**DRIVERS AND BARRIERS OF NON-RESIDENTIAL GREEN BUILDING CERTIFICATION IN MALAYSIA**

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# Abstract

# Building sector has the largest potential for significantly reducing greenhouse gas emissions compared to other major emitting sectors. Realising this, the green building revolution is one of the focus of the Government to ensure that appropriate and efficient actions are carried out to mitigate the increasing environmental pollution that causes climate change and face the risks of inexistence. However, currently, there are only a few buildings that have managed to be certified. This paper will add to the body of knowledge by identifying the drivers and barriers of green building certification in Malaysia, examine the relationship of the drivers and barriers in the green building certification decision making and recommend actions that could encourage more key players to obtain green building certification. This research is an Explanatory Research conducted using Sequential Mixed Method design. The data collection process was started with literature review before online questionnaire survey was conducted. After the questionnaire data was analysed, semi structured interview (Qualitative Method) was conducted to validate the questionnaire results and the theoretical framework was revisited. Descriptive analysis result and ranking of the variables was analysed. Then, reliability analysis was conducted before a correlation analysis was performed. Based on the quantitative analysis and qualitative validation, it was concluded that the main drive for owners are reduced cost, and increase in company image, supported by government initiative to reduce the cost incurred, through fiscal incentives. Legislative measures, educate public and tax incentives were ranked highest among all the recommendations, while based on the correlation analysis between the recommendations and number of buildings certified, only reduce certification cost was significantly correlated. However, based on the quantitative analysis and interview result, it can be concluded that instead of just creating more incentives, the government needs to educate the public about the benefits of green building certification, including the existence of incentives available. In addition, some sort of legislative measure such as enactment of laws and policies related to green building certification is needed to encourage more building owners to obtain green building certification.

# Keywords:

# Green Building, Certification, Malaysia

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# BACKGROUND OF STUDY

# Year 2015 became a turning point in global efforts to transform the social and economic development into a more sustainable one. On 12 December 2015, during the United Nations Framework Convention on Climate Change, Malaysia was one of the countries among 195 countries that adopted the Paris Agreement, where they made commitment to achieve below 2°C global temperature rise by recognizing the severe climate change and acknowledging its costs.(United Nations, 2015) Consistent with the commitment made, the ‘Green Growth’ agenda with consideration of all the three bottom lines of sustainable development is given priority in the Eleventh Malaysia Plan, 2016-2020, (RMK11), (EPU, 2015) as one of the strategy includes the green building revolution.

# For supporting the green building revolution, the stakeholders or professionals involved in the construction or building sectors require the latest information and trends to assist in them making informed decisions on greener buildings. Thus, this research will add to the body of knowledge by identifying drivers and barriers of green building certification in Malaysia and examine the relationship of the drivers and barriers in the green building certification decision making.

# This focus in green building for achieving the outcomes are due to the fact that the largest potential for significantly reducing greenhouse gas emissions is the building sector compared to other major emitting sectors building sector has (Herazo & Lizarralde, 2015; Lemmet, 2013). Globally, the building sector accounts to 30 per cent of the energy-related greenhouse gas and final energy consumption whilst in Malaysia; buildings structures consume 54 percent of electricity consumption (Hassan et al., 2014).

# Currently, there are only a few buildings that managed to be certified. According to GBI (2016) as of 15 July 2016, 698 buildings have been registered for rating, but less than 9% (60 buildings) of that has been awarded with certifications and only 2 buildings (less than 2%) out of the final certification has been awarded with renewal certifications. This very low number of renewal certifications depicts that the motivation for green building certification is extremely low and would hinder the effort or actions taken to minimise the effect of the building sector to the environment. However, studies on the drivers and barriers of the green building certification and the influence of the factors on the green building certification are scarce (Zuo & Zhao, 2014). Hence, this research fills the gap of knowledge that exists in Malaysia regarding the relationship between the drivers and barriers, and the decision by owners to obtain certification.

