Research in Management of Technology and Business Vol. 2 No. 1 (2021) 972-998

RMTB

Homepage: http://publisher.uthm.edu.my/periodicals/index.php/rmtb
e-ISSN : 2773-5044

Factors Affecting Developer's Decision on Green Residential Supply

Ruth Leong[1], Seow Ta Wee[1,2,*], Sulzakimin Mohamed[1,2] & Norliana Sarpin[1,2]

[1]Department of Construction Management, Faculty of Technology Management and Business, Universiti Tun Hussein Onn Malaysia, Parit Raja, Batu Pahat, Johor, 86400, MALAYSIA

[2]Center of Sustainable Infrastructure and Environmental Management (CSIEM), Faculty of Technology Management and Business, Universiti Tun Hussein Onn Malaysia, Parit Raja, Batu Pahat, Johor, 86400, MALAYSIA

*Corresponding Author

DOI: https://doi.org/10.30880/rmtb.2021.02.01.073
Received 01 March 2021; Accepted 30 April 2021; Available online 01 June 2021

Abstract: Malaysia population has gradually increase and housing demand has also been affected. In order to resolve and control the issues, government has taken proactive action with various incentives and support for construction industry and urged construction player to promote green concept in the past decades. However, bringing transition among housing industry from conventional concept to green concept is a huge challenge for developer. There are consists of various factors that influence developer decision in green residential supply. Therefore, the research question for this research paper will be focus on the factor influence developer's decision in supplying green residential and strategic among developer's decision in supplying green residential. The data collection stage was implemented qualitative method which through interview session and online method carry out with 12 developer companies in Johor Bahru. The result shows that cost factor is the factor influence developer's decision in supplying green residential. The cost factor is due to high construction cost, maintenance cost, huge amount to engage Green Building Index (GBI) and building consultant fee. Hence, in term of strategic among developer's decision in supplying green residential is also cost factor by focus on budget controlling, costing margin, cost efficiency and looking for reasonable resources. As conclusion, the research objectives are achieved and the research study has help to provide an actual overview for construction industry stakeholder and as well for researcher regarding the factor and strategic that influence developer's decision in green residential supply.

Keywords: green residential, green building, green home

**Corresponding author:tawee@uthm.edu.my*

1. Introduction

The term of 'green' is refer to an environmental friendly practice from design phase to the landscaping choices or until construction phase (Singh, 2018). Green home concept basically is a new design method that provides a cosines space with energy efficiency and healthy living lifestyle for residents (Alias *et al*., 2010). In addition, green home is one of the ways to minimize the effect of homeowner and builder caused to the environment (Alias *et al*., 2010). The process of design and constructed method of Green Home is utilizing sustainable resources from natural environment to maximize and produce less harm toward environment so that selecting materials is important part. (Alias *et al*., 2010). Green development is not only important for advance country but also in Malaysia as a developing country (Elias & Lin, 2015).

1.1 Research Background

In this 21st century, environmental issues have become a worldwide concern issues for every country due to rapid development and industrialization (Lan & Sheng, 2014). From the environment impact perspective, construction sector is one of the sectors has a significance effect that bring about on the environment (Singh, 2018). As the population grows rapidly in Malaysia, the demand of house is gradually increased to meet the requirement of populations in Malaysia (Ibrahim *et al*., 2014). Conventional home is the most common concept and design that implemented by Malaysia construction industry which is using concrete, clay, cement as construction materials. Undeniable, conventional or traditional home concept which will contributes pollution to environment from the aspect of materials such as timber, clay brick and more will consumes more energy and harmful emission compared with green homes (Lan & Sheng, 2014). With the development of technology, green home concept is being introduced, gradually popular and implemented in worldwide and in Malaysia to replaced conventional house in 2007 (Alias *et al*., 2010). The reason is because green residential able to generate better energy efficient for future and also human (Singh, 2018).

1.2 Problem Statements

As we know that the supplying of green residential concept in Johor Bahru is still at a developing stage which mean is still infancy when deal with sustainability matter (Zainul Abidin Nazirah, 2010). The main problem is because lack of technology and knowledge transfer and government policy support to developer it due to low supply in developing green residential in Johor Bahru. According to the study of Goh *et al*., (2013) has revealed that the low level and limited of understanding and knowledge of green residential concept among developer had affect them in not heeding and reluctant in supplying green residential. Besides that, developer lack of knowledge in green residential concept it will lead to a low level of implementation of green residential in construction project (Samari *et al*., 2013). Furthermore, Malaysia do not have fully green technology support and need to obtain from oversea (Goh *et al*., 2013) because some of the green technology are not suitable implement in Malaysia. The less opportunity to collaboration between housing and building construction project had resulting the limit in implemented green technology in green residential (Elias & Lin, 2015). On the other hand, lack of government policy support could also affect developer's decision in supplying green residential in Johor Bahru. As we know that government was encouraging and promoting green building concept in Malaysia such as providing stamp duty and tax exemption (Goh *et al*., 2013) (Samari *et al*., 2015). However, according to Goh *et al*., (2013) revealed that although Malaysia government has promoting incentives but there is lack of enforcement monitoring, policies changing affect developer are ambiguous about the real current situation going-on and lead to developer are not willingly to take risk in supplying green residential.

1.3 Research Question

(i) What are the factores influence developer's decision in supplying green residential?

(ii) What are the strategic among developer's decision in supplying green residential?

1.4 Research Objective

(i) To determine the factor influence developer's decision in supplying green residential.

(ii) To study the strategic among developer's decision in supplying green residential.

1.5 Scope of the Study

The research study scope area that chooses for collecting data is Johor Bahru, Malaysia. While the respondent that choosing for data collection will be focus on construction developer in Johor Bahru and have involve in housing industry. The purpose is to ensure that data that collected is reality and justify. The reason for choosing Johor Bahru is because according to State Socioeconomic Report 2018 retrieved from Department Statistic of Malaysia has shown that Johor is the top 3 state that has highest population which is 3.75 million. In addition, Singapore was as a neighborhood country to Johor. This was also one of the reasons affecting many China developers and local developer starting develop housing industry in Johor Bahru region in past few years. This able to justified that have possibility affecting developer's decision in supplying on green residential in Johor Bahru. Therefore, in this research objective is to determine the factor influence developer's decision in supplying green residential and study the strategic among developer's decision in supplying green residential.

1.6 Significance of the Study

This research study able to provide advantageous and guidelines for current and future green and non-green residential construction industry player such as contractor and architect, government and even stakeholder.

2. Literature Review

The literature review section describes all relevant literature related to the research and critically discussed. This section can be structured based on the stated objectives and focus of the study or any logical order as deemed appropriate.

2.1 Definition of Green Building

Green building is a foundation of sustainable construction development (Mohd Shafiei & Abadi, 2017). In another word it refers as a building from construction phase to the lifetime of operation to assure the healthiest possible environment and in the same time produce most efficient and least destructive on land, water, energy and resources (Shraddha Pandey, 2015). Green building is about of resource efficiency, lifecycle effect and building performance (Mohd Shafiei & Abadi, 2017). The main characteristics of green building are to increase the energy efficiency, enhance efficiency in resources and materials, maintain biodiversity, decrease the emission of pollutant and lower the carrying capacity of environment. (Lan & Sheng, 2014). Presently, the direction of construction industry is moving from developing of environmentally concern into having development process by integrated within the wider context of environmental agenda. So that construction industry player must work and conform with the need to protect and sustain the environment.

2.2 Green Rating Tool

Green building rating tool is a yardstick which measure to what extent the building to meet the requirements of green building (Illankoon *et al*., 2017). In global, there are many green rating tools has been developed and some has being followed by few countries as a reference for example Leadership in Energy and Environment Design (LEED) in United States (US), Building Research

Establishment Environmental Assessment Method (BREEAM) in Europe, Comprehensive Assessment System for Built Environmental Efficiency (CASBEE) in Japan, Green Mark in Singapore and more (Shraddha Pandey, 2015). While, in Malaysia have its own green rating tool which is Green Building Index (GBI). Green Building Index was formulated and introduced to evaluate the impact of a building on environment based on six criteria which are energy efficiency, indoor environment quality, sustainable site and management, material and resources, water efficiency and last is innovation (Suhaida *et al*., 2011). GBI Sdn. Bhd. are also recognize as an expert on green building development that provides housing developers with the platform to attain the necessary support to resolve problem that regarding to green residential development (Ibrahim *et al*., 2014).

