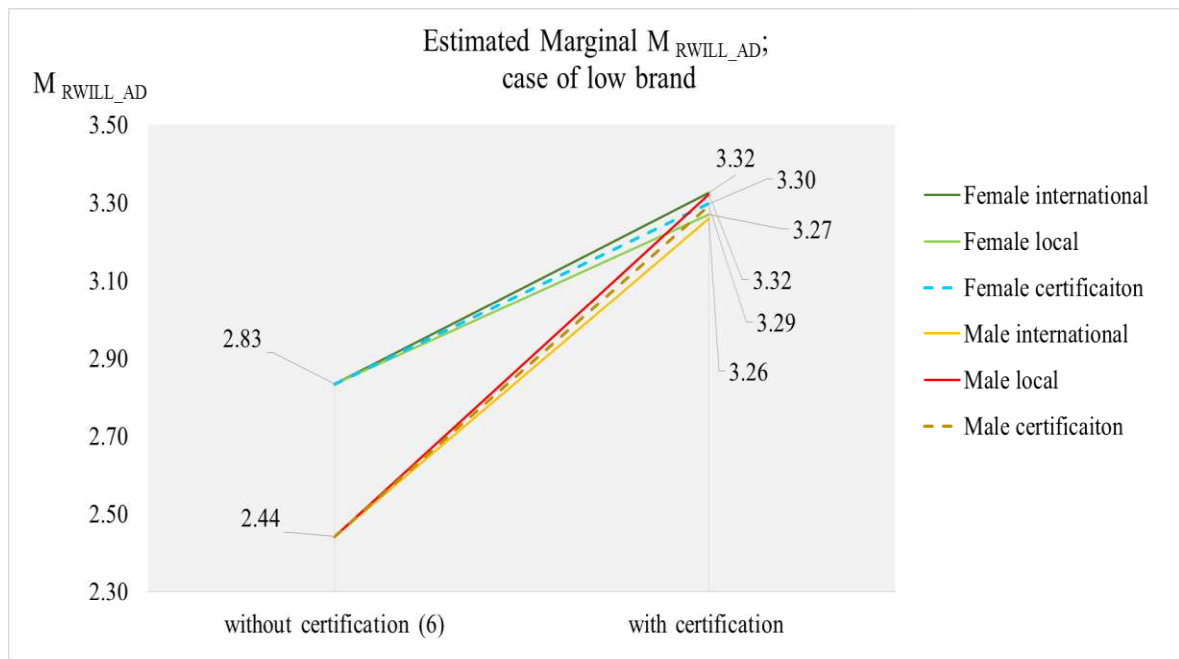


Figure 13. Comparison M_{Rwill_ad} on Male and female respondents; hypothesis 3 (low brand providers)

IV.5.2 Analysis on different green attitude

In this study, green attitude factor is classified by the mean average of each respondent. Therefore, the sample size of green supporters and non-green supporters are 284 respondents (70%) and 122 respondents (30%) respectively.

An analysis on green supporters and non-green supporters was conducted by using a factorial ANOVA. Similar to the analysis on gender, there are 3 approaches with the aim to indicate an influence of green attitude, green building certification, and brand recognition; towards the purchase intention.

First approach compares uncertified green condominium and certified green condominium. A factorial ANOVA exposed that there were significant main effects of green building certification and brand recognition on the purchase intention [$F(1, 402) = 37.14, p < 0.05$] and a significant main effect of green attitude towards the purchase intention [$F(1, 402) = 16.12, p < 0.05$]. There was no significant interaction between the two factors (green attitude and sets of experiment); therefore gender does

not significantly affect the relationship in Hypothesis 1. However, the profile plots in Figure 14, compared level of purchase intention between green supporters and non-green supporters showed that non-green supporters perceived more values of green building certification than green supporters, but non-green supporters still have lower purchase intention than green supporters towards both uncertified green condominium and green condominium with certification.

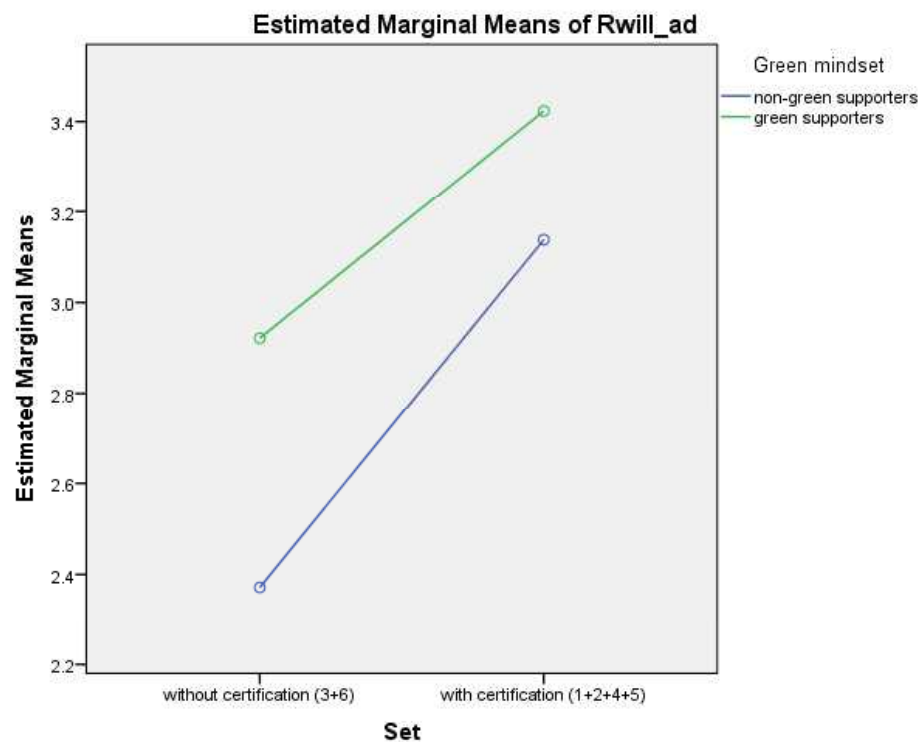


Figure 14. Comparison M_{Rwill_ad} between green supporter and non-green supporters; hypothesis 1

Secondly, comparing differences among certified green condominium with international certification and local certification; and uncertified green condominium. A factorial ANOVA exposed that there were significant main effects of green building certification and brand recognition on the purchase intention [$F(2, 400) = 23.14, p < 0.05$] and a significant main effect of green attitude towards the purchase intention [$F(1, 400) = 16.80, p < 0.05$]. There was, conversely, no significant interaction between the two factors (green attitude

and sets of experiment). However, trends of the purchase intention on green supporters and non-green supporters (Figure 15) exhibited that non-green supporters perceived more values of certification than green supporters when changing from no certification to local certification. In contrast, green supporters perceived more values of certification when shifting from local certification to international certification. In total, green supporters have higher purchase intention towards green condominium than non-green supporters.

