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Green Homes Development Practices and House Buyers' Requirements: A Review

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ABSTRACT

The advancement of green homes requirement in housing development is based on the house buyers' perception which results in the development of various green concept implementation in new housing development. In Malaysian context, it has been recognised that it is limited knowledge about the green homes itself. The majority of house buyers do not know very well about the green homes projects. This paper examines on the perception of house buyers in applying the green homes concepts. By conducting literature review involving developed and developing countries, it is found that the community design and planning, efficient usage of resources, use of alternative resources, natural system, protection and safety, and reusing and recycling approaches are related to house buyers' requirements for their future house. Research findings in this study provide valuable references to guide green homes development practices towards the house buyers requirements and the manner in which the developers approach green homes development projects.

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INTRODUCTION

The advancement of green homes movement is now shaping new practices of all business sectors including housing development, towards greener practices to attract the house buyers. This scenario is related to the two most pressing problems in the current issues which are energy crisis and world's increasing demand for green homes. According to Kruger and Shiers (2007) who identify the problems such as air pollution, improperly managed industrial activities, vegetation suppression, and other external environmental factors caused by the process of urbanization. Malaysian awareness on these environmental issues has led to the construction of green buildings in the country. Over the past few years, Malaysia has experienced a striking increase of population as the direct effect of constant urbanization. From the observation, the process of urbanization is the major factor for the change in the urban atmosphere. This change, however, is not necessarily positive. These problems have been deteriorating over time and need to be taken care of immediately.

The advancement of green homes practice in new development has resulted in the improvement of energy saving, quality of life and preservation of environment. Oktay (2002), defines green home as a house that fulfil the occupant's requirement as a shelter and the need for sustainability. The development of green homes should be synonym with the name and demonstrate the element of freshness. Therefore, most developing countries do not just face a similar problem in building environmentally friendly premises, they also have a mutual problem in meeting the prerequisite needs of the house buyers. A few researchers believed that the better way for housing industry to face the challenges posed by unifying and consolidating in order to meet the sustainability ambition of the industry. But then, some of them had discussed the problems plaguing the housing industry and green-related technology issues. Lowrey (1995) argues that previous researches on both green marketing and green consumers suggest that most of the green concepts are notoriously difficult to apply. According to Ding (2008), there is an urgent need for contractors or the authority to create a building performance assessment that concerns environmental issues. The mass development of green homes depend on the construction players and authority in advancement to gain knowledge about the technology of green homes practices.

Hence, if this suggestion is being taken seriously, hopefully it can help to solve the problems. Based on the previous studies, environmental issues have become the focus for developers in both developed and developing countries. Developing countries must learn from the anthropogenic activities that have been done by most developed countries to put a stop on the environmental issues. Rey, *et al.* (2007) demonstrate that the main challenge in the developed countries is to maintain their standards of living and comfort because of their high rates of energy consumption. This motivates them to create a sustainable development to ensure to meet the need of future generation and also the generation at present will also be able to fulfil their needs.

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In the housing market, most successful developers depend on their advancement in understanding the demand of the house buyers. The most important criteria of green homes is the energy saving characteristic. Based on the study conducted by Omer (2007), mentioned that to enhance the interaction between buildings and climates, the housing industry stakeholders must look at these criteria for their development guidelines; firstly, choose good locations that can avoid heights and hollows. Secondly, adjust the buildings in ways that the orientations could maximise or minimise solar gains. Thirdly, ensure the spacing of the building is well enough to avoid unwanted winds and shade effects. Fourthly, gain the maximum daylight in the building with proper designs. Fifth, produce proper designs that can prevent solar overheating with shades or window designs. Sixth, select trees and wall surfaces that can shelter the buildings from driving rain and snow and lastly, ensure the ground surfaces are dry. All the elements allocated the cost saving in the development, but it depends on the developers and all players in the construction industry to determine the direction of green homes development.