# Given the current state of the green building certification in Malaysia, as highlighted earlier, it is vital to seek out the barriers that have been discouraging the growth and approval of green building certification. The knowledge acquired through this research would benefit the stakeholders in the decision-making process and development of policies related to green building certification and sustainable construction and development holistically.

# RESEARCH METHODOLOGY

# This research is an Explanatory Research designed using Sequential Mixed Methods Design. The collection and analysis of quantitative results to a population will be done before it is followed up with qualitative data that is based by the results from the quantitative phase to collect detailed views and explanation of the results from the sub-set of participants. This research mainly focuses on the significance of the drivers and barriers in influencing the owners to obtain green building certification in Malaysia, based on the experience of each owner. Census survey is employed because the size of population is small. Purposive sampling design is adopted to obtain information from the owners because it refers to a specific target group that owns the buildings.

# The research was started with literature review which includes a literature review on sustainability, development and initiatives of green building certification specifically in Malaysia. The identification of possible drivers and barriers of green building certification was done through extensive study on related researches done by international and local researchers.

# Data and information to identify the drivers and barriers of green building certification and the level of influence of the drivers and barriers on green building certification, are gathered through questionnaire before validation through structured interview. A set of questionnaires were distributed among the building owners that have obtained green building certification from Green Building Index (GBI) through online based survey. The questionnaire consists of multiple-choices, ranking, rating and open-ended questions. The potential participants for interview were selected from the respondents of the questionnaire. Interview questions were designed before the interview is conducted so that the researcher is prepared to ask the questions in advance.

# The data obtained are then used for analysis before the interpretation and conclusion is made. Statistical Package for the Social Science (SPSS) software was used for the purpose of statistical analysis. Bi-Variate Analysis using the Spearman Rank-Order Correlation test was employed to examine the significance or strength of the relationship between the variables because it is the appropriate test to analyse both dependent and independent variables when either or both are ordinal. The findings of the questionnaire were then validated through the interviews conducted. Data reduction, as a form of qualitative data analysis was performed.

# RESULTS AND DISCUSSION

# This study started with literature review that revealed the problem of low numbers of green building certifications in Malaysia. The variables were identified through previous researches done in the same topic, and the theoretical framework was constructed based on the literature review, before the data collection was commenced. The identification of the drivers and barriers was achieved through the literature review. Then, a theoretical framework was established. Fifteen (15) drivers and eight (8) barriers were selected as independent variables that might influence the dependent variable – number of green buildings certified. Then, the significance level of the drivers and barriers were identified through questionnaire survey and validated through semi-structured interview. The respondents were asked to rank their motives and rate the drivers in two different questions while the barriers were just rated using Likert scale.

# Based on the analysis, as shown in Table 4.0, motive with mean value less than five is just company image, reduced cost, financial incentives, CSR and environment.

**Table 4.0: Rank of motive for green building certification**

|  |  |  |  |
| --- | --- | --- | --- |
| **Rank** | **Motive** | **Mean** | **Std. Deviation** |
| 1 | Company Image | 2.88 | 1.916 |
| 2 | Reduced Cost | 3.30 | 2.084 |
| 3 | Financial Incentive | 4.15 | 2.224 |
| 4 | CSR | 4.18 | 2.128 |
| 5 | Environment | 4.42 | 2.385 |
| 6 | Regulations | 5.97 | 2.721 |
| 7 | Tenant Demand | 6.06 | 2.150 |
| 8 | Personal Beliefs | 6.88 | 1.883 |
| 9 | Financier Requirement | 7.15 | 1.787 |

# However, the mean values for drivers are all about the same. There is no significant difference in the rating of all the fifteen drivers. As shown in Table 4.1, all the drivers have mean value more than 3.00, which signifies that all the drivers are almost equally influential to drive the owners to obtain green building certification.