2.3 Advantages of Green Residential

According to (Alias *et al*., 2010) explain that green residential able to reduce expenses in long run compared with conventional residential because green technology and green material are in used and maintenance and operation cost is low. green residential concept also able to provides a fresh air space for residential by using ventilation system to filter mites, dust, and pollutant from the indoor air (Alias *et al*., 2010). The next benefit of green residential concept is providing resident healthier life through using eco-friendly building material. Lastly, green residential concept also able to generate energy efficiency advantages for environment as well as homeowner.

2.4 Study on Green Residential Market

The introduced of the concept of sustainable construction in Malaysian housing industry has led to many green movements in recent year but it does not been widely implement in practice (Abidin *et al*., 2013). The reason is because in Malaysia, there are still majority Malaysian home buyers still are not ready to accept green residential concept as a new concept of lifestyle because they did not understand the advantages and concept of green home although government and construction players had started to introduced since year of 2007. The low-level demand in green residential concept in Malaysia might due to low level of awareness, less choices in term of design and inaccessibility and higher prices (Mohd Shafiei *et al*., 2013) (Alias *et al*., 2010). In order to rise up the development of green residential market in Malaysia, government role and green technology and material is the key driving force for developer. While the awareness, perception and acceptability of green home buyers are also contributes influences to developer in green residential supply.

2.5 Statistic on Green Residential Supply

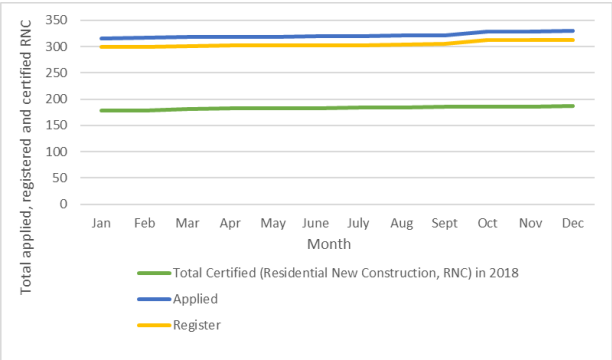

Figure 1: Total Certified Residential New Construction (RNC), 2018 (Green Building Index, 2020)

Based on Figure 1, the total applied and register of GBI-RNC is high, however the total certified of GBI-RNC is much lower than the register and applied numbers. One of the major concerns among

many developers and construction players to start green is due to the increased cost in development process. It required a holistic top to toe approach, taking every components and steps of the construction process into account (bin Esa *et al*., 2011). due to the discrepancy of the total number project of applied but unable to get certified is high and total number project of certified is low has give an overall view of green residential supply in Malaysia market is low.

Table 1: Total Green Building Index (GBI) project registered in Johor in 2018 (Green Building Index, 2020)

Months	Nos. registered	Nos. rated
January	76	33
February	77	33
March	77	33
April	77	33
May	77	33
June	78	33
July	79	34
August	80	34
September	80	34
October	80	34
November	80	34
December	80	35

Following next, based on the Table 1 shows that total GBI project registered in Johor including residential and non-residential. Based on the statistic above shown that the number of registered is higher than the number of rated. Besides that, the number of rated is considering in a consistent number which there is not obviously increase in the past 12 months of 2018. Although based on the table above shown that the current situation and condition of green building in Johor is not optimistic, however this development will continue to contribute to the positive growth of the property market, as it helps to raise up the demand of houses in Johor due to the exponential population increase (Syuhadah *et al*., 2013).

3. Research Methodology

3.1 Research Flow Chart

Figure 2 in Appendix A shows the overall flow chart throughout the research. The purpose of prepared a research flowchart is to provide a systematic view and sequence process throughout a research study. It able to provide a clear and a perspicuity direction for a research study.

3.2 Research Design

Research design is form a blueprint for data collection, calculation and analysis. The purpose research design is to ensure that the evidence obtained enables respondent to answer the initial questions as unambiguously as possible (Kirshenblatt-Gimblett, Barbara, 2006). In this research, qualitative method will be adopted in data collection in order to achieved the research objective for this research study. The purpose of implementing qualitative method in data collection is because able to understand and look into deeply about the opinion and view of developer toward green residential in Johor Bahru region. In addition, it also able as a supportive evidence for the research outcome.

3.3 Research Instrument

Research instrument is a factfinding strategies and also a tool for data collection (Annum, 2019). Therefore, for this research purpose, interview method is chosen for data collection.

3.3.1 Primary Data

Primary data is referring to a first hand data collected by researcher and the data is factual, real-time and original (Ajayi, 2017). For this research, in order to achieved research question and research objective, interview method is chosen in data collection. While the type of interview that chosen is face-to-face with semi-structured interview method. The interview questions method will be using open-ended questions.

3.3.2 Secondary Data

Secondary data is referring to past data that has been collected by someone else earlier that are not relate to the research study. The collection sources are such as websites, books, journal, articles, government publication and et cetera (Ajayi, 2017). In this research study, secondary data has referred to Tunku Tun Aminah Library in Universiti Tun Hussein Onn Malaysia (UTHM) website such as journal, articles and books. All reference source that refers are regarding to green residential and in the same time focus on green residential supplying. The purpose of refer on library sources is to ensure that all information that retrieved is reliable and valid. In addition, secondary data can also as a support data to support the research information.

3.4 Population

A population also refer as a community about which some information is required to be ascertained (Banerjee & Chaudhury, 2010). In this research, the target population will be focus on construction industry developer. Meanwhile, the targeted developer will be in Johor Bahru region. The reason that choosing developer is because they have involved in construction industry with numerous construction project and also involve with different type of project in many years.

3.4. 1 Respondent

This research purpose, a group of developer will be chosen as a respondent for the interview session. Developer that chosen will be specifically have involve in construction industry with housing industry in Johor Bahru region. The number of respondents is 12 construction developers that have involved in housing industry in Johor Bahru region. The reason that choosing developer that have involve in housing industry is because this research study is focus on residential, so by choosing developer that have involve in housing industry will be able to provide an accurate information for the research purpose.

3.5 Data Analyses

Data analyses is a core element for a research outcome. The aim and goal of data analyses is to define, transform and support decision-making and bring an outcome for a research study or in another word it analyses the data and inferences and produce a conclusion for a research study (Ashirwadam, 2014). For this research study, content analysis will be implementing as a data analysis.

3.5.1 Content Analysis

Content analysis is a data analyses method that to analysing written, verbal or visual communication messages. In another explanation, content analysis is to study about human communication such as books, newspaper, video, text messages and et cetera and analyses the context, meaning and subtext that contained in the messages (Parveen & Showkat, 2017). Therefore, in this research paper, qualitative content analysis will be implementing to analyses data. The reason

is because the methodology that using for data collection is qualitative method, it able to produce an accurate analysing for the data that collected and provide a correctly result.

4. Results and Discussion

4.1 Interview Session

The interview session has been conducted through face-to-face meeting by walk-in method and through sending email to the particular construction developer company in Johor Bahru. However, appointment through phone calls has also been made before the interview session for certain respondents. The overall data collection process has taken around 2 months to collect and complete.

4.2 Background of Respondent

The aim of the background of respondent is to justify the respondent's identities and personal working background details in the particular construction developer company. In this research study, there are overall total 12 respondent has involved and participated in the interview session to provide an accurate, reliable and useable data in order to achieve the research objectives in this research study. Table 2 will show the background of respondents for this research study.

Table 2: Background of respondents

Respondent	Company Name	Current Work Position	Year of Service in Industry
Respondent 1 (R1)	Crescendo Corporation Berhad	Sales and Marketing Executive	5 Years
Respondent 2 (R2)	Tiong Nam Logistic Solution Sdn Bhd	Sales Executive	1 Year
Respondent 3 (R3)	IOI Properties Group	Landscape Executive	10 Years
Respondents 4 (R4)	IJM Properties Sdn Bhd	Sales and Marketing Executive	8 Years
Respondent 5 (R5)	Country Garden Pacific Sdn Bhd	Project Director	4 Years
Respondent 6 (R6)	Goodway Development Sdn Bhd	Managing Director	2 Years
Respondent 7 (R7)	Huashi (Malaysia) Sdn Bhd	Site Engineer	2 Years
Respondent 8 (R8)	Can-I Interior Fit Out Sdn Bhd	Sub-Contractor	10 Years
Respondent 9 (R9)	SP Setia (Johor Bahru branch)	Senior Project Manager	25 Years
Respondent 10 (R10)	Tanah Sutera Development Sdn Bhd	Marketing and Leasing Executive	2 Years
Respondent 11 (R11)	YTL Cooperation Berhad	Project Manager	20 Years
Respondent 12 (R12)	Sunway Iskandar	Project Management	2 Years

4.3 Objective 1: To determine the factor influence developer's decision in supplying green residential.

(a) Current situation of green building (residential) in Johor Bahru.