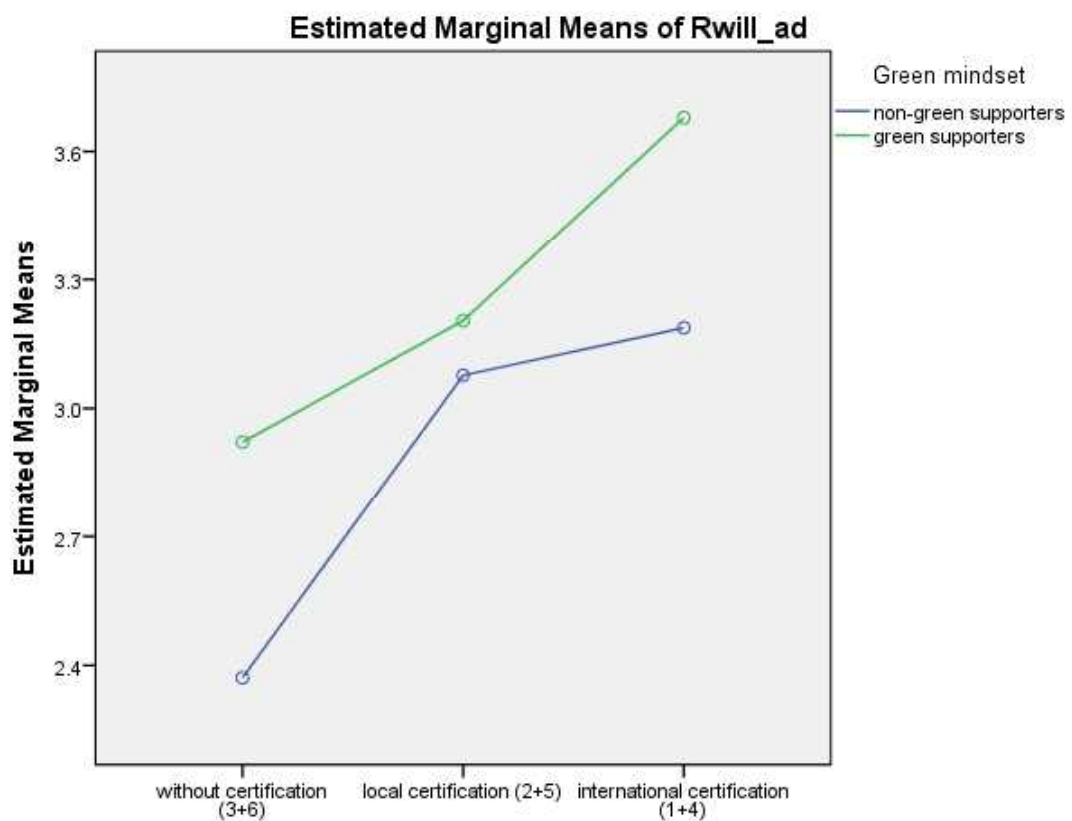


Figure 15. Comparison M_{Rwill_ad} between green supporter and non-green supporters; hypothesis 2

Third approach focused on the effects of brand recognition. Same as analysis on gender, the investigation was divided into two groups; high brand and low brand conditions.

For high brand recognition conditions, a factorial ANOVA was conducted to compare the effect of different green attitude on the purchase intention. There was a

significant main effect of brand recognition and green building certification [$F(2, 201) = 11.79, p < 0.05$] toward the purchase intention. There was a significant main effect of green attitude [$F(1, 201) = 6.82, p < 0.05$]. Besides, there was a significant interaction between green attitude and sets of experiment at 90% confidence [$F(2, 201) = 0.618, p < 0.1$]. Indicating a significant difference of the purchase intention towards uncertified green condominium between green supporters ($M_{\text{Rwill_ad green}} = 3.00, SD = 1.03$) and non-green supporters ($M_{\text{Rwill_ad non-green}} = 3.74, SD = 0.806$). There was, again, a significant difference of the purchase intention on green condominium with international certification between green supporters ($M_{\text{Rwill_ad green}} = 3.87, SD = 0.78$) and non-green supporters ($M_{\text{Rwill_ad non-green}} = 3.32, SD = 0.57$). In addition to local certification case, there was a significant difference on the purchase intention between green supporters ($M_{\text{Rwill_ad green}} = 3.11, SD = 0.78$) and non-green supporters ($M_{\text{Rwill_ad non-green}} = 2.88, SD = 0.86$). As shown in Figure 16, relationship of purchase intention and high brand condition indicated that non green supporters have lower intention than green supporters for all conditions. Both green supporters and non-green supporters perceived highest values towards international certification condition in high brand recognition case.

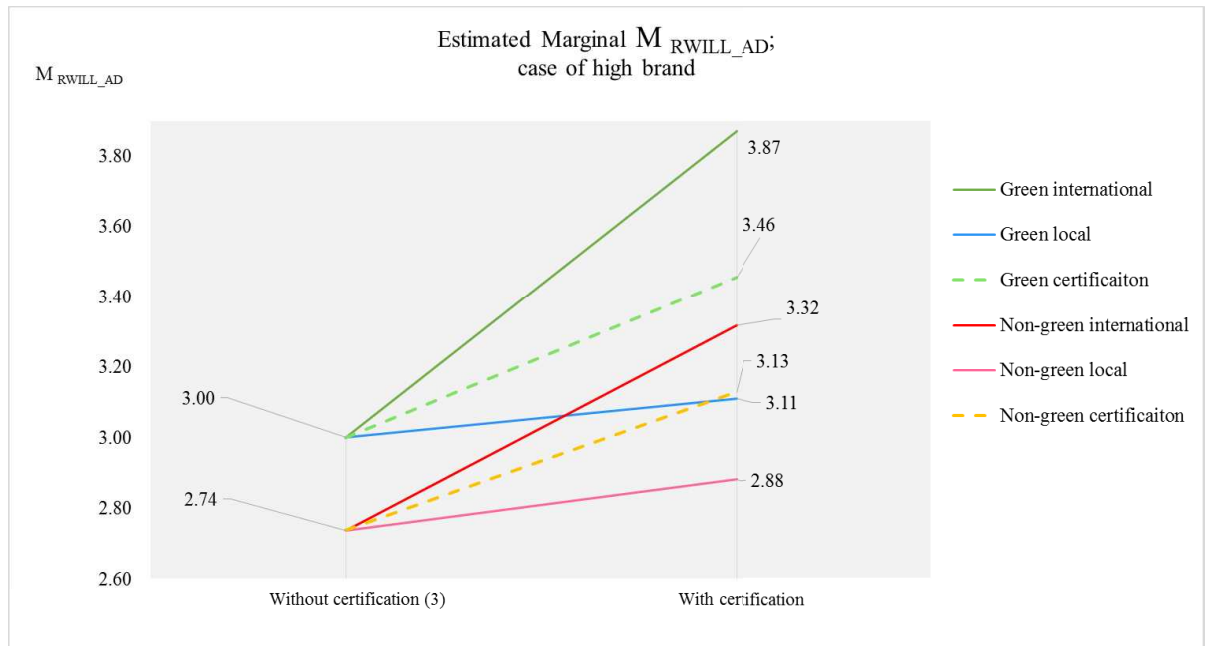


Figure 16. Comparison M_{Rwill_ad} between green supporter and non-green supporters; hypothesis 3 (high brand conditions)

For low brand provider conditions, a factorial ANOVA exposed that there was a significant main effect on sets of experiment on the purchase intention [$F(2, 193) = 17.88, p < 0.05$] and a significant main effect on green attitude towards the purchase intention [$F(1, 193) = 11.93, p < 0.05$]. There was a significant interaction between the two factors (green attitude and sets of experiment) [$F(2, 193) = 3.04, p < 0.05$]. Indicating a significant difference on the purchase intention of uncertified green condominium conditions between green supporters ($M_{Rwill_ad\ green} = 2.85, SD = 0.94$) and non-green supporters ($M_{Rwill_ad\ non-green} = 1.94, SD = 0.854$). There was, again, a significant difference on the purchase intention towards green condominium with international certification between green supporters ($M_{Rwill_ad\ green} = 3.45, SD = 0.79$) and non-green supporters ($M_{Rwill_ad\ non-green} = 3.08, SD = 0.74$). In addition to local certification case, there was a significant difference on the purchase intention between green supporters ($M_{Rwill_ad\ green} = 3.33, SD = 0.92$) and non-green supporters (M_{Rwill_ad}

non-green = 3.23, SD = 0.81). As in Figure 17, level of purchase intention towards low brand conditions for non-green supporters perceived higher values on local certification than international one. In contrast with green supporters, international certified condominium had higher purchase intention than local certification. However, non-green supporters still had lower purchase intention than green supporters towards both uncertified green condominium and green condominium with certification.