These instructions could be taken as the ways to reduce climate changes in buildings. Some of them are very important and need to be taken seriously to provide comfort to the building occupants. As the Malaysian government looks forward to become a developed country by the year 2020, so that to materialize this vision, the government needs to take the issue of sustainable development very seriously. Nowadays, Malaysia already has a green building index to make sure that everyone in the construction industry will take sustainable development critically. Besides, all players in the industry such as the developers, consultants, contractors, local authorities, manufacturers and purchasers are responsible in ensuring their project activities will give minimal impacts to the environment. They need to be aware of the ongoing environmental issues as well as having the knowledge to solve them.

Green Home:

The term moving forward is related with the agenda of green homes development by many developing countries in which most of the developed countries already heads that agenda. In recent study, Ding (2008) notes that green buildings also enhance the environmental awareness among practitioners and lay down the fundamental direction for building industry to move towards environmental protection and achievement of the goal of sustainability. Green homes are being defined as houses that can meet environmental requirements and then create a comfortable zone for the occupants. Considering green homes as a part of a sustainable development, Shiers (2000) defines green homes as the integrated and holistic approach to use the energy and resources in a way that minimises the environmental impact. The most important element in green homes is the level of saving during and after the construction. By understanding the green homes aspects in the right manner that will help the developers to conserve the environments and use their resources efficiently. Walsh, *et al.* (2006) define green homes as a type of basic human needs. Heerwagen (2000) suggests that 'green' buildings are often linked to higher productivity, better health and well-being, and improvements in organisational performance, such as lower staff turnover. Human productivity are related with comfortable and needs in their life in which a home should has all the elements that are interpreted in green homes. The elements in green homes will be carried out by the players in the construction industry which have the knowledge of green homes.

Green Homes Development:

The word development itself demonstrates the process of developing or being developed to be better, whether in life or another crave. The greatest reason for green homes development is to provide basic human needs. The purpose of green development is to ensure human and environment can live in a harmony life without the disturbance by any absurd development. The development of green buildings focuses on the quality of the environment, quality of life, and overall satisfaction (Heerwagen, 2000). The most important principles in the development of green homes that should be considered by developers are to build the buildings for long term and to ensure that the home is durable and long lasting, to build for children and also to make their environment safe, and to use materials from sustainable resources. Tenorio and Pedrini, (2002) stated that there are four principles and strategies in green homes. They are, low energy design and thermal comfort, use of renewable energy, water conservation, and materials conservation. All the elements considered the human and environment aspects to provide a better life for the present and future generation.

Marketers in the United States has their own set of green marketing criteria, in order to comply with Federal Trade Commission guidelines (Polonsky, 1994), they are:

- Clearly state environmental benefits – The final product should address the advantages to the environment
- Explain environmental characteristics – Able to understand the qualifications of environment requirements
- Explain how benefits are achieved – Describe the advantages of their green product
- Ensure comparative differences are justified – Dissimilar of the product are clearly legitimate
- Ensure negative factors are taken into consideration – Deliberation of the negative factors in product development
- Only use meaningful terms and pictures – Tempt the customers by using the attractive manner

Green homes principles are needed to make sure that the environment is safe and both the alternative, the natural resources are being conserved and used in efficient ways. If these principles are taken seriously, both the present and future generation will benefit from green developments. Developments of green homes are clearly needed in the market. The fact that the demands related to green homes like the designs for green homes have not yet been met in satisfactory manner has resulted in many of the current assessment methods such as BREEAM being used in practice as design guidelines (Crawley and Aho, 1999). Green homes is the ones technique to solve human and environment problems in housing development.

The Elements of Green Homes Project:

The main reasons for the people in developed countries have adapted the benefits of green homes are because of the lowering of the operating cost, reducing the consumption of resources, providing healthier working and living environment and reducing waste. This study discussed on the criteria of green homes which are community design and planning, efficient usage of resources, use of alternative resources, natural system, protection and safety, and reusing and recycling approach.