Based on Table 3 in appendix data result on current situation of green building (residential) in Johor Bahru, it can be categorized into 3 category level which is rising up level, moderate level and low demand level. There are 7 respondents has claims that the current situation of green building (residential) in Johor Bahru is in low demand level, 2 respondents stated that is rising, 2 respondents stated that is moderate level while 1 respondent provided different view in the current situation of green building (residential) and 1 respondent did not provided a related view and answer for the question. In overall, there are majority of the respondents has stated that the current situation of green building (residential) in Johor Bahru is in low demand situation.

(b) Green residential project in Johor Bahru

Based on Table 4 in appendix data collection from 12 construction developer company in Johor Bahru, the data analysis has achieved in an equilibrium point and presented an obvious overview answer based on the question. There are 6 respondents declared that their company have green residential project in Johor Bahru area and another 6 respondents declared and provide unanimous answer with stated that they have no green residential project in Johor Bahru. The 6 respondent that have green residential project in Johor Bahru, the size of the company is relatively belong to huge and highly stable construction developer company in Malaysia construction industry.

(c) The importance and need of green residential in Johor Bahru

Based on the Table 5 in appendix data that collected shown that there are majority of the respondent agree that green residential is important and needed in Johor Bahru which reached to 8 respondents because of environmental benefits and cost efficiency, create many opportunity to improve the standard of living for Johor Bahru, bring a lot of benefits to residents such as reduce energy consumption and minimize the emission of pollutants, reduce the emission of harmful gases and et cetera. However, there are minority of the respondent has stated that green residential is still not important and needed in the current situation and current moment because due to higher maintenance cost which reached to 3 respondents and 1 respondent has provide a subjective view.

(d) Factor that influence company decision to start or intent to start green residential project in Johor Bahru.

Based on Table 6 in appendix result that has collected from developers company, it shown that every respondent has provided different view and standpoint on this question. Hence, it can be classified into few main categories of factor and the major factor that influence company decision to start or intent to start green residential project in Johor Bahru is cost factor and following next is buyer demand and needs, and environmental factor. There are 5 respondents concern about cost factor, 4 respondents concern about buyer demand and need factor, 2 respondents concern about environmental factor. However, respondent has also provided other and different factor in it while there are 1 respondent that did not provide the answer based on the question.

(e) Factor that hindrance company to launch green residential project in Johor Bahru.

Based on Table 7 in appendix has provided different of view and factor that hindrance respondent company in launching green residential project in Johor Bahru. Although respondents have point out their different factor on this question, however, there are still majority of the respondent agree with cost and price factor is one their company hindrance in launching green residential project in Johor Bahru which reached to 7 respondents. Besides that, demand in term of market and buyers, policies, workmanship of workers, Covid-19 pandemic and knowledge and expertise of local contractor is also one of the factors that hindrance among respondent to launch green residential in Johor Bahru.

(f) High demand of green residential in Johor Bahru.

Based on the result from Table 8 in appendix has shown that the demand of green residential in Johor Bahru has a significantly classification which are not high demand, moderate demand and high demand. However, unexpectedly there are most than half respondent has stated that demand of green residential in Johor Bahru is not high demand which reached 9 respondents out of 12 respondents. The views that provided by respondent is due to Johor Bahru support level is low, higher maintenance cost and highly costing, green building project tends to sell at a high price, Johor Bahru are not well aware about the importance of green residential and green residential will not be selected when comes to a purchase, not much promotion and awareness about green building and more suitable for commercial building. While there are 2 respondents stated that the demand of green residential is in moderate level and 1 respondent stated that the demand of green residential in Johor Bahru is high. This statement can be speculating that the low demand of green residential has become one of the factors that influence developer's decision in supplying green residential in Johor Bahru.

(g) High supply of green residential in Johor Bahru.

Based on the Table 9 in appendix data result that has collected from 12 construction developer company has shown that there are majority of respondent has stated that the supply of green residential in Johor Bahru is not high which reached 10 respondents while there are 2 respondents stated that the green residential supply in Johor Bahru is in high supply. The low supply of green residential due to few reasons such as local developer still preferring the traditional ways and not widely expose to green residential as it has low awareness among buyer.

(h) Challenges and obstacles that faced by company to start or intend to start green residential project.

Based on the result from Table 10 in appendix shows that most of the respondent are voice out that their challenges and obstacles that faced by company to start or intent to start green residential project is due to cost issue which reached to 7 respondents. While, other respondent has also stated and provided other challenges and obstacles such as supply-demand, government policies factor, familiarity and awareness of green building in term of construction player and community, expertise factor in term of technology, workmanship worker, the present of construction technology and construction material.

(i) The willingly of Johor Bahru buyer in purchasing green residential.

Table 11 in appendix has shown that the data that has been collected from 12 construction developer companies in Johor Bahru. The overall result has shown an obvious result which there are majority of the respondent believe that Johor Bahru buyers are willingly to purchase green residential and which reached 7 respondents which due to environmental friendly, willing in purchase and use green technology or smart technology, a trend from house buyer interested to purchase the residential with the green building elements or features and et cetera. While there are 4 respondents said that there Johor Bahru buyers will not willingly in purchase green residential which due to buyer still prefer for traditional housing and Johor Bahru does not have high buying power compare to bigger cities and 1 respondent has provided a neutral opinion.

(j) Type of residential that company mainly construct (green residential or non-green residential).

Based on Table 12 in appendix data analyses have shown that there are most of the construction developer companies has mainly constructed on non-green residential project which also name as conventional or residential which occupy 8 respondents out of 12 respondents. However, there are 2 respondents has provided a neutral opinion which states that 50/50, depends on the cost effectiveness and they are in progress towards more green residential or commercial. Yet, there are 2 respondents did not provide answer based on the question.

(k) Johor Bahru residence (people) awareness or knowledge in green residential.

Based on the Table 13 in appendix has shown that the awareness or knowledge among Johor Bahru resident (people) is still not much and low according to the perception of 12 respondent. There are 8 respondents which states that that the awareness or knowledge among Johor Bahru resident (people) is still not much and low. Hence, there are 3 respondents which states that Johor Bahru resident (people) have awareness or knowledge in green residential while there is 1 respondent which provide a neutral perception on this question.

(l) Major obstacles in implement material and resources characteristics if develop a building (green residential) in Johor Bahru.

Based on the Table 14 in appendix has shown that the major obstacles that facing by respondent is due to cost factor. There are 8 respondents answer that cost is their major concern if develop a building (residential) in Johor Bahru. While, there are 3 respondents that has provided different perception which is hard to promotes due to the weather is comfort, low availability or quality of the green building's material and acquiring and sourcing the material from local supplied in Malaysia. Therefore, as a conclusion for this section, the major obstacles that facing by Johor Bahru construction developer companies is due to cost factor and follow by material availability factor.

(m) Identify the challenges in apply indoor environmental quality green features in green residential.

Table 15 in appendix has shown that 12 respondents has provided different standpoint and explanation in this question. There are obviously many respondents has agreed and states that there is a challenge in implementing this green feature in green residential in Johor Bahru. Based on the result above, there have 6 respondents has agreed with the same challenges which is cost factor in implementing this green feature in green residential such as higher cost, project costing margin, material is more expensive and et cetera. Yet, there are 2 respondents which declare that residents awareness and consumer behaviors are the challenges. There are also 3 respondents provide different view such as current buyer that meet do not require this feature, structural design for natural ventilation and architectural design and others. However, there is 1 respondent mention that there is not a challenge because they are focus in this feature.

(n) Difficulties in achieving sustainable site planning and management features during develop a green residential.