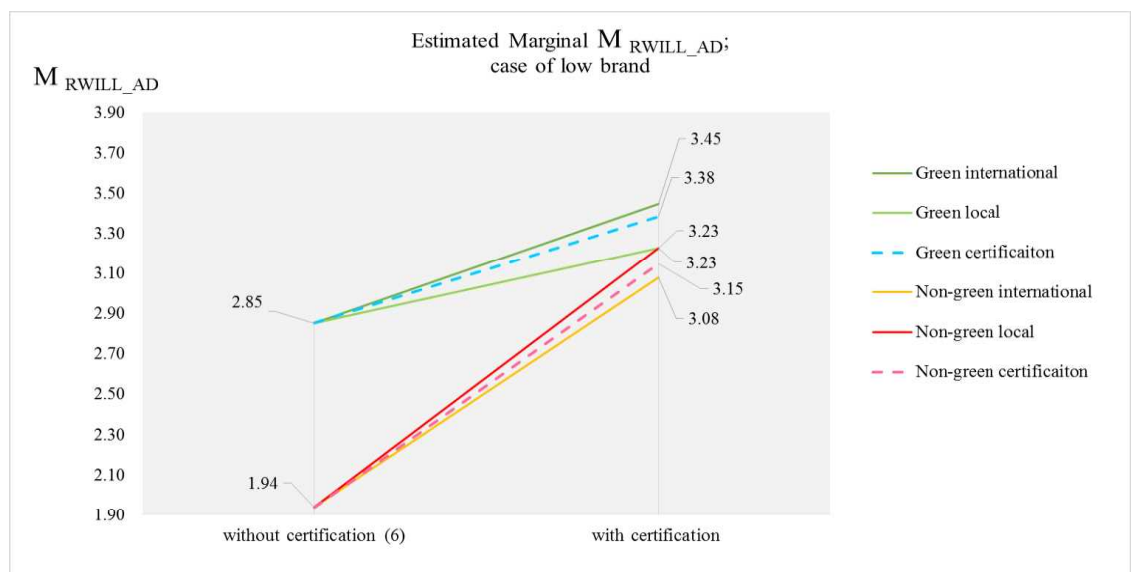


Figure 17. Comparison M_{Rwill_ad} between green supporter and non-green supporters; hypothesis 3 (low brand conditions)

CHAPTER 5

V. Discussion and Conclusion

V.1. Discussion

The aim of this research was to measure the effects of green building certifications and brand recognition on the purchase intention towards green residential buildings in Thailand. The results show that green building certifications can be used as a tool for real estate developers in order to communicate ‘go green’ concept of their condominium. Moreover, COO influences consumer purchase intention and preferences.

According to the experiment, the purchase intention is highest on green residential building with international certification and lowest on uncertified green residential building. Furthermore, considering the effect of brand recognition, well-known brand provider perceived the highest benefit when the building was certified by international institute. Therefore, the effect of COO influences higher purchase intention on high brand recognition. However, there was no evidence to state that the purchase intention towards local certification condition is higher than without certification condition.

In addition to low brand recognition, low brand provider perceived higher benefits when that building has green building certification. However, there was no evidence to measure the effects of COO on low brand conditions in this study.

The results also show that difference in gender does not affect the relationship between main factors (types of green building and brand recognition) and the purchase intention. However, difference in gender has different level of purchase intention, and men perceived more values from green building certification than women when compared between certified green condominium and uncertified green condominium.

On the other hand, the effect of COO influences an increasing purchase intention on women higher than men.

For high brand green condominium, women perceived more values of international certification than men. However, the purchase intention insignificantly increases on both men and women when green building certified by local institute for high brand providers.

In case of low brand providers, men perceived value of green building certification more than women. Furthermore, men have purchase intention towards local certified green condominium slightly higher than international certified green condominium for low brand case.

The results indicate that attitude towards green products affects the relationship between the main factors and the purchase intention towards green condominium. Green supporters have higher purchase intention towards green condominium than non-green supporters, and the effect of COO influences higher on green supporters.

Emphasizing on the effect of brand recognition, green supporters and non-green supporters perceived highest values towards international certification for high brand condominium. However, non-green supporters perceived highest values towards local certification for low brand condominium.

In this study, the other aspects, namely, age, income level, occupation, and household size have no evidence to indicate the effects of these factors.

V.2. Managerial Implication

In this experiment, the relationship between green condominium and the purchase intention was investigated. The influences of green building certification, COO, brand recognition, gender, and green attitude were also studied. The results show that green building certifications are able to influence the purchase intention towards green condominium, especially, international certification. The effect of COO can influence only on high brand condominium, therefore, high brand providers should register for international certification in order to increase reliability and consumers' purchase intention. However, it is not essential to apply the local certification for high brand developers.

On the other hand, there is no evidence to compare the influence of local certification and international certification toward purchase intention for developers with low brand recognition. However, due to the results, the level of purchase intention towards condominiums with these two certifications are similar, but again, the difference of these two certifications is price for registration which is lower for local certification. Thus, low brand providers should register for local certification if they desire to certify their building, or else, the providers also can mention that their building was constructed followed by the standard of international certification in their marketing campaign.

According to the results from experimental survey, awareness towards green building and green building certification is limited among Thai people. However, the intention to gain more knowledge towards green building is positive. Therefore, there is an opportunity for real estate providers to use the benefits of green building as a tool for promotion and differentiation.

For the gender aspect, there is no difference in terms of purchase intention's trend for men and women. However, women perceive more values on international certification than men. Therefore, the developers with high brand recognition should strongly highlight promotion about international certification aspect on women than men.

The results also show that there are different attitudes towards green condominium between green supporters and non-green supporters. The purchase intention towards green condominium and the impact of COO are stronger on green supporters. For well-known condominium, both green supporters and non-green supporters perceived highest values toward international certification. Thus, well-known real estate providers should promote their green condominiums by using international certification and targeting green supporters. Besides, new developers with green condominium should set green supporters as their targeted customers.

V.3. Limitation

There are limitations on this study according to demographic information of respondents, target respondents and knowledge about green building and green building certification among Thai people.

Firstly, the experimental survey was distributed to Thai employees who live in Bangkok and surrounded areas. Hence, the results may change when considering the different target respondents such as Thai employees who live in Thailand, Thai employees who are well educated about green building certification, and Thai people who live outside Bangkok and surrounded areas.

Secondly, there are few Thai people who are aware of green building certification according to the finding. Thus, preference on green building certification and purchase

intention toward green building may differ from the finding in this study when Thai people are well educated about green building certification.