Community Design and Planning is the arrangement of the housing community by considering the human needs, protection and safety, and to make it convenient in the future. It has been represented by the four categories namely public infrastructure, community design, design for safety, and adaptable building.

Public Infrastructures:

Public infrastructures that are pleasant and convenient to the community should be able to satisfy their desires. According to Walsh, *et al.* (2006) there is a desire for transportation among the house buyers to help them to overcome the distance that separates their homes from the places where they work, shop, seek medical attention, go to school, do business, or visit friends and relatives. In site selection, the infrastructures that are already existed will influence the environment, economy and social activities in the area for new developments. The incorporation of sustainability principles in the neighbourhood design is important because many of the problems encountered at the macro-city scale are in fact cumulative consequences of poor planning at the micro neighbourhood level. Neighbourhood-scale analysis is necessary to evaluate and to develop more efficient and sustainable local urban infrastructures, including buildings, transportation, urban vegetation, and water (i.e., water supply, wastewater, and storm water) systems (Engel-Yan, *et al.*, 2005). As a consequence, providing sustainable housing cannot be accomplished without providing an adequate transportation system. The recent study shows the importance of infrastructures in green homes or sustainable housing areas. The completion of infrastructures in sustainable community area will save a lot of energy and conserve the environment through efficient planning and design.

Community Design:

The harmonization of the community is related to the design of the housing development in which the design will influence human life. According to Toker (2007) who defined community design as the involvement of local people in the social and physical developments of the environment that they are living in. Sustainability is one of the major characteristics of community design which will affect the surrounding of the development area. Ding (2008) suggested that the most effective way in achieving sustainability in a project is to consider and to incorporate environmental issues at a stage even before a design is being conceptualised. Human and organizational needs have to be understood because the benefits of green homes demand for a broader perspective that links the building design, organizational performance, and human factors research (Omer A. M., 2008 and, Wedding and Crawford-Brown, 2007). The community design is a part of the green home components and all the factors that are related to the human and environment.

Design for Safety:

Many types of crime prevention procedures have been done to make sure that the housing area is always a safe area. Natural surveillance has been practised in Crime Prevention through Environmental Design (CPTED), Secured by Design (SBD) and Defensible Space (DS). Natural surveillance is an important dimension since the criminals do not generally wish to be observed and apprehended. The configuration of physical features, activities and people, in ways that maximise the opportunities for surveillance can act to discourage crime. Desyllas, *et al.* (2003) defined natural surveillance as the overlooking of public spaces by members of the public in the course of their day-to-day lives.

Adaptable Building Design:

According to Russel and Moffat (2001), and Arge (2005) adaptable building design is the generality in which the ability of a building to meet the changing functional users' or owners' needs without changing its properties. This element will help the future generation to fulfil their needs during that time without causing damage to the building and environment. Adaptable buildings are sustainable buildings and this is why

adaptability ought to be an important element in all real estate developers' agenda, regardless of time and market perspectives (Arge, 2005).

Efficient usage of the resources will help to conserve the environment, save the resources and reduce the financial cost. There are three key resources in this study whereby water, energy and materials.

Water Efficiency:

Water is very important in our daily lives. Water scarcity can impact society in different ways: for example, it can limit both population and economic growth, endanger wildlife and reduce the domestic gardening for home-grown food (Ryan, *et al.*, 2009). Realising the growing scarcity and rising cost of water have resulting to water allocation and usage more efficiently. Therefore, in order to ensure sustainable usage and efficient allocation, minimise wastage, providing incentives for the development of water-efficient technologies, and enforce reusing and recycling, markets and prices can be used.