Based on data from Table 16 in appendix that has collected has shown that 12 respondents have provided different view and concern about the difficulties in achieving sustainable site planning and management matter. There are 4 respondents states that they are difficulties in achieving this green feature is due to cost, 2 respondent which states that there are no difficulties in achieving this green feature, 2 respondents which provided different view which due to size of the land developing and sufficient land size or space is required. Last but not least, there are 4 respondent which respectively has provided different view and answer toward this section. As conclusion, majority of the respondent has voice out that there is a difficulty in achieving sustainable site planning and management during develop green residential as the main caused was due to cost matter.

(o) The most affect company decision during develop a green residential in Johor Bahru in future or now based on six green building criteria.

Table 17 in appendix has shown that 12 respondents has also provided different answer based on this question. Hence, sustainable site planning and management is the most affect factor to company decision during develop green residential in Johor Bahru in future or now. There have 7 respondents which agree with this green feature that most affect to their company decision. Next, there are also some respondent states that indoor environment quality, innovative design and material and resources

is their most and main affect to company decision during develop a green residential in Johor Bahru in future or now.

4.4 Objective 2: To study the strategic among developer's decision in supplying green residential.

(a) Strategy that affect company decision in supplying green residential in Johor Bahru.

According to Table 18 in appendix have shown the respondents view that based on the question, respondents has provided different view and strategies in this section. Hence, cost factor is still one of the major strategies among developers. There are 5 respondents has respectively stated that cost is the strategy that affect company decision in supplying green residential in Johor Bahru. Yet, there are 7 respondents which provided different view and opinion such as take timely adjustment based on market and policies and technology and also promotes more green technology, depends on market demand, location, marketing scheme to attract buyer and others.

(b) Current trend of green residential in Johor Bahru (rising or decreasing).

According to Table 19 in appendix data result that has been collected from 12 respondents in Johor Bahru, it has shown an unexpectedly result which majority of the respondent has stated that the current trend of green residential in Johor Bahru is in rising situation which reached to 7 respondents which due to for a better living environment, encouragement from government and the investment from other country and due to the growth of environmental awareness and increase of overseas investments. Yet there are 2 respondents which point out that the current trend of green residential in Johor Bahru is decreasing due to low economy and awareness of zero emission among the buyers are still low. Last, there are 2 respondents which stated a neutral perspective on this question.

(c) The affordability and attractiveness of green residential among Johor Bahru residence.

According to Table 20 in appendix has shown a clear result which most of the respondent has view out that the affordability and attractiveness of green residential among Johor Bahru residence is low and not so much which reached to 9 respondents. The reason is due to not affordable, higher maintenance cost and land cost, price for green residential are quite high for normal working people, green building housing always is more expensive compare to non-green building housing and more. However, there are still minority of the respondent which view out that there is affordability and attractiveness of green residential among Johor Bahru residence which are 3 respondents which due to having a good environment and peaceful living place.

(d) To identify energy efficiency features able to increase the quality and value of a building (residential) in Johor Bahru.

Based on the result on Table 21 in appendix has been collected from 12 respondent, it has presented an obvious result on this question which most of the respondent agree that energy efficiency features able to increase the quality and value of a building (residential) in Johor Bahru which reached to 9 respondents. This is due to bring up awareness and knowledge to buyers, reduce heat solar gain will reduce electricity consumption, minimize the impacts toward our mother earth, give a building high living standard and more environmental friendly compare to non-green residential and et cetera. However, there are 2 respondents has provided a neutral standpoint and view and 1 respondent did not answer to the question.

(e) To determined company would implement or focus in water efficiency green features in future residential.

Table 22 in appendix has shown that there are also majority of the respondent agree that their company would implement or focus in water efficiency green features in future residential which reached to 7 respondents. Hence, there are 2 respondent which disagree with would implement or

focus in water efficiency green features in future residential and 2 respondent which provided no related answer and did not provide answer for this question. Based on the respondent that agree that their company would implement or focus in water efficiency green features in future residential has explained that as this will becoming the major concern of the consumers as this feature will help them achieved water saving and also the fare saving (water bills), indirectly reduce the maintenance fee of residents and et cetera. Hence, 2 respondents that disagree with would implement or focus in water efficiency green features in future residential which due to Malaysia water bill is cheap and they think that energy efficiency is more important and more useful compare to water efficiency.

(f) Strategy that company will approach if company intent to start a green residential project in future in term of innovative design green feature.

This section, 12 respondents have totally provided different view and answer based on Table 23 in appendix. Therefore, it will be listed out. The strategy that company will approach will be in term of innovative design green feature, quality and affordable price, provide offer to government servers, educational industries to attract them, have a team technician that have experience in the design high level of architectural significance, demand of market and supply of materials, approach Rain Harvesting System and solar power system able to attract buyers, focusing on the indoor environment quality and this will become their major selling point, landscape, building façade, energy saving appliances, solar water system and sustainable construction practice and obtain Green Building Index (GBI) or GreenRE.

5. Conclusion

The first research objective is to determine the factor influence developer's decision in supplying green residential. It aims to determine what is the actual factor that influence developer's decision in supply green residential. According to the overall result, the factor that influence developer's decision in supplying green residential is due to cost factor. The cost factor is refer as highly cost for instance high building construction cost, highly maintenance cost, needed huge amount to engage the building consultant fee and Green Building Index (GBI) fee. The cost factor has also led to the hindrance, challenges and obstacles for developer in supplying green residential and start green residential project. The cost factor that hindrance developer to launch green residential is due to input-output ratio, high construction cost and maintenance cost, cost of development, technology highly cost, capital expenditure and price for green product. While the cost factor that cause challenges and obstacles that faced by developer in supply green residential is due to construction cost as well, high initial cost, high capital and operation expenditure of cost variance of adopting this concept. Hence, buyer demand and need also as a factor influence developer decision in supplying green residential. Based on the respondent view majority stated that they will depend of buyer need in term of starting green residential project.

However, there are also consists of few aspects that indirectly influence developer's decision in supplying green residential which are supply aspect and demand aspect. Based on respondent view and answer which stated that there is low supply and low demand of green residential in Johor Bahru. Low demand of green residential is due to higher maintenance cost, not much promotion and awareness, price of property and highly cost than conventional residential. While low supply is due to majority developer companies is still prefer conventional ways and also due to this concept is not widely adopted. Yet, low supply and low demand also due to the current situation of green residential in Johor Bahru is in low demand based on respondent view. In the same time, according to respondent view as well has also mentions that Johor Bahru residence awareness or knowledge in green residential is not much. This has indirectly affected developer in supplying green residential.

The second objective aim is to study the strategic among developer's decision in supplying green residential. According to the overall result from respondents based on this research objective, cost factor is the strategic among developer's decision in supplying green residential. Majority respondent stated that they will focus on budget controlling, costing margin, cost efficiency and looking for reasonable resources in supplying green residential. Hence, in the same time the affordability and attractiveness of green residential among Johor Bahru residence is low and not so much based on respondent result. The reason is due to higher maintenance cost, higher land cost and price of green residential is high for normal people. However, respectively, the current trend of green residential in Johor Bahru is rising situation as for a better living, encouraging from government and investor from other country due to the growth of environmental awareness. This has provided an opportunity and as strategics as well among developer's decision in supplying green residential. Besides that, there are few aspects that developer companies will focus in green residential project which are water efficiency, energy efficiency and innovation design as well.

This research study is focus on factor and strategic that influence developer's decision in supplying green residential. Although there are some obstacles facing during the research study process, yet there are still have some recommendation for construction industry as a guidelines purpose. According to the result has collected, the factor that influence developer's decision in supplying green residential supply is due to cost factor which is highly cost in term of construction cost, maintenance cost, building consultant fee and more. However, construction industry is one of the industries that contributes a huge negative impact to environmental issues. Hence, green concept is a concept introduce for construction industry to reduce and minimize environmental issue that risen up in the past decades through the implementation from technology, material and resources, system and design of a building. Although the initial cost for green building project might be high but in long term it will produce positive impact to stakeholder and developer and also environment. Therefore, green concept should be gradually emphasized in construction industry and gradually adopted in future. This able to build up a healthy and greenery environment for future generation.

In conclusion, the research objectives of this research study have been successfully achieved although there are facing limitations during the data collection process however it still managed to completed. All the data that been collected is reliable and met the research objectives.

Acknowledgement

The author would like to thank and highly appreciate the Department of Construction Management, Faculty of Technology Management and Business, Universiti Tun Hussein Onn Malaysia (UTHM) who have been very supportive during the conduct of this study.