Therefore, further studies may research on the impacts of these factors toward the relationship of green building certification and purchase intention on green residential building, and also generate the new possible moderators that affect purchase intention towards green condominium. Besides, further researches can also consider the different target respondents for instance Thai employees who aware of green building certification.

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Appendix

Appendix1: Sample of Experimental survey (English version)

Survey English version (Set 1)

Survey on the purchase intention of Green building

Your opinion is extremely valuable for completing this survey. Please complete the questionnaire; it will take only a few minutes. **The information you provide will be confidential and will not be used for any other purposes.** Thanks for your co-operation and time in advance

Part 1: Demographic information

1. Gender

☐ Male

☐ Female

2. Year of birth _____

3. Marital Status

☐ Single

☐ Married

Other _____ (please specify)

4. Education level

☐ Lower than High school

☐ Diploma

☐ Bachelor

☐ Master

☐ Higher than Master

5. Occupation

☐ Student

☐ Office worker

☐ Business owner

☐ Public sector

Other _____ (please specify)

6. Income

☐ Less than ₪ 20,000/ month

☐ ₪ 20,001-40,000 / month

☐ ₪ 40,001-60,000 / month

☐ ₪ 60,001-80,000 / month

☐ ₪ 80,001-100,000 / month

☐ Above ₪ 100,000 / month

7. How many family's members currently live in your household?

☐ 1-2

☐ 3-4

☐ 5-6

☐ more than 6

Part 2: Knowledge and attitude toward “Green products” or “eco-friendly product”


Question 1-4: Do you agree with the below statement?

	Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	I am willing to buy green products					
2	I am willing to spend a little more money to buy green products.					
3	I will continue to buy green products.					
4	I recommend green products to others.					

Part 3: Consumer purchasing intention


START FROM
3.5 MILLION BAHT

Leader of
Real Estate

NANADA 

A GREEN AND SUSTAINABLE
BUILDING FOR TOMORROW

CONNECTED TO BTS SILOM STATION

CERTIFIED BY  INSTITUTION
FROM USA

SALE OFFICE | TEL. 028-123-4341

WWW.NANADAGREEN.CO.TH

From the above advertisement, please answer the question below

Question 2-7: Do you agree with the statement below?

	Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	I am interested in buying the condominium in the above advertisement.					
2	I intend to purchase the condominium as shown in the above advertisement in the future					

Part 4: Attitude toward Green building

1. Which of the following labels are you familiar with?



☐ Yes ☐ No



☐ Yes ☐ No

2. After you finished this survey, would you like to know more about “Green Building”?

Really do not want to know

Really want to know

1

2

3

4

5

Appendix2: Sample of Experimental survey (Thai version)

Survey Thai version (Set 1)

แบบสำรวจความต้องการซื้อของผู้บริโภคต่ออาคารเขียว (Green Building)

ความคิดเห็นของคุณมีประโยชน์ต่องานวิจัยนี้ กรุณาตอบแบบสอบถามทั้งหมด ซึ่งใช้ระยะเวลาอันสั้น ไม่เกิน 3 นาที ในการทำแบบสำรวจนี้ ข้อมูลในแบบสำรวจนี้จะใช้สำหรับทำงานวิจัยเรื่อง “ความต้องการซื้อของผู้บริโภคต่ออาคารเขียว (Green Building)” เท่านั้น และ ข้อมูลจะถูกปิดเป็นความลับ ขอขอบคุณล่วงหน้าสำหรับความร่วมมือค่ะ

ส่วนที่ 1: ข้อมูลทั่วไป

1. เพศ ☐ ชาย ☐ หญิง
2. ปีเกิด (พ.ศ.) _____
3. สถานะ
☐ โสด ☐ แต่งงาน ☐ อื่นๆ _____ (โปรดระบุ)
4. ระดับการศึกษา
☐ ต่ำกว่า มัธยมศึกษาตอนปลาย ☐ มัธยมศึกษาตอนปลาย ☐ ปวช., ปวส.
☐ปริญญาตรี ☐ปริญญาโท ☐ สูงกว่าปริญญาโท
5. อาชีพ
☐ นักเรียน, นักศึกษา ☐ พนักงานบริษัทเอกชน ☐ ธุรกิจส่วนตัว
☐ ข้าราชการ, รัฐวิสาหกิจ ☐ อื่นๆ _____ (โปรดระบุ)
6. รายได้
☐ ต่ำกว่า 20,000 บาท/ เดือน ☐ 20,001-40,000 บาท/ เดือน
☐ 40,001-60,000 บาท/ เดือน ☐ 60,001-80,000 บาท/ เดือน
☐ 80,001-100,000 บาท/ เดือน ☐ สูงกว่า 100,000 บาท/ เดือน
7. คุณมีจำนวนสมาชิกในครอบครัวที่อาศัยอยู่ร่วมกันกี่คน
☐ 1-2 คน ☐ 3-4 คน ☐ 5-6 คน ☐ มากกว่า 6 คน

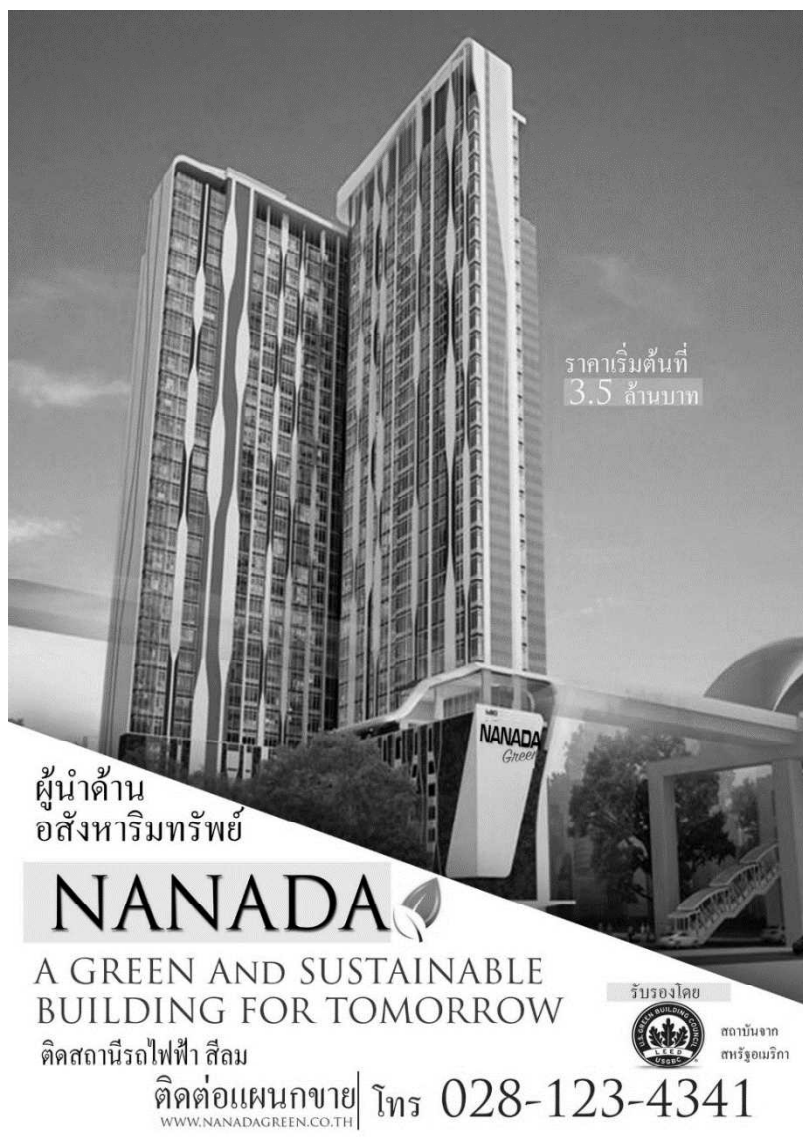
ส่วนที่ 2: ความรู้และทัศนคติเกี่ยวกับผลิตภัณฑ์ที่เป็นมิตรต่อสิ่งแวดล้อม หรือ ผลิตภัณฑ์สีเขียว (Green Products)