# Table 4.1: Rank of drivers of green building certification

|  |  |  |  |
| --- | --- | --- | --- |
| Rank | Drivers | Mean | Std. Deviation |
| 1 | Reduced Cost | 4.00 | .791 |
| 2 | Government Incentives | 3.88 | .893 |
| 3 | Return on Investment | 3.70 | 1.132 |
|  | Image | 3.70 | .684 |
| 4 | Regulations | 3.67 | 1.137 |
| 5 | Increased Education | 3.58 | .792 |
| 6 | Reduce Environmental Impact | 3.48 | .972 |
|  | Management Interest & Commitment | 3.48 | .755 |
| 7 | CSR | 3.45 | .971 |
| 8 | Resources Availability & Capability | 3.42 | .708 |
| 9 | Client/ Tenant Demand | 3.33 | .957 |
| 10 | Strong Government Commitment | 3.30 | 1.159 |
|  | Health, Comfort and Productivity | 3.30 | .951 |
| 11 | Competent Team Members | 3.21 | .927 |
| 12 | Infiltration of Certification system | 3.15 | .834 |

# Nevertheless, when the result of the ranking and rating question were compared, there are three significant drivers namely reduced cost, government incentives and company image. The barriers are high cost, limited resources, lack of awareness, low perceived benefits, lack of government incentives, poor, certification system complicated and lack of experience.

# All the barriers, as shown in Table 4.2, have mean value of more than 3.00. Nevertheless, high cost was the only barrier with mean value of more than 4.00. As explained above, all of the drivers and barriers were found to have similar mean value of more than 3.00, except for reduced cost driver and high cost barrier, which was rated with mean value of more than 4.00. This shows that buildings owners’ main concern is cost.

Table 4.2: Rank of barriers of green building certification

|  |  |  |  |
| --- | --- | --- | --- |
| **Rank** | **Drivers** | **Mean** | **Std. Deviation** |
| **1** | High Cost | 4.18 | .882 |
| **2** | Limited Resources | 3.82 | .917 |
| **3** | Lack of Awareness | 3.76 | 1.001 |
| **4** | Low Perceived Benefits | 3.67 | .777 |
| **5** | Lack of Government Incentives | 3.55 | .869 |
| **6** | Poor Cooperation | 3.55 | .794 |
| **7** | Certification system Complicated | 3.52 | .870 |
| **8** | Lack of Experience | 3.42 | .969 |

# Spearman’s correlation test was conducted to examine the significance of the drivers and barriers and the number of buildings certified. The researcher found that only these drivers were correlated with the number of buildings certified:

# i) Motive – NRNC – reduced cost and increased property value

# ii) Motive – NREB – CSR

# In addition, the barrier that correlated with the number of buildings certified is only:

# i) Barrier – NREB – Low perceived benefit

# Furthermore, the researcher found relationship exist between reduced cost motive and government incentives motive; reduced cost driver and image motive; and low perceived benefit barrier and lack of incentive barrier.

# From the quantitative analysis and qualitative validation, it can be concluded that the main drive for owners are reduced cost, and more revenue by increase in company image, supported by government initiative to reduce the cost incurred through fiscal incentives. The correlation analysis result has confirmed that the main concern of building owners’ is cost. The result was also validated by the semi-structured interview.

# The respondents were asked to rank appropriate actions required to encourage more building owners to obtain green building certification. As shown in Table 4.3, legislative measures, educate public and tax incentives were ranked highest among all the recommendations, while based on the correlation analysis between the recommendations and number of buildings certified, only reduce certification cost was significantly correlated.

# Table 4.3: Rank of recommendations to encourage owners to obtain green building certification

|  |  |  |  |
| --- | --- | --- | --- |
| Rank | Recommendations | Mean | Std. Deviation |
| 1 | R1 Legislative measures | 3.21 | 2.522 |
| 2 | R6 Educate public | 4.76 | 3.021 |
| 3 | R7 Tax incentives | 4.88 | 2.955 |
| 4 | R9 Definitive GBC level for Government buildings | 5.12 | 3.219 |
| 5 | R2 Publicise merits of GBC | 5.30 | 2.543 |
| 6 | R10 Low interest credit opportunities | 5.52 | 3.212 |
| 7 | R4 Reduction of certification charges | 6.18 | 2.157 |
| 8 | R8 Disseminate academic research knowledge | 6.88 | 2.631 |
| 9 | R5 Rating tools for smaller projects | 6.94 | 2.179 |
| 10 | B7 Training of professionals | 8.03 | 10.678 |

# CONCLUSIONS

# This study was started with literature review that revealed the problem of low numbers of green building certifications in Malaysia. The variables as shown in Figure 5.0 were identified through previous researches carried out in the similar topic, and the theoretical framework was constructed based on the literature review, before the data collection was commenced.