References

Abidin, N. Z., Yusof, N., & Othman, A. A. E. (2013). Enablers and challenges of a sustainable housing industry in Malaysia. Construction Innovation, 13(1), 10–25. https://doi.org/10.1108/14714171311296039

Ajayi, V. O. (2017). Primary Sources of Data and Secondary Sources of Data. September, 1–6. https://doi.org/10.13140/RG.2.2.24292.68481

Alias, A., Sin, T. K., & Aziz, W. N. A. W. A. (2010). the Green Home Concept – Acceptability and Development Problems. Journal of Building Performance, 1(1), 130–139.

Annum, G. (2019). Research Instruments For Data Collection Method. Research Methodology, 1–6. https://www.academia.edu/36865594/RESEARCH_INSTRUMENTS_FOR_DATA_COLLECTION_Updated_

Ashirwadam, J. (2014). Communication Research Methods Methods of Data Analysis. Tamilnadu Theological Seminary, August, 1–6.

Banerjee, A., & Chaudhury, S. (2010). Statistics without tears: Populations and samples. Industrial Psychiatry Journal, 19(1), 60. https://doi.org/10.4103/0972-6748.77642

bin Esa, M. R., Marhani, M. A., Yaman, R., Rashid, A. A. H. N. H. N., & Adnan, H. (2011). Obstacles in implementing green building projects in Malaysia. Australian Journal of Basic and Applied Sciences, 5(12), 1806–1812.

Department of Statistics Malaysia (2020, February 23). Demographic Statistics Fourth Quarter 2019, Malaysia. Retrieved from https://www.dosm.gov.my/v1/index.php?r=column/cthemeByCat&cat=430&bul_id=UDc0eVJ4WEJiYmw0Rmt5cjYvWHFkdz09&menu_id=L0pheU43NWJwRWVSZklWdzQ4TlhUUT09

Elias, E. M., & Lin, C. K. (2015). The Empirical Study of Green Buildings (Residential) Implementation: Perspective of House Developers. Procedia Environmental Sciences, 28(SustaiN 2014), 708–716. https://doi.org/10.1016/j.proenv.2015.07.083

Goh, H. H., Goh, K. C., & Seow, T. W. (2013). Challenges of implementing Sustainability in Malaysian Housing Industry. Http://Eprints.Uthm.Edu.My/3964/, 2007, 1–8. http://eprints.uthm.edu.my/3964/

Green Building Index. Assessed on 30 May 2020. Available at: https://www.greenbuildingindex.org/

Ibrahim, F. A., Mohd Shafiei, M. W., Ismail, R., & Said, I. (2014). Green homes development: Factors affecting housing developers' readiness. ARPN Journal of Engineering and Applied Sciences, 9(6), 971–980.

Illankoon, I. M. C. S., Tam, V. W. Y., Le, K. N., & Shen, L. (2017). Key credit criteria among international green building rating tools. Journal of Cleaner Production, 164, 209–220. https://doi.org/10.1016/j.jclepro.2017.06.206

Kirshenblatt-Gimblett, Barbara. Part 1, What Is Research Design? The Context of Design. Performance Studies Methods Course syllabus. New York University, Spring 2006; Trochim, William M.K. Research Methods Knowledge Base. 2006.

Lan, S.-H., & Sheng, T.-C. (2014). The Study on Key Factors of Influencing Consumers' Purchase of Green Buildings Application of Two-stage Fuzzy Analytic Hierarchy Process. International Business Research, 7(6), 49–60. https://doi.org/10.5539/ibr.v7n6p49

Mohd Shafiei, M. W., & Abadi, H. (2017). The Impacts Of Green Building Index Towards Energy Consumption In Malaysia. Australian Journal of Basic and Applied Sciences, 11(March), 131–139.

Mohd Shafiei, M. W., Samari, M., & Ghodrati, N. (2013). Strategic approach to green home development in Malaysia- The perspective of potential green home buyers. Life Science Journal, 10(1), 4213–4224.

Parveen, H., & Showkat, N. (2017). Content Analysis. August.

Samari, M., Godrati, N., Esmaeilifar, R., Olfat, P., & Shafiei, M. W. M. (2013). The investigation of the barriers in developing green building in Malaysia. Modern Applied Science, 7(2), 1–10. https://doi.org/10.5539/mas.v7n2p1

Shraddha Pandey. (2015). Impact of Green Building Rating Systems on the Sustainability and Efficacy of Green Buildings Case Analysis of Green Building Index , Malaysia. MIT-UTM Malaysia Sustainable Cities Program, 1–10

Singh, C. S. (2018). Green Construction: Analysis on Green and Sustainable Building Techniques. Civil Engineering Research Journal, 4(3). https://doi.org/10.19080/cerj.2018.04.555638

Suhaida, M. S., Chua, K. H., & Leong, Y. P. (2011). Sustainable Development in the Building Sector : Green Building Framework in Malaysia. 15th International Conference on ISO & TQM (15-ICIT), March, 1–8. http://www.uniten.edu.my/newhome/uploaded/admin/research/centres/iepre/2012/papers/Sustainable Development in the Building Sector Green Building Framework in Malaysia.pdf

Syuhadah, N., Said, B., Martin, D., & Juanil, D. (2013). 2nd International Conference on Technology Management, Business and Entrepreneurship. The Housing Environment Preference among Housing Ccnsumers in Johor Bahru, December, 55–70.

Zainul Abidin Nazirah, N. (2010). Investigating the awareness and application of sustainable construction concept by Malaysian developers. Habitat International, 34(4), 421–426. https://doi.org/10.1016/j.habitatint.2009.11.011

Appendix

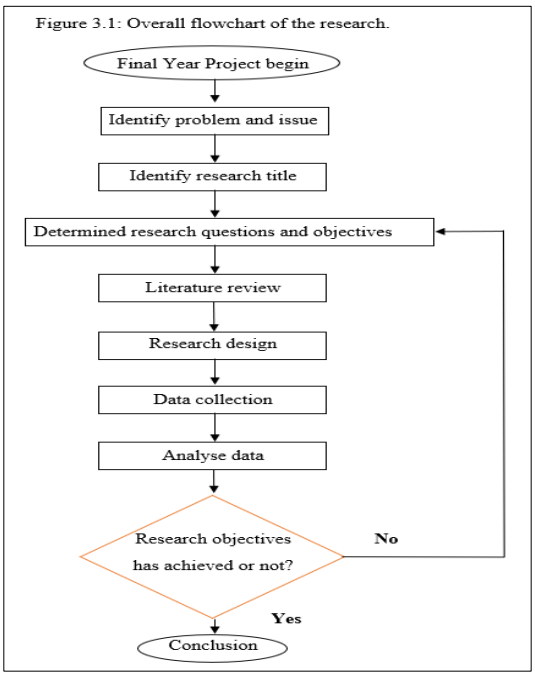

Figure 2: Overall flowchart of the research

Table 3: View of current situation of green building (residential) in Johor Bahru from construction developers.

Respondent	Annotation
R1	"Not much. From the perspective of developer is good in long term but not good in short term. For example in term of technology such as solar panel in long term is cheap, good and many people use, but in short term is expensive and not many people affordable"
R2	"The demand for green building is very low."
R3	"Growing not too rapidly at this moment."
R4	"As I know, that most popular green building in JB is Forest City."
R5	"Not much project."
R6	"From my point of view, currently situation of green building (residential) is rising up because there are many developed country like China that bring in technology and opportunity to Johor Bahru compare to other state in Malaysia."
R7	"In Johor Bahru, there is not much demand for green buildings and buyers are not very interested."
R8	"From my view, the markets of green building in JB are not focusing the

	locals and majority the buyers are foreigners."
R9	"Not much participation from developer in green building."
R10	"Currently all new developments upcoming in Johor Bahru, have all placed emphasis on green."
R11	"There are still progress of increasing number. Currently not much building go for green certification."
R12	"Green building is still not widely adopted and introduced especially towards local developers in Johor Bahru."

Table 4: Construction developers answer on green residential project in Johor Bahru.