กรุณาทำเครื่องหมาย ✓ ในช่องว่างที่ท่านเลือก

คำถามข้อที่ 1-4: คุณเห็นด้วยกับข้อความต่อไปนี้หรือไม่

	ข้อความ	ไม่เห็นด้วย อย่างยิ่ง	ไม่เห็นด้วย	ไม่มี ความเห็น	เห็นด้วย	เห็นด้วย อย่างยิ่ง
1	ฉันยินดีที่จะ ซื้อผลิตภัณฑ์ที่เป็นมิตรต่อสิ่งแวดล้อม หรือ ผลิตภัณฑ์สีเขียว (green products)					
2	ฉันยินดีที่จะ จ่ายเงินเพิ่มขึ้นเล็กน้อยเพื่อซื้อ ผลิตภัณฑ์ที่เป็นมิตรต่อสิ่งแวดล้อม หรือ ผลิตภัณฑ์ สีเขียว (green products)					
3	ฉันจะซื้อ ผลิตภัณฑ์ที่เป็นมิตรต่อสิ่งแวดล้อม หรือ ผลิตภัณฑ์สีเขียว (green products)ต่อไปใน อนาคต					
4	ฉันแนะนำ ผลิตภัณฑ์ที่เป็นมิตรต่อสิ่งแวดล้อม หรือ ผลิตภัณฑ์สีเขียว (green products) แก่ผู้อื่น					

ส่วนที่ 3: ความตั้งใจในการซื้อสินค้าของผู้บริโภค



ราคาเริ่มต้นที่ 3.5 ล้านบาท

ผู้นำด้าน อสังหาริมทรัพย์

NANADA

A GREEN AND SUSTAINABLE BUILDING FOR TOMORROW

ติดตั้งรถไฟฟ้า สีส้ม

ติดต่อแผนกขาย โทร 028-123-4341

WWW.NANADAGREEN.CO.TH

รับรองโดย สถาบันจาก สหรัฐอเมริกา

จากป้ายโฆษณาข้างต้น กรุณาตอบคำถามดังต่อไปนี้

คำถามที่ 1-2: คุณเห็นด้วยกับข้อความต่อไปนี้หรือไม่

	ข้อความ	ไม่เห็นด้วย อย่างยิ่ง	ไม่เห็น ด้วย	ไม่มี ความเห็น	เห็นด้วย	เห็นด้วย อย่างยิ่ง
1	ฉันรู้สึกสนใจที่จะซื้อคอนโดมิเนียมที่อยู่ในป้ายโฆษณาข้างต้น					
2	ในอนาคต ฉันตั้งใจจะซื้อคอนโดมิเนียมเหมือนกับในป้ายโฆษณาข้างต้น					

Part 4: ทักษะเกี่ยวกับ อาคารเขียว (Green building)

1. คุณคุ้นเคยหรือรู้จักองค์กรในโลโกัดังต่อไปนี้หรือไม่



☐ รู้จัก ☐ ไม่รู้จัก



☐ รู้จัก ☐ ไม่รู้จัก

2. หลังจากทำแบบสอบถามเสร็จ คุณอยากรู้ข้อมูลเพิ่มเติมเกี่ยวกับ “อาคารเขียว (Green Building)” หรือไม่

ไม่อยากรู้เลย

1

2

3

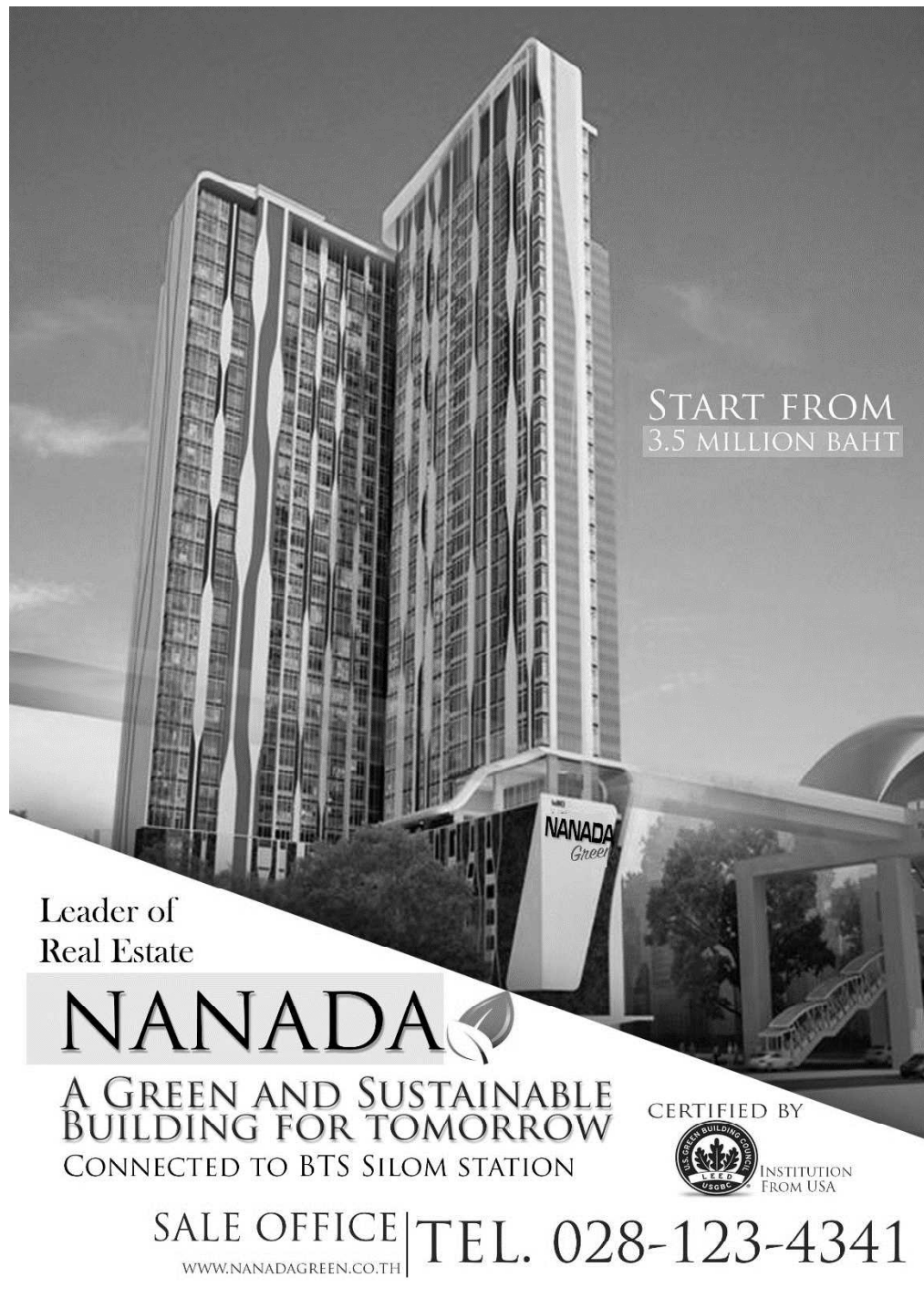
4

อยากรู้มาก

5

Appendix3: Advertisements in experimental survey (English version)