Energy Efficiency:

Energy efficiency gives big meaning in construction industry where it can help to reduce a lot of development cost. The theory of green buildings includes a lower environmental load, higher energy efficiency and resources saving throughout a building's whole life cycle and provides comfortable, safe and healthy environments for people (Xia, *et al.*, 2008). It should be considered during the beginning of the project and until the customer finally stay in their home without the high monthly utility bill. Designing low-energy buildings in high density areas requires a special treatment of the planning of urban structure, co-ordination of energy systems, and integration of architectural elements and utilisation of space. As building design need to consider requirements and constraints, such as architectural functions, indoor environmental conditions, and economic effectiveness, a pragmatic goal of low-energy building are also needed to achieve high energy efficiency, which requires the lowest possible need for energy within the reason of economic limits (Omer, 2008).

Material Efficiency:

By considering the best and qualified material will improve the efficiency usage of that material in construction. A thermal insulation system includes the external walls, windows, roof and floors of a building as the largest areas of heat loss. To upgrade the insulation system in existing buildings, techniques like roof insulation, cavity fill, double-glazing, internal wall lining and exterior wall cladding can be used (Omer, 2007). This technique can be utilized to reduce the utility cost during the building operation.

Use of Alternative Resources will help the developers to use less main resources in building houses with more options. This study found three alternative resources namely water, energy and material.

Water:

All living creatures in the planet need water to survive. Human is the highest water user on earth. The sources of water are surface water, rock catchment areas and rock holes, river or lakes, excavated dams, rainwater tanks, bores and wells and artesian bores. The responsibility of the local people for water provision and they invested in small scales. For the alternative water is greywater. The usage of greywater presents the demand for water management system and also contributes to reduce the usage of fresh water for irrigation. Therefore, in order to ensure water sustainability, the usage of greywater need to be coincidental with the water-sensitive garden design and growing food in open spaces at home and public. Recent developments in technology and changes in the attitude towards water usage suggests that there is a need for the usage of greywater in developing countries (Al-Jayyousi, 2003).

Energy:

Human can live without energy but it is in fact a part of people's life. Human needs energy to fulfil their desires and to make their life conducive. Energy is very essential to the functioning of many cities. It provides services that underpin economic activities and enables the residents to meet their basic needs such as foods, shelters, health, education, and mobility (Walsh, *et al.*, 2006). Renewable energy is a form of sustainable energy and the term renewable energy is being used to describe a wide range of naturally occurring, replenishing energy sources (Omer, 2008). Recently, there has been an increase in the research directed at the progression of technologies that can provide reduction in energy consumption without decreasing the satisfactory level of thermal comfort in buildings.

Material:

In producing a construction product the most important thing is material. The material will affect the quality of the final product in terms of its quality, prices and safety. To save the resources and earth, the construction industry should use alternative materials such as biomass, bioplastic and bioasphalt. Obata, *et al.* (2005) suggested that the concept of "sustainable development" has been applied seriously on resources, energy, and

environments whereby the essential commodities for continuous development of human society. To use the resources without damaging the environments is a very big challenge. Minerals such as metals, oils and gasses are important resources for engineering and energy generation industries. The renewable materials are materials that can be formed again in a short period of time naturally and the reformation only gives little impacts on the environments.

Natural System is the technique to use the environment as the basic to produce the energy and also to reduce the usage of energy. According to Oktay (2002), the consideration of the local climate should address both positive and negative aspects of the site. For example, the building orientation will take advantage of free energy from the sun in terms of both heat and light if it is appropriately designed. In a hot and humid country for instance Singapore, the most cost-effective way is natural ventilation to minimize the physiological effects of high humidity in achieving acceptable indoor thermal conditions.

Protection and Safety is one of the criteria in green homes that is related to the awareness among the house buyers to live in a secure zone. Paul and Taylor (2008) asserted that for green homes to be more comfortable and satisfying than any conventional buildings there must be some features that are unique, or at least extraordinary, to their designs that could contribute to a better indoor environmental quality. By using the low-toxicity finishes and furnishings which could result in better air quality is the best solution in practices. This statement is related to the suggestion by Omer (2008), he says that if green homes employed low-toxicity finishes and furnishings, their air quality will be perceived as better than those of conventional buildings.