Respondent	Annotation
R1	"Have, currently Forest City is our green residential project in Johor Bahru."
R2	"Nil."
R3	"Yes, D'Summit Residence in Kempas."
R4	"No."
R5	"Yes, Bandar Cemerlang."
R6	"No, currently our company only focus development in Pahang state."
R7	"No."
R8	"No."
R9	"No."
R10	"Yes, we are looking towards our goal of a zero waste township, that mainly focuses on green residentials creating a sustainable community. One of the residential that emphasises on this would be 'The Seed'."
R11	"We go for green building in Iskandar Puteri."
R12	"There are few project in Masai area."

Table 5: View on the importance and need of green residential in Johor Bahru from construction developers.

Respondent	Annotation
R1	"It is important for long-term development, however the current market and policies do not show strong demand."
R2	"Not necessary at the moment. Higher maintenance cost."
R3	"Important yet low demand as in market of Johor Bahru."
R4	"So far not so important."
R5	"Yes, environmental benefits and cost efficiency."
R6	"Yes it is important or needed in Johor Bahru. This is because there will create many opportunity to improve the standard of living for Johor Bahru."
R7	"Yes, it is important for the Johor Bahru property industry. It is because green residential can bring a lot of benefits to residents such as reduce energy consumption and minimize the emission of pollutants."
R8	"Yes. To reduce the emission of harmful gases as the rate of emission of harmful gases such as Carbon Dioxide in Johor Bahru especially in town area are considered very high."
R9	"Yes. To reduce harmful the earth, environment, reduce energy usage and also to reduce heat island effect."
R10	"It is not really needed in Johor Bahru, but I would say it is important for the developers as customers now are more aware of 'green' than ever before, hence it plays an important role in creating value of the residentials for customers."
R11	"It is encouraged by local authority. It is good for environmental and sustainability."

R12	"Green residential is a subjective matter, it may bring beneficial. However, it still depends on the demand by its designer and client."

Table 6: Factor that influence company decision to start or intent to start green residential project in Johor Bahru base on respondent view.

Respondent	Annotation
R1	"The factor that influence company decision to start or intent to start green residential project is base on buyer need, policies, and input-output ratio."
R2	"Cost and demand."
R3	"High maintenance cost."
R4	"Meet people's need."
R5	"This is the current residential environment buyers looking for. (Mostly young family group)."
R6	"From my point of view, there are few factor that influence company decision to start or intent to start green residential project in Johor Bahru. Firstly, time consuming of construction, this is because all green building project usually using all IBS technology to construction the building. All IBS usually take lesser time to construct compare with the traditional ways. Second factor is environmental friendly, green building is a construction way which get efficiency and positive environmental goals of green design. Last factor is improving economy of country, this is because green building project may attract developed country to invest in Malaysia， there are a very good example in johor which is forest city that invested by China company."
R7	"Construction Cost. The higher the construction cost, the lower the profitability."
R8	"I heard that the management and development team has an intention to start a green residential project in JB. I believe is due to the trending now is more focusing on the green aspects and also zero emission buildings."
R9	"Initial cost. Normally developer are willing to buy in the green building elements to be implement in their project. However to recognize the building as a green building need a pretty huge amount of money to engaged the green building consultant and fees to GBI for inspection and assessment as a process of recognition a building as a green building."
R10	"Mainly it would be the customers' needs and wants, and followed by the company's corporate image."
R11	"Company management direction to support sustainability concept and concern on environment."
R12	"Factor to be involve will be cost of designing, building and maintaining for the long run of the building."

Table 7: Factor that hindrance company to launch green residential project in Johor Bahru.

Respondent	Annotation
R1	"The factor that hindrance company decision to launch green residential project is base on buyer need, policies, and input-output ratio."
R2	"Cost and demand."
R3	"High construction cost with maintenance in future time. And town council didn't emphasize on maintaining green building."
R4	-
R5	"Top management team from old generation and old concept. Cost of

	development (need space for landscape and high maintenance on landscape."
R6	"From my point of view, there are few factor that hindrance to launch green residential project in Johor Bahru. Firstly, costing is the first factor for it, this is because for all these new technology always over costing compare to the traditional way. Second factors is workmanship of worker, all these new technology always have a different work way compare to traditional way so that we need to waste more to retrain all the worker. Last factor is about demanding of market, in Malaysia all of the consumer always prefer the traditional construction way so that this lead the demanding of market for green building will be lesser than traditional construction way."
R7	"The demand for a green residential project in Johor Bahru. The lower the demand for green residential projects, the lesser the green residential project to be carried out."
R8	"The main reason that our company had delayed the development process is the Covid-19 Pandemic. The markets now are unpredictable so that our company decided to play safe."
R9	"Not many house buyer knows about green building and aware about this matter. Less appreciation from them unless they understand the best and advantages of the green building. Developer and Government should create more awareness about green building as per electrical and automotive manufacturers tell their consumer about energy saving for example light-emitting diode (LED) bulbs, inverter system and hybrid car/motorcycle."
R10	"The capital expenditure required by a company to enforce this Green Initiative."
R11	"Price of green products or materials that is currently available in market."
R12	"The hindrance will be the knowledge and expertise of local contractor to build such quality of green residential is still not well establish."

Table 8: Demand of green residential in Johor Bahru.

Respondent	Annotation
R1	"Not high demand as Johor Bahru support level is low."
R2	"No, higher maintenance cost."
R3	"Moderate. Main stream would be from Singaporean or other town."
R4	"No, high costing."
R5	"Average demand because only apply to young family below age 40 to 50."
R6	"Yes, this is because there are many invested from other country is demanding green building in Johor Bahru like country Singapore and China. Meanwhile, our government also encourage local developer to launch more green building to build an environmental friendly country."
R7	"No, the green building project tends to sell at a high price."
R8	"No. For my opinion, this is due to the prices of the green residential are always higher than the normal residential as it contains a lot of latest technologies. The consumers in Johor Bahru are not well aware about the importance of green residential and green residential will not be selected when comes to a purchase."
R9	"No. Not much promotion and awareness about green building."
R10	"Currently not at the moment, however there is a seen rise in its demand. Mainly due to the many oversea investments that are setting ground here in Johor Bahru."
R11	"Currently not so much. As normally it will be more suitable for commercial building."
R12	"Not really because nowadays due to the price of property, buyer tend to

	prioritise price of property over the design of building."

Table 9: Construction developers view on high supply of green residential in Johor Bahru.

Respondent	Annotation
R1	"Not much."
R2	"No."
R3	"Yes."
R4	"No."
R5	"No."
R6	"No, this is because in Johor Bahru most of the local developer still preferring the traditional ways."
R7	"No."
R8	"No."
R9	"Not from local developer but not very sure about the developer from China. However, if we look at their development, seems like their buildings having more green building elements and characteristic."
R10	"Yes."
R11	"Nope. But local authority is encouraging this concept."
R12	"Johor Bahru is still not widely expose to green residential as it has low awareness among buyer."

Table 10: Challenges and obstacles that faced by respondent to start or intend to start green residential project.

Respondent	Annotation
R1	"There are two challenges and obstacles which are demand from buyer whether buyers are willingly or not willingly to purchase. Second is government policies which government will step out in helping or providing benefits or not."
R2	"Costing."
R3	"Market supply more than demand."
R4	"No planning."
R5	"Change old management team member, old concept thinking."
R6	"Challenges or obstacles that faced by company to start or intend to start green residential project like cost of construction, familiarity of green building and workmanship of worker. Cost of construction is the main obstacle to start green building because green building construction costing is higher compare to non-green building construction. Next, familiarity of green building also an obstacle for it, because local contractor still prefer with traditional construction compare with green building. Lastly is workmanship of worker, local contractor need some time to train all the worker related to green building construction skill. This will take more time to finish a project compare with traditional construction."
R7	"The present of construction technology, construction material, construction cost cost."
R8	"The profit and loss. And also the real estate bubble in Johor Bahru are becoming saturated."
R9	"Less expertise in green building, not much incentive from government and high initial cost."
R10	"High capital and operational expenditures."
R11	"Awareness of green building by community."
R12	"It would be the expertise of technology in the construction technology and

	the cost variance of adopting this concept."

Table 11: The willingness of Johor Bahru buyers in purchasing green residential based from construction developer companies view.