Set 1: High brand recognition real estate provider with international certification (LEED)




The advertisement features a large, modern skyscraper with a distinctive, angular design. The building is shown from a low angle, emphasizing its height. The sky is overcast. In the foreground, there is a sign that reads "NANADA Green". To the right of the building, text indicates the starting price. Below the building image, the company name "NANADA" is prominently displayed with a leaf logo. Below this, the tagline "A GREEN AND SUSTAINABLE BUILDING FOR TOMORROW" is written, followed by "CONNECTED TO BTS SILOM STATION". To the right, a circular seal indicates LEED certification by the U.S. Green Building Council (USGBC). At the bottom, the contact information for the sales office is provided, including a telephone number and a website URL.

START FROM
3.5 MILLION BAHT

Leader of
Real Estate

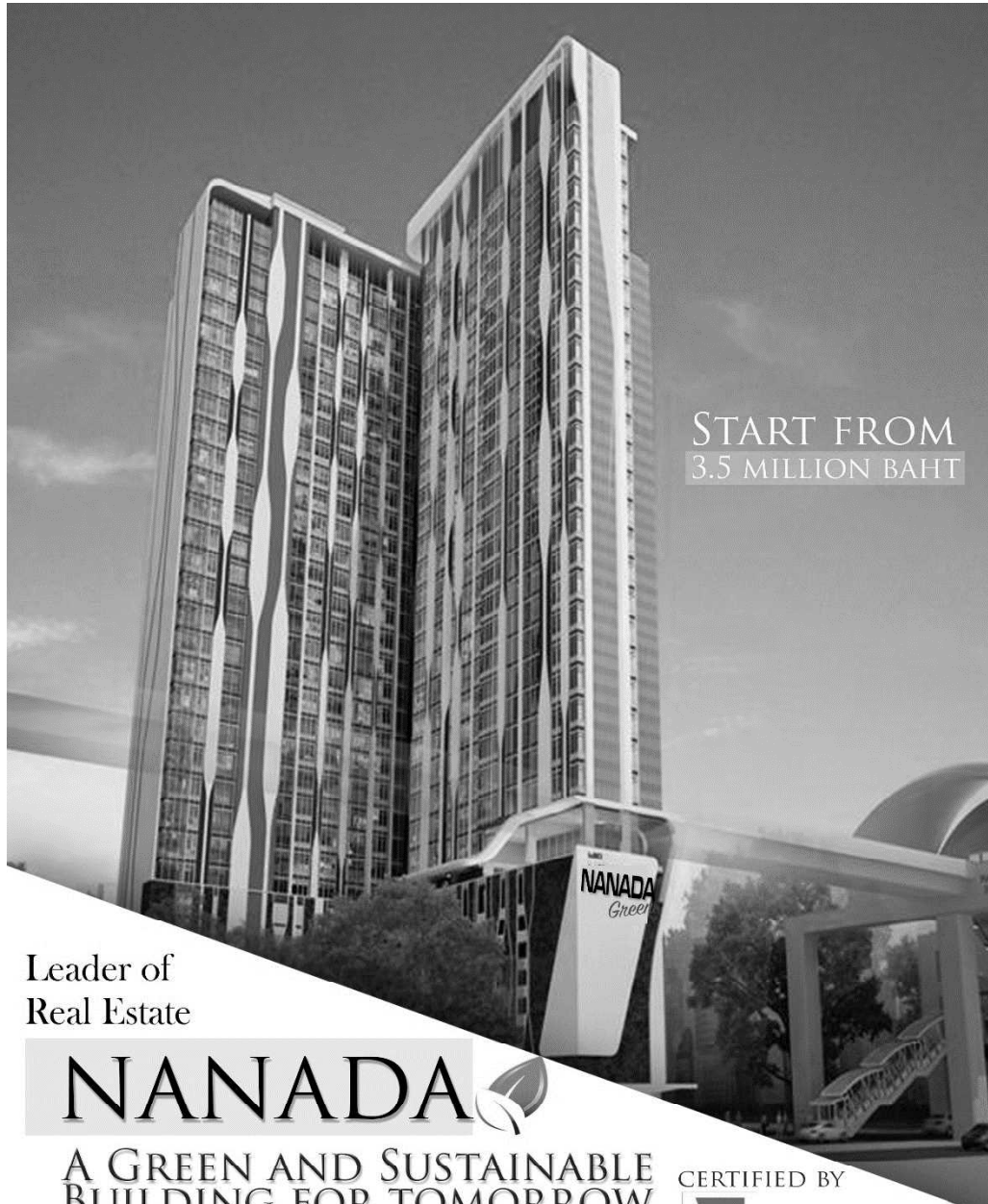
NANADA 

A GREEN AND SUSTAINABLE
BUILDING FOR TOMORROW
CONNECTED TO BTS SILOM STATION

CERTIFIED BY
 INSTITUTION
FROM USA


SALE OFFICE | TEL. 028-123-4341
WWW.NANADAGREEN.CO.TH

Set 2: High brand recognition real estate provider with local certification (TREES)