Reusing and Recycling Approach is regarded as an emerging trend, beginning with the society in 1970s, and actually come into force during the early 1990s. Reusing and recycling approach is one of the element in green homes that should be considered by developers during the housing development. Pappuet *al.* (2007) mentioned that the use of some of the industrial waste as a cementation/raw material or additives could be realised in manufacturing blended cements, concrete, bricks and aggregates. All the recycle and reusing materials will reduce the cost of construction and the developers will be able to sell the houses in a very reasonable price. Moreover, the concerns of the citizens in developing countries about the environments and waste separation are related to the perspectives of their governments in implementing the agenda.

Table 1 shows the criteria of green homes from the synthesis of the literature review whereby it consists of six elements, firstly, the community design and planning, efficient usage of resources, use of alternative resources, natural system, protection and safety, and reusing and recycling approach. All the developed countries have their own criteria and their criteria are related to each other. The main purposes of the criteria are to save energy, to use resources in the efficient manner and to conserve the environment.

Table 1: Criteria of Green Homes that had been Practices in the Developed Countries

Criteria	Portland, Oregon, United States 2002	Berkeley, California, United States 2003	Berkeley, California, United States 2004	San Mateo, California, United States 2004	(Walsh, <i>et al.</i> , 2006)	Captiola, California, United States 2004	LEED, United States 2010	BEA M, Hong Kong, 2010	Dangelico and Pontrandolfo 2010
Community Design and Planning									
- Public infrastructure	X	X	X	X	X	X	X	X	
- Community design	X	X	X	X		X	X	X	
- Design for safety	X	X	X	X		X	X	X	
- Adaptable building			X					X	
Efficient usage of resources									
- Water									
- Energy	X	X	X	X	X	X	X	X	X
- Material	X	X	X	X	X	X	X	X	X
-	X	X	X	X		X	X		X
Use of alternative resources									
- Renewable water		X	X			X	X	X	X
- Renewable energy		X	X	X		X	X	X	X
- Renewable material	X			X		X	X	X	X
-	X			X		X	X	X	X
Natural System	X	X	X	X		X	X	X	X
Protection and safety									
- Design									
- Product	X	X	X	X		X	X	X	X
-	X	X	X	X		X	X	X	X
Reusing and recycling approach	X	X	X	X	X	X	X	X	X
Others									
- Operation and maintenance	X	X	X			X	X	X	
- Innovative design							X	X	

Urrtent Green Home Practices In Malaysia:

Developers in Malaysia recently prefer to produce housing by using green home concept even though they do not really know much about the concept. The green home concept is part of a sustainable development in which the concept focuses more on saving costs, preserving natural resources, saving energy and providing comfort. A part of the concept, recycling has been implemented since many years ago but not by every household. In 2009, Malaysia has launched GBI for players in construction so that the criteria of green home developments in developed countries could be applied. In the other words, Malaysia already has a green building index to make sure that everyone in the construction industry will take sustainable development

critically. Table 2 present the GBI certified project by rating categories. From the table shows the category of residential new construction which for platinum has 2, gold has 17, silver has 9, and certified has 43. Malaysia growth fast in development of green homes but the development is not based on the house buyers needs. GBI provide guidelines to the developers to build green homes but they also need to understand the house buyers' requirements together with the concept of green homes. Green design ensures cost savings by providing environmental upgrades in an organization while facilitating the organization's commitment to social responsibilities. Green movements provide a lot of opportunities to the manufacturers or developers to produce green products like green homes because they are still new in Malaysia. In this study the criteria of green homes have been developed based on the needs of house buyers in Malaysia. These criteria are believed should be able to help developers to promote Green Homes in the market.

Table 2: GBI certified projects by rating categories.