Respondent	Annotation
R1	"Willing. For example willingly in purchase and use green technology or smart technology."
R2	"Depend on the price."
R3	"Yes. As part of environmental friendly, people might want to enjoy better life with green residential."
R4	"No."
R5	"Yes, because mostly strong buyers is around age 30 to 40 plus. (Young family need a new house)."
R6	"I think not willing enough, this is because Johor Bahru buyer still prefer for traditional housing instead of pay more for green building housing. Most of the buyer is from overseas."
R7	"Yes. Young people willing to purchase green building projects."
R8	"I think that there are still buyers that willing to purchase the green residential."
R9	"Sure, there is a trend from house buyer interested to purchase the residential with the green building elements/features especially on intensive landscape, more wide opening for brightness, building orientation to avoid direct sunlight, smart home system in order for them to control the electrical appliances through their smart phone et cetera. All the demands mentioned above are actually the green building elements and features without their notice and knowledge."
R10	"With the Johor Bahru population alone, it will not be enough."
R11	"Yes. Provided that selling price is reasonable."
R12	"This because the local in Johor Bahru does not have high buying power compare to bigger cities, green building is still a cold market among the local."

Table 12: Type of residential that company mainly construct (green residential or non-green residential) based from respondents.

Respondent	Annotation
R1	"Non-green residential. But normally in green residential will also added green technology but will not join in green residential. Besides that, based on government requirement, we will also add green features into project such as ventilation."
R2	"Non-green residential. Affordable price."
R3	"50/50. Depends on the cost effectiveness."
R4	"Non-green residential."
R5	"2/3 non-green residential, 1 green residential."
R6	"Currently still mainly construct non-green residential because of costing, workmanship and demanding of market."
R7	"High-rise building. Probably due to the constraint space in city."
R8	"Non-green residential. As a developer based company, we focus in the P&L ratio. So we construct the type of residential according to the market. We may construct green residential in the future once it become a hot trending in the real estate market."
R9	"Non green building but with some green building elements."

R10	-
R11	"We are in progress towards more green residential or commercial. This is company direction to support sustainability."
R12	"Conventional residential, as green building is still not widely adopted by all developer and designer."

Table 13: Johor Bahru residence (people) awareness or knowledge in green residential based from construction developers view.

Respondent	Annotation
R1	"Not much awareness or knowledge. Although have awareness or knowledge but not willing in pay the price."
R2	"Not really."
R3	"The awareness still need to be raised up. As most of the residents might still choose for cheaper and lasting construction method."
R4	"No, less green residential."
R5	"Yes, but mot much."
R6	"Most of them have awareness or knowledge in green residential, this is because they will take Singapore green residential as reference and sample, so they will have some ideas how green residential look like."
R7	"Yes, always will be get affected from Singapore property industry. Nowadays Singapore new project trend to be green building which is fit to their building standard law."
R8	"In my opinion, I think that they are lacked of the awareness. We can observe that the green residential in Johor Bahru are not selling too well but the ordinary residential always in a contrast situation."
R9	"Not really and no awareness campaign to promote green building residential."
theR10	"Only a small population have adequate knowledge, whilst the mass population does not. Education on this matter is not yet that well versed to the public."
R11	"Less. As more will be on basic knowledge like solar panel can save electricity."
R12	"The awareness in Johor Bahru is still low. Because Johor Bahru are still majorly consists of conventional building."

Table 14: Major obstacles in implement material and resources characteristics from respondent if develop a building (residential).

Respondent	Annotation
R1	"In Johor Bahru will be hard to promotes due to the weather is comfort therefore there is not much need. It also need to depend buyers acceptance and willingness in term of purchase."
R2	"Cost and demand."
R3	"As part of company strategy, cost efficiency might lead to the lowest tender price. The lowest price might not be the one to provide best material and resources."
R4	"Low availability/quality of the green building's material."
R5	"Material costing between green and non green materials."
R6	"From my company view, the major obstacle in implement this characteristic if develop a building (residential) in Johor Bahru is the costing of material and resources. All the costing of material and resources for green building is more

	expensive compare to non-green building material and resources. This is because all green building material and resources costing of manufacturing is more expensive compare to non- green building material and resources."
R7	"Yes, construction material is one of the obstacles in the implementation of green buildings. Such as Nippon paint green choice environment-friendly series tends to be more expensive compare with other normal paints."
R8	"The price of this kind of material are usually higher. So it is not in our first choice as we prefer the material with lowest price."
R9	"Most of the material is more expensive due to certification of GBI, for example Low volatile paint, certified GBI timber flooring, double glaze window et cetera."
R10	"Usually these materials and resources available are pricey by nature, same with why organic vegetables are more expensive. Hence, cost would be the main obstacle."
R11	"If the price is more competitive, then it should not be a obstacle."
R12	"The challenges will be the acquiring and sourcing the material from local supplied in Malaysia. There may be restriction to source it locally."

Table 15: Challenges in apply indoor environmental quality green features in green residential based from respondent view.

Respondent	Annotation
R1	"Is not a challenges. In this criteria our company is very focus on this because if the indoor environment quality is not good, buyer will not purchase. Therefore, we will do it in high requirement. However, we will also based on market demand and measure buyer requirement and acceptability."
R2	"Higher cost."
R3	"Yes. As current buyer that we meet do not require this feature. Hence this might not be the focus point for us in Johor Bahru."
R4	"Yes. High costing and quality of products still need to improve."
R5	"Supplier source and project costing margin."
R6	"Yes, there are few challenges in apply this green feature in a green residential in Johor Bahru like costing of construction and consumer behaviour for housing. Firstly, costing of construction for housing is because need add more window and ventilation component, this lead the costing of housing increased. Next is the consumer behaviour for housing, currently most of the consumer still prefer the traditional housing which is less window and ventilation because to dust and hygiene of house."
R7	"Yes, we got a lot of challenges in implementation such as structural design for natural ventilation and architectural design in the building."
R8	"I believe there are some minor challenges such as pricing of the materials used. But I believed that they are some consumer willing to install this feature as this will bring significant toward the daily life of the buyers."
R9	"As mentioned before, this material is more expensive."
R10	"As mentioned before, these implementations are pricey by nature, hence cost will be the main consideration amongst all others."
R11	"Residents' awareness and acceptant if this is crucial. As green product might have different texture or feeling after installation and not all residents can accept it."
R12	"Implementing such features might not be impossible, however the cost for material and installation to construct may impose higher cost than conventional construction technology, so the cost may be the obstruction for this adoption."

Table 16: Difficulties in achieving sustainable site planning and management features during develop a green residential by respondent.

Respondent	Annotation
R1	"It based on marketing department decision and different type of buyer."
R2	"Land cost."
R3	"First, public transport in Johor Bahru is not well developed yet by looking at our company site now. The building features itself will become the main selling point. Yet, we are facing problem that town council didn't take effort to maintain landscaping after we handed over. This makes the Green Building Index (GBI) less effective."
R4	"High initial cost and lack of awareness and knowledge among developers and buyers."
R5	"Not difficult but it takes a longer time to achived."
R6	"From my company perspective, the difficulties in achieving this feature during a green residential is the size of the land developing. Size of land is determine all factors above, this is because in the perspective of profit organization, profit always the first consideration among all the profit organization. If the land is develop to green residential, the land for housing will be less compare to non-green residential, this will lead the profit of the project get low if there are less unit of house for sell."
R7	"Not difficult. It just requires full cooperation from the client (Land Owner or Property Owner), subcontractor, and relevant party."
R8	"The authorities are not doing their job properly when coming to inspection. And there are corruption issues between the site project managers and authorities."
R9	"Additional cost need to be allocate for example walkways with shelters, trees and shrubs for landscaping need more cost planting and maintenance."
R10	"As mentioned before, these implementations are pricey by nature, hence cost will be the main consideration amongst all others"
R11	"Sufficient land size or space is required. This is subject to availability of land for public facilities."
R12	"To achieved a good Green Building Index (GBI), planning via management is not much a challenge as it just require adequate experience by stakeholder and management personnels."

Table 17: The most affect company decision during develop a green residential in Johor Bahru in future or now based on six green building criteria.