START FROM
3.5 MILLION BAHT

Leader of
Real Estate

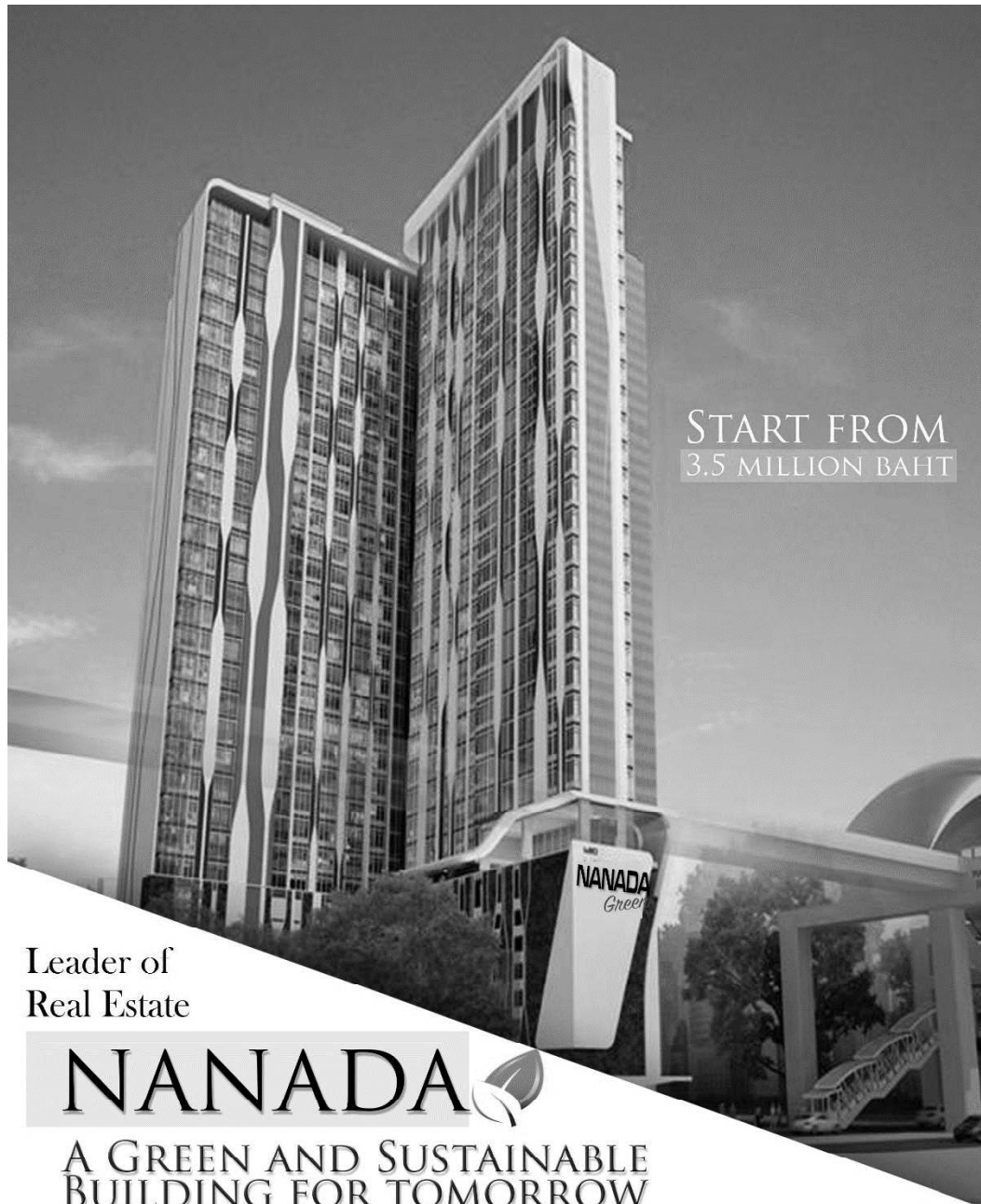
NANADA 

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BUILDING FOR TOMORROW
CONNECTED TO BTS SILOM STATION

CERTIFIED BY
 THAI GREEN BUILDING
INSTITUTION

SALE OFFICE | TEL. 028-123-4341
WWW.NANADAGREEN.CO.TH

Set 3: High brand recognition real estate provider without certification



START FROM
3.5 MILLION BAHT

Leader of
Real Estate

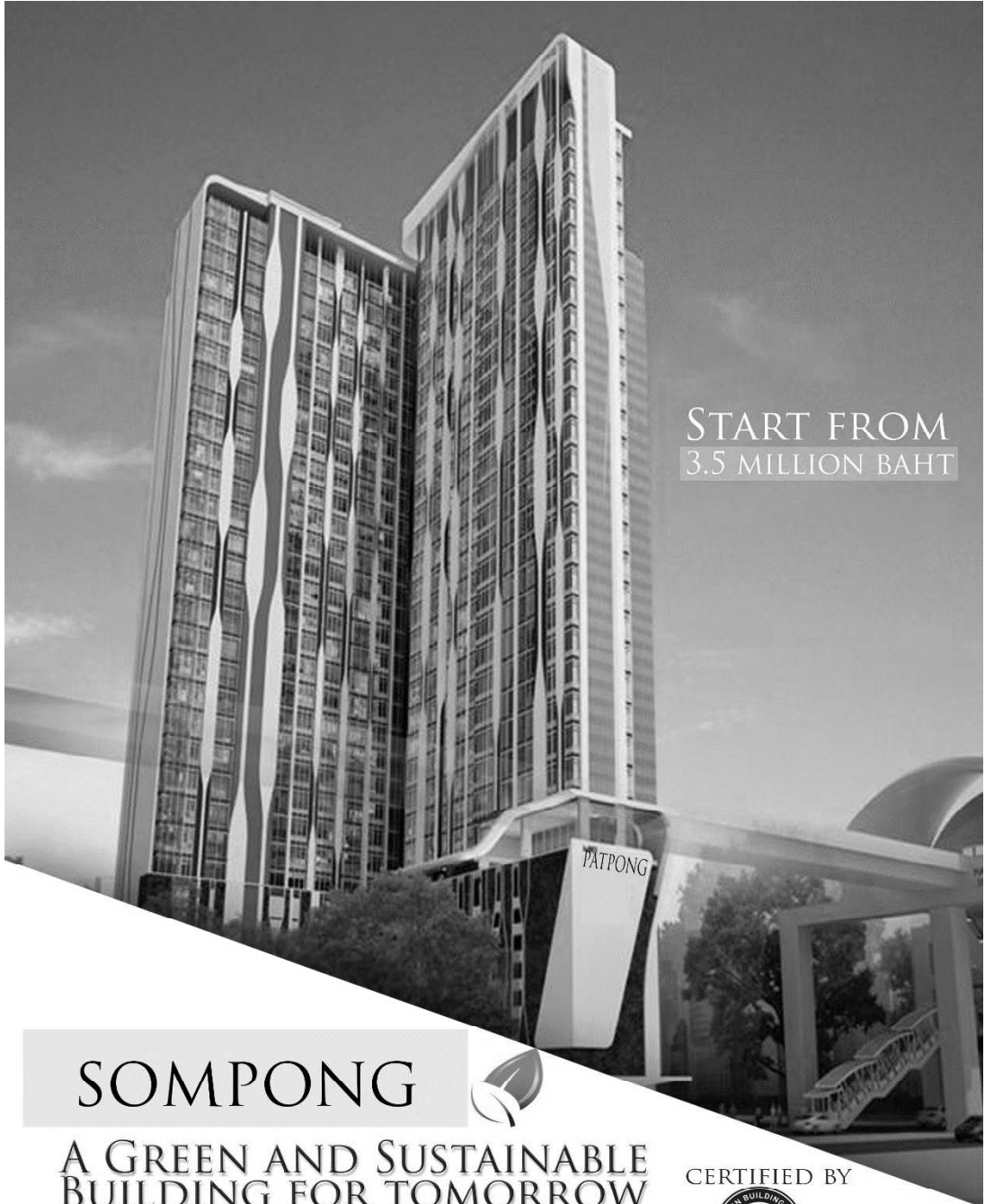
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SALE OFFICE | TEL. 028-123-4341

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Set 4: Low brand recognition real estate provider with international certification (LEED)