RATING	TOTAL as of 15 SEPTEMBER R 2013	NRNC Non Residential New Construction	RNC Residential New Construction	INC Industrial New Construction	NREB Non Residential Existing Building	IEB Industrial Existing Building	T Township
PLATINUM 86 to 100 points	7 (4%)	3	2	-	1	-	1
GOLD 74 to 85 points	39 (25%)	22	17	-	-	-	-
SILVER 66 to 75 points	22 (14%)	10	9	-	1	-	2
Certified 50 to 65 points	91 (57%)	40	43	2	4	1	1
Total Certified	159	75	71	2	6	1	4

Green Homes and House Buyers' Perception:

According to several researchers, green products is now growing rapidly in the market. This signifies that they could be the most promising products in the future. Nowadays, people think more about their future and will try to find better ways to live. Moreover, in distributing green products, companies will emphasize on several aspects like design, production, packaging, usage, and disposal, so that they can protect the environment and encourage the consumers to have positive attitudes towards it. In other words, the implementation of green marketing will reduce the negative impacts of the industry to the environment. Green products are environmentally friendly products that carry out little or no danger at all to the environment and can be reused and recycled. *'If society prefers a more conserving and sustainable economy, then businesses will have an incentive to develop "green" technologies and product; if consumers are "green", then it will be profitable for the businesses to become "green"; if society cares little about conservation, and is blind to the environmental costs of economic growth, then businesses cannot be entirely blamed for a materialistic culture whose commercial values reflect popular demand'* (Roarty, 1997). This shows the importance of social awareness in the growth of green products for environmental conservation. The growth of green products is based on the awareness among the society and it is closely related to the green market that opens the opportunities to the manufacturers or developers.

House Buyers' Perceptions:

Perception is having or showing keenness of insight, understanding, or intuition of the problem involved. In this study, house buyers' perceptions is about the thoughts of the house buyers regarding the green homes projects whether it is positive or negative insight on the green homes. Furthermore, the consumers who are environmentally aware have high possibility to purchase green products and they feel constrained by their efforts to protect the environment. In other words, the behaviours of house buyers are very important in making sure that the green products will succeed and further improving green businesses. In a study on customers' behaviours, there are seven demographic variables which are age, gender, income, level of education, employment status, home ownership, marital status and family size should be considered. Demographic variables are very important in providing a research to find the characteristic of people regarding several issues. As suggested by Tadesse (2009) found that "younger age" has a positive relationship with the "concern of the environment." This means, younger people are fundamentally more sensitive to the environmental issues. In the other words younger age could significantly positively impact the probabilities of consumers in making decisions when purchasing green products. In term of gender factor, most researchers supported that women are

more likely to consume green products than men. Yet, some have argued that men are better than women in green movements. However, being married consumer does have a slight impact on the probabilities to purchase green products. Means that marital status still affect people's consciousness on environmental matters.

Levy and Lee (2004) suggested that parents will put into consideration of their children needs in making decision to purchase a house. Criteria like how many bedrooms, location close to a school, safe environment, near to a bus stop and size of the yard will be considered. If the parents take a look at their children's future, they will start to recognize and respond to green products. Moreover, this study also believed that people with higher education are more understanding on the issues for instance the environmental problems. They are more concerned about the environment and motivated to be responsible for the environmental changes. Moreover, people with superficial behaviours like better education have a positive relationship with the "concern for the environment." Postgraduates are significantly and positively giving impact to the probabilities to purchase green products. House buyers' education with respect to recycling, lower prices, or differentiating products with high prices and higher quality is the best way that businesses and governments should take towards achieving proactive environmentalism. By understanding deeply on the issues regarding the environments, they will get the motivation to conserve the environments. According to Amin *et al.* (2006) who suggested that household income is the total income of all family members. Others suggested that people with such superficial behaviours such as high-income people will have the higher tendencies to protect the environment. Several educated person also supported that high-income people will have a higher purchasing power rather than the low-income people to support green products in the market. In other words, for low-income people the price limitation prevents them to pay more for green products. However, the income issue is not strong enough to affect on the probabilities of purchasing green products among the consumers.