Respondent	Annotation
R1	"First is indoor environment quality as buyers feeling is the most obvious. Second is sustainable site planning and management as able access to public transportation. Third is innovation design as buyer will focus on the design whether the building is nice or not nice."
R2	"Sustainable site planning and management."
R3	"Energy efficiency, sustainable site planning and management and innovative design. We are now striking to work better with consultant/contractor for the above and these will be our strategy to go forward."
R4	"Sustainable site planning and management."
R5	"Sustainable site planning and management as we are now building on this."
R6	"Among the six green building criteria, the most affect is material and resources this is because currently most of the supplier of materials still preferred traditional materials, so that maybe there are problem to find supplier for green building. This will lead to the costing increase because of hard to find

	material and resources for the project."
R7	"Indoor environment quality is the most affected factor. It is because nowadays people more concerned about the comfort of living which is decided by the environment noise, indoor air quality and indoor temperature."
R8	"Material and resources. As this will direct link to the financial department and we have to discuss about the P&L ratio before we make any decision."
R9	"Innovation under sub-category GBI facilitator. This is the most critical process where the cost is high and the process are lengthy."
R10	"Sustainable site planning and management. This is because, among all, this would be one that would lay the foundation for all the others."
R11	"We focus for all criteria. Green building should include all the element."
R12	"Stakeholder or company usually emphasize on cost and quality which lean the material and reources and sustainable site planning and management."

Table 18: Strategy that affect company decision in supplying green residential in Johor Bahru.

Respondent	Annotation
R1	"To take timely adjustment based on market and policies and technology and also promotes more green technology."
R2	"Depends on market demand."
R3	"Cost efficiency. As company has been focusing on budget controlling in the past few years especially when there is economy impact at this moment. Cost became the first concern."
R4	"Location and costing."
R5	"Costing margin. Looking for more reasonable sources."
R6	"Firstly, is the future demand of buyer, in future green building should be familiar to all people. Next, is technology in future, in future the technology will more advance and advance, when the technology is more advance the cost will reducing this lead there are many local contractors willing to try on supplying green building."
R7	"The government green building policy."
R8	"We did several surveys in the market and we had analysis the data before we have any decision."
R9	"Recognition Green Building Index (GBI) process is a lengthy and expensive."
R10	"Not sure."
R11	"Green product will have higher construction cost than conventional method."
R12	"It would usually be the marketing scheme to attract buyer that highly emphasize or concern to the nature and environment."

Table 19: Current trend of green residential in Johor Bahru (rising or decreasing) based on respondents.

Respondent	Annotation
R1	"In long term will be rising while in short term will be decreasing."
R2	"No idea."
R3	"Decreasing due to low economy."
R4	"Rising as for a better living environment."
R5	"Rising but slowly due to concept problem or margin profit problem."
R6	"From my perspective is rising, this is because encouragement from government and the investment from other country."
R7	"Rising trends. Due to the growth of environmental awareness."
R8	"Decreasing. (At least in this coming 5 years). I think that the awareness of

	zero emission among the buyers are still low. They prefer getting a larger or prettier residential with the same pricing.”
R9	“Rising as per mentioned above.”
R10	“Rising, due to the increase of overseas investments.”
R11	“Rising slowly. Because more and more awareness is required.”
R12	“Green residential is slowly appearing and adopted but still not in a significant quantity.”

Table 20: The affordability and attractiveness of green residential among Johor Bahru residence.

Respondent	Annotation
R1	“Based on the level of green residential. But in Johor Bahru buyer is not affordable. For example Forest City not many Johor Bahru buyer to buy due to expensive.”
R2	“No. Higher maintenance cost and land cost.”
R3	“Its attractive yet not affordable. Price for green residential are quite high for normal working people.”
R4	“Yes, having a good environment and buyers from Singapore also.”
R5	“Yes. Nice view and peaceful living place.”
R68	“From my perspective, green residential is not affordable and attractive among Johor Bahru residence. This is because green building housing always is more expensive compare to non-green building housing but green building is more attractive than non-green building housing is because the design is more modern and more environmental compare to it.”
R7	“No. Normally in Malaysia the green building project tends to be a luxury residential project with a higher selling price.”
R8	“No. It is not attractive to the consumers as the price performance of the green residential is not so high compared with the non-green residential.”
R9	“Yes, green building actually attractive but not affordable for most people. For Johor Bahru the buying power and average income are still low.”
R10	“Not so much, as usually green residentials are on the high side on prices.”
R11	“Not really as green product is more expensive thus affected selling price.”
R12	“It is attractive and provide a green environment. However, it may not be the affordable building to live in as the maintenance cost to be considered for the longer period.”

Table 21: Identify energy efficiency features able to increase the quality and value of a building (residential) in Johor Bahru from respondents.

Respondent	Annotation
R1	“Yes but based on the how big is the price and whether able to implement or not.”
R2	“No idea.”
R3	“Yes. Our company does consider this. As this will be part of the marketing strategy and at the same time could bring up awareness and knowledge to buyers.”
R4	“Yes.”
R5	“Yes, but not much.”
R6	“Yes, it will able to increase the quality and value of a building, this because energy efficiency will give a building high living standard and more environmental friendly compare to non-green residential.”
R7	“Yes. We agree with it. Such as to reduce heat solar gain will reduce electricity

	consumption."
R8	"Sure. As long as the emission is low, it will minimize the impacts toward our mother earth. The quality and the value of the building will be increased with the existence of this feature."
R9	"Yes, energy efficiency should lead to improving indoor living quality and lower down energy consumption in long run."
R10	"With the improvement of energy consumption, I would presume the extra benefits in terms of savings to the company and additions to the buyers would increase the quality and value of the residentials."
R11	"Green building did promote less wastage but slightly increase quality. This is due to quality of building still depend on the workmanship of contractors."
R12	"It can provide a energy efficiency environment as it allow natural resources such as natural lighting, ventilation and temperature regulating to occur. However, increasing the value of building is still subjective as certain buyers does not view this functionality of building in a longer term period."

Table 22: Determined company would implement or focus in water efficiency green features in future residential.

Respondent	Annotation
R1	"No. Because this features is not focus by buyers and as Malaysia water bill is cheap. We will based on market analysis to consider this features either implement or not in future residential."
R2	"No idea."
R3	"Yes."
R4	"Water consuming system."
R5	"Yes, but still costing margin problem."
R6	"Our company would not implement or focus in this future residential project this is because in our company view we think that energy efficiency is more important and more useful compare to water efficiency."
R7	"Yes. We will provide, if it is suitable for that project (need to concern to M&E design). It is because it will get more attraction from the buyer."
R8	"Yes. As this will becoming the major concern of the consumers as this feature will help them achieved water saving and also the fare saving (water bills)."
R9	"Yes, but we need more manufacturer able to produce the water efficiency product especially for cold-water plumbing and sanitary fittings. Currently, we have faced a low water pressure problem due to gravity flow pressure is not as good as mechanical aided pressure."
R10	"Definitely, as it aligns with our vision of a zero-waste sustainable township."
R11	"Will try if it is possible like high rise project. This able to indirectly reduce the maintenance fee of residents."
R12	"If the design is to be emphasize on green residential, then I believe in corporating efficiency function to source like utility to the future user is a highly beneficial in the long term period."

Table 23: Strategy that company will approach if company intent to start a green residential project in future in term of innovative design green feature.

Respondent	Annotation
R1	"Developers will hope and focus on this criteria and di it well. However, design is not the main focus, we will based on buyer of customer's requirement and comfortability as buyer will not prefer on complexity design and structure."
R2	"Quality and affordable price."

R3	"We will provide offer to government servers, educational industries to attract them. As there few industries are long term service, hence we could serve them better."
R4	"Have a team technician that have experience in the design high level of architectural significance."
R5	"Example like our Bandar Cemerlang township, we are trying to build a green environment but building takes time."
R6	"There are few strategy like demand of market and supply of materials. Demand of market will approach company to start green residential project in future this is because if high demand of market there will be high supply of market, this will lead many local developer start to supplying. Next, supply of materials also one of the approach to start green residential project this is because currently most of the supplier of materials still preferred traditional materials, so that maybe there are problem to find supplier for green building."
R7	"Rain Harvesting System and solar power system able to attract buyers due to able to reduce utility expenses which is the main concern for residents."
R8	"If our company intent to do so, I think we might focusing on the indoor environment quality and this will become our major selling point."
R9	"Landscape, building façade, energy saving appliances, solar water system and sustainable construction practice."
R10	"Education in marketing would be the prime objective. Furthermore, would be in providing more compelling offers and promotions for new projects."
R11	"To obtain GBI or GreenRE as part of the certification to the said project."
R12	"Design is a first impression to the potential buyer. However having a innovative design is still a subject to the client and designer preference to target specific target market."