**Drivers**

D1. Government incentives/ tax rebates

D2. Strong government leadership/ political will and commitment

D3. Regulations

D4. Reduced costs

D5. Return on investment

D6. Marketing & competitive advantage/ company image

D7. Client/ tenant demand

D8. Ability to reduce environment impact

D9. Corporate Social Responsibility (CSR)

D10. Ability to ensure overall health, comfort and productivity

D11. Infiltration of rating system

D12. Increased education

D13. Interest & commitment of leaders

D14. Resources availability & capability

D15. Competent team members

Owners obtain green building certification

**Number of buildings certified**

**Barriers**

B1. Lack of government incentives

B2. Low perceived benefits

B3. High cost

B4. Lack of awareness

B5. Complicated rating system

B6. Limited resources

B7. Lack of application experience

B8. Poor cooperation among participants

**Barriers**

B1. Lack of government incentives

B2. Low perceived benefits

B3. High cost

B4. Lack of awareness

B5. Complicated rating system

B6. Limited resources

B7. Lack of application experience

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**Barriers**

B1. Lack of government incentives

B2. Low perceived benefits

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B4. Lack of awareness

B5. Complicated rating system

B6. Limited resources

B7. Lack of application experience

B8. Poor cooperation among participants

**Barriers**

B1. Lack of government incentives

B2. Low perceived benefits

B3. High cost

B4. Lack of awareness

B5. Complicated rating system

B6. Limited resources

B7. Lack of application experience

B8. Poor cooperation among participants

**Barriers**

B1. Lack of government incentives

B2. Low perceived benefits

B3. High cost

B4. Lack of awareness

B5. Complicated rating system

B6. Limited resources

B7. Lack of application experience

B8. Poor cooperation among participants

# Figure 5.0: Initial Theoretical Framework

**Drivers**

Government incentives/ tax rebates

Reduced costs

Marketing & competitive advantage/ company image

Owners obtain green building certification

**Number of buildings certified**

**Drivers**

Government incentives/ tax rebates

Reduced costs

Marketing & competitive advantage/ company image

**Barriers**

Low perceived benefits

High cost

Lack of awareness

Owners obtain green building certification

**Number of buildings certified**

Owners obtain green building certification

**Number of buildings certified**

**Drivers**

Government incentives/ tax rebates

Reduced costs

Marketing & competitive advantage/ company image

**Barriers**

Low perceived benefits

High cost

Lack of awareness

Owners obtain green building certification

**Number of buildings certified**

**Drivers**

Government incentives/ tax rebates

Reduced costs

Marketing & competitive advantage/ company image

**Barriers**

Low perceived benefits

High cost

Lack of awareness

Owners obtain green building certification

**Number of buildings certified**

**Drivers**

Government incentives/ tax rebates

Reduced costs

Marketing & competitive advantage/ company image

**Barriers**

Low perceived benefits

High cost

Lack of awareness

Owners obtain green building certification

**Number of buildings certified**

**Drivers**

Government incentives/ tax rebates

Reduced costs

Marketing & competitive advantage/ company image

**Barriers**

Low perceived benefits

High cost

Lack of awareness

**Barriers**

Low perceived benefits

High cost

Lack of awareness

**Barriers**

Low perceived benefits

High cost

Lack of awareness

# Figure 5.1: Revised Theoretical Framework

# From the quantitative analysis and qualitative validation, it can be concluded that the main drive for owners are reduced cost, and more revenue by increase in company image, supported by government initiative to reduce the cost incurred through fiscal incentives, as shown in Figure 5.1. The government needs to create more awareness on the benefits of green building certification, particularly the incentives provided.

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