Hence, people with higher incomes are the main supporters for green products because they have the purchasing power in the green market. Yet, the responsibility to protect the environment does not only lies on the hands of the rich people. Therefore, people with low incomes should also be considered in the process of producing green products maybe in the other ways.

The property market is considered efficient when the market price of a transacted property is equals with its market worth. When this condition exists, then identical properties should have been sold or let for the same prices. From the points of view, the perception can be analyzed on every people because they have their own perception on choosing green homes which are basically based on their behaviour and life style conditions.

Integration of Green Homes and House Buyers' Perception:

In term of integration, green homes is widely and globally accepted and that it is already a norm in the developed countries such as the USA, Germany, Australian and Japan. Roarty (1997) supported this by stating that the market for green products and services in the Western Europe, Japan and North America is growing exponentially. Housing act in Malaysia was developed in 1966 and since then, housing schemes have become a serious agenda. Every year housing development in Malaysia has been increased but the developed houses are still not enough to balance out the increasing population. Unfortunately, the mass development of green homes is still a rarity, and it is only built for individuals who approach the developers and making private demands. Recently, the status and acceptance of green homes development has been elevated to a higher level by a property developer in Melaka. Nevertheless, the concept is still relatively new in this country, so the proponents of the green homes need to double their efforts in making the homes a norm in the Malaysian housing development industry. Housing development in Malaysia has gone through the process of evolution through which the development has changed from small scale to large scale. There is indeed an obvious growth in housing development in general. However, the development of green homes is still considered new- only some developers in Malaysia has practiced the concepts of green homes by developing solar powered homes, and creating small gardens in housing and etc. Housing developers still do not know the most suitable criteria for the house buyers to implement the green homes concepts in Malaysia. There is however, a similarity between the development of green homes in the developed nations and in Malaysia. Despite the good examples shown by the few successful projects, there have been little efforts to mass-develop green homes so that these houses can be bought easily by the house buyers. Because of this scenario, a marketing research focusing on reducing the uncertainties associated with new products such as green homes need to be carried out by any developer to make these houses attractive to the house buyers. Means that, green homes has built a better perception among house buyers nowadays and leads them to purchase it.

Since Malaysia got the independence in 1957, there is a growing improvement in housing development in Malaysia and many mega projects have been completed such as Kuala Lumpur International Airport (KLIA), Penang Bridge etc. Table 1 shows that from the study, there are six elements in green homes development which are community design and planning, efficient usage of resources, use of alternative resources, natural system, protection and safety and reusing and recycling approach. Based on the population by age group from 1963 to 2008 in Malaysia, this shows that the house buyers in Malaysia, from 18 to 65 years old, can make a loan to buy houses. From the study, in 2008, there are 17, 620 200 people can be categorized within the age group of 15 to

64 years old. This means that a lot of potential buyers in Malaysia could be involved in a housing scheme and loan programs. Every year this age group grows by 380,000 people and this scenario shows that developers need to prepare themselves with knowledge in building houses that can gratify the potential house buyers. The developers need to study their customers' needs and plan on how to create the best products in the market. Furthermore, as the six elements have been discovered, the house buyers in Malaysia should be more motivated and impressed to buy green homes because of the benefits. At the same time, this will improve and enhance the house buyers' perceptions regarding the green homes as they had clear vision on the green homes concept.