START FROM
3.5 MILLION BAHT

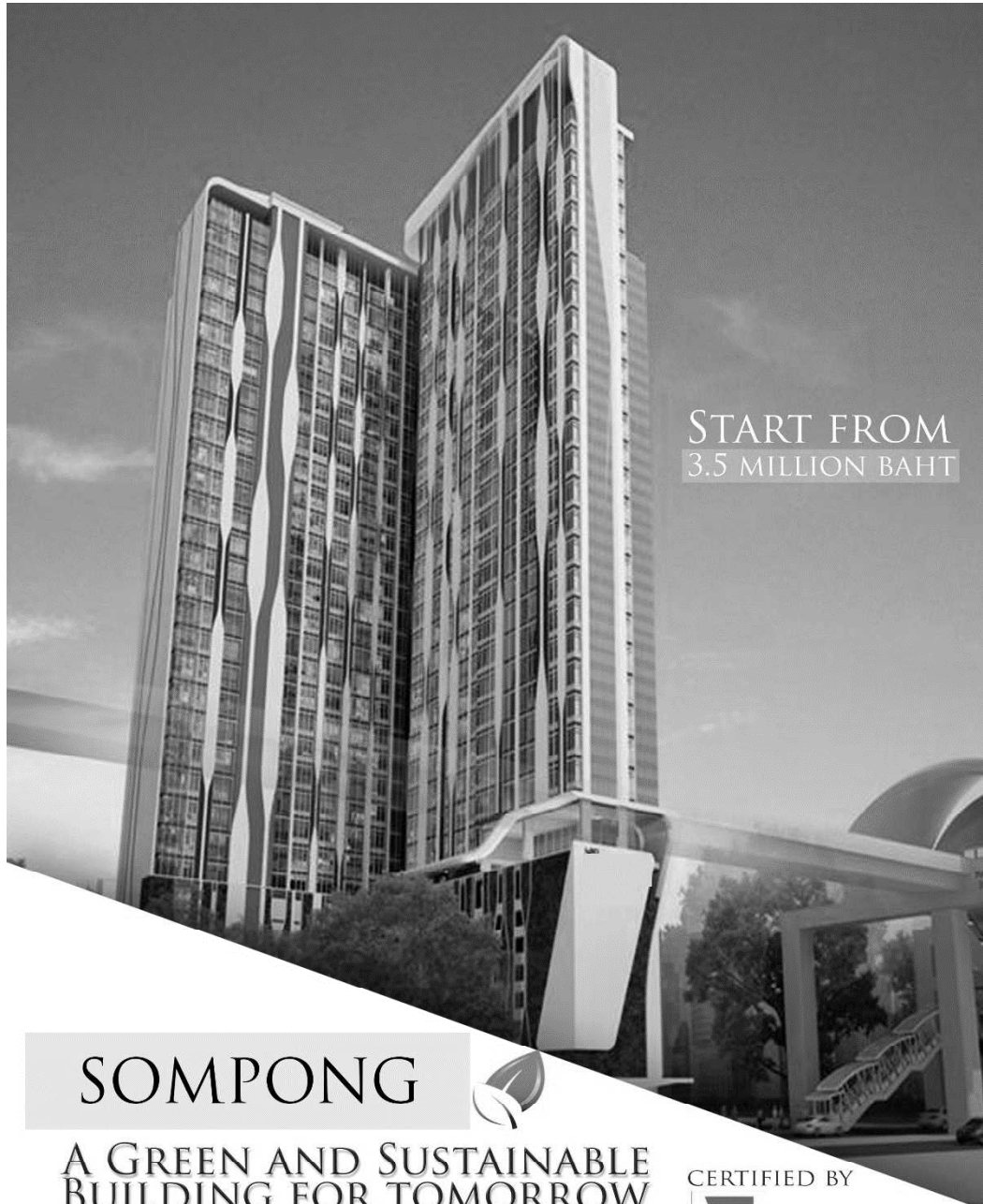
SOMPONG 

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BUILDING FOR TOMORROW
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CERTIFIED BY  INSTITUTION
FROM USA

SALE OFFICE | TEL. 028-123-4341
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Set 5: Low brand recognition real estate provider with local certification (TREES)



START FROM
3.5 MILLION BAHT

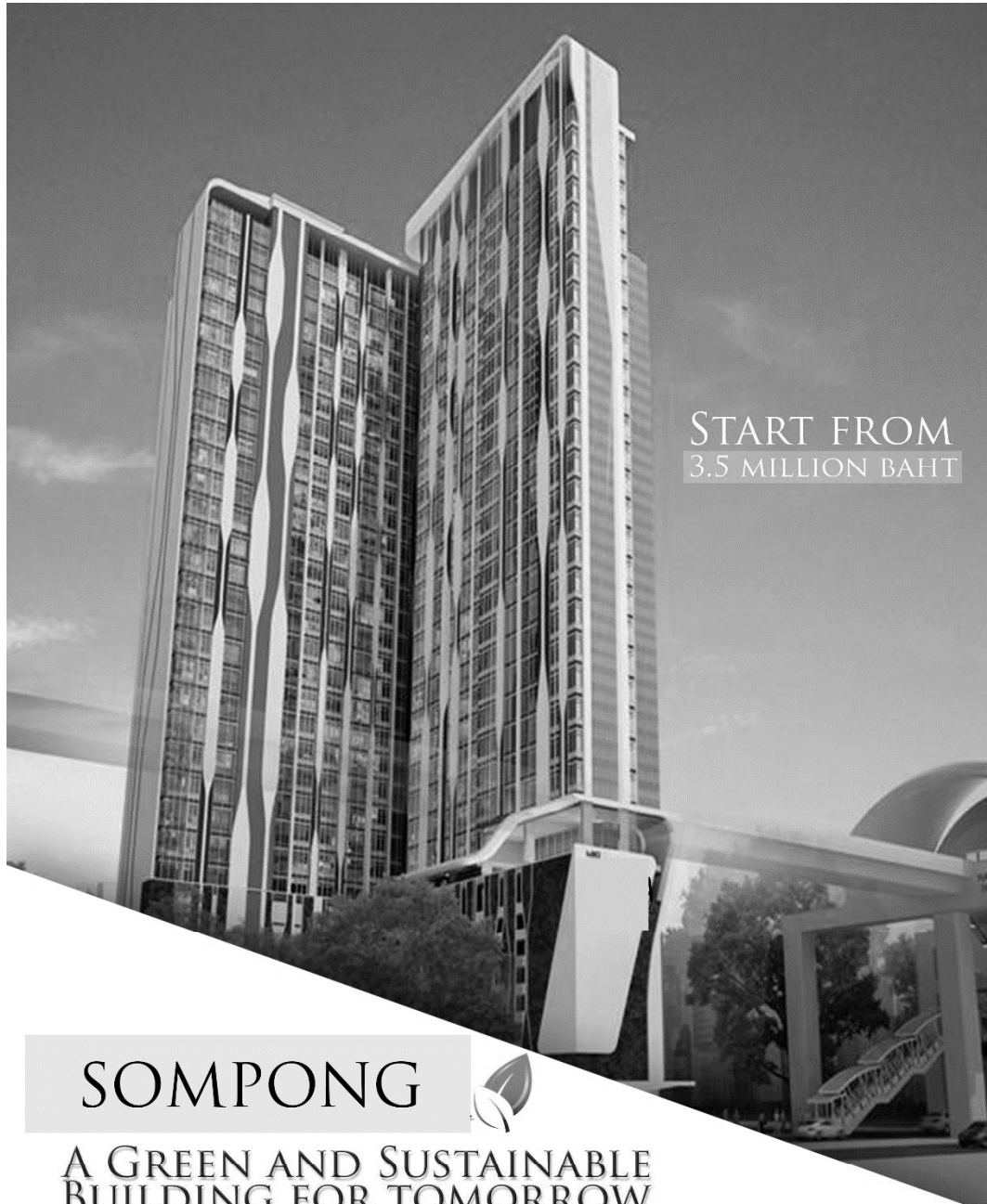
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CERTIFIED BY
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INSTITUTION

SALE OFFICE | TEL. 028-123-4341
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Set 6: Low brand recognition real estate provider without certification



START FROM
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