Discussions and Recommendations:

Green homes has been acknowledged as one of today's most discussed issue with many implications in a variety of contexts such as in the USA, Germany, Australia and Japan. They are also gaining popularity in the developing countries like in Malaysia and Singapore. Moreover, a growing public awareness and understanding of environmental issues and their impacts on human health and the quality of life are generating higher expectations for green homes on social, environmental and economic standards and for more systematic solutions from the governments, industry and other stakeholders. In response to the need for new approaches in green homes development, the role of the government requires some changes. Malaysian should change their perception on choosing green home as their place to stay for better quality of life. A researcher points out that the most important objective in the construction industry is building houses or buildings that are environmentally friendly. This suggests that Malaysian housing developers should apply the green homes concept to ensure a harmonious life for everyone in the country.

Figure1 illustrates the theoretical relationships between the green homes criteria and the requirement of green homes among house buyers. After the literature reviews have been completed, the criteria of green homes have been examined, identified, selected, and synthesized. The criteria are being represented by these variables: (1) community design and planning, (2) efficient usage of resources, (3) use of alternative resources, (4) natural system, (5) protection and safety, and (6) reusing and recycling approach.

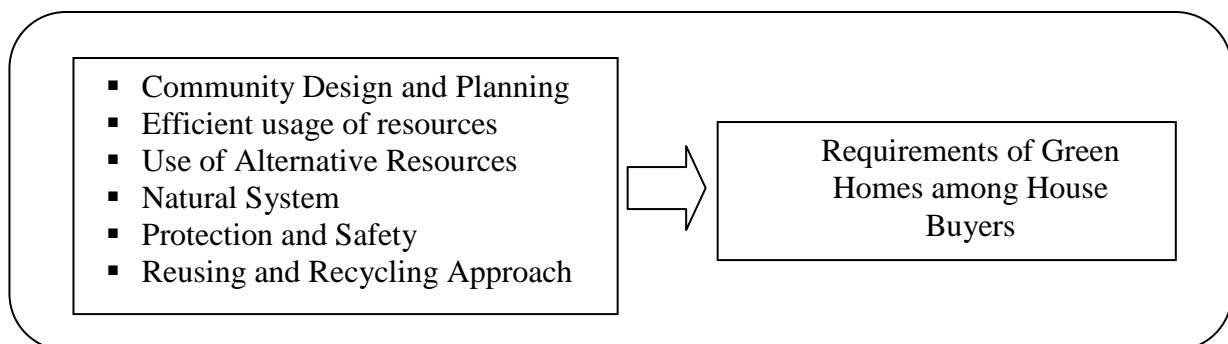


Fig. 1: Criteria of Green Home Development Influencing House Buyers' Perception

Conclusion:

As the green homes havenow become popular in Malaysia, Malaysian has slowly changed their perception on the green homes. House buyers are now considering on buying a sustainable housing for their better and healthy life style. But then, there are still a large group of people who are stillnot aware about the green homes development and they should be given more opportunity to know more about green homes in detail so that it can be easier for them to make a decision in purchasing a house. In other words, house buyers must be given more knowledge on the consumers' information. The perception of the house buyers are also being influenced by the income level where less wealthy buyers are more sensitive to house prices and fulfilling their basic accommodation needs. The findings in this study, suggest that the community design and planning, efficiency usage of resources, use of alternative resources, natural system, protection and safety, and reusing and recycling approach can improve the house buyers' perception of green homes in Malaysia.

Research Limitations and Future Study:

The current study has some limitations that offer a direction for future research. The study also has evaluate on the current literature related to thegreen homes development, house buyers' perceptions and housing industry, particularly in Malaysia. As a result, future study should try to provide more green house criteria that can enhance house buyers to give better perceptions.Since the topic is too large and not much is known about green homes in Malaysia, the study has some limitations. A green home framework or model is not currently available for the developers to be used as a guideline. Therefore, it is highly expected that the recommendations from this study will be useful for future housing developments. Besides, green homes development as a highly

related practices in order to change house buyers' perception should also be considered and the quality of the green homes as an effective sustainable achievement should be evaluated in future study. Future research should also try to address on how housing companies and government should adapt to and shape the environmental and organizational settings in such a way that the context optimally stimulates sustainability imperatives through the housing projects